SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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DEP: 2020 DIRECCION DE NUEVAS CREACIONES **EVE:** 378 FASE NACIONAL INCLUIDO CAPITULO I
TRA: 11 PCT-PATENTE DE INVENCION CAPITULOS I Y II **FOLIOS**: 5
ACT: 430 REQUERSOLICITA

DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado(a)/Señor(a)
CARLOS R. OLARTE GARCIA

Asunto: Radicación: 14-84688- -4
Trámite: 11
Evento: 378
Actuación: 430
Oficio: 5203
Folios: 5

Patente de Invención	**X**			Patente de Modelo de Utilidad	
Vía Nacional					
Vía PCT (Fase Nacional)	**X**	Capítulo I	**X**	Capítulo II	
No. Solicitud Internacional	PCT/US2012/061379				
Fecha de Presentación Internacional	22/10/2012				

Como resultado del examen de fondo realizado, con fundamento en el Artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se comunica:

1. Documentos estudiados

Descripción:	Rad. N° 14-084688-00000-0000	21/Abril/2014
Reivindicaciones:	Rad. N° 14-084688-00000-0000	21/Abril/2014
Dibujos:	Rad. N° 14-084688-00000-0000	21/Abril/2014
Prioridad:	US 61/549.345	20/Octubre/2011

2. Objeto de la invención

De acuerdo con lo establecido en el numeral 1.2.2.2 del Capítulo Primero del Título X de la Circular Única para efectos del examen de patentabilidad, se tendrá en cuenta la tasa pagada por el solicitante al momento de comenzar el examen para las reivindicaciones adicionales; esto es que cuando la solicitud contenga más de diez (10) reivindicaciones y no se haya pagado la tasa complementaria, sólo se estudiarán las cubiertas por la tasa pagada. Por lo tanto, se estudiaran las reivindicaciones 1 a 10.

Título de la solicitud: “Una herramienta de mano para cortar vidrio laminado” (Fl. 1).

El problema planteado en esta solicitud, consiste en lograr un aparato y un método para cortar el vidrio laminado y vidrio cubierto de película, como los utilizados en parabrisas de automóviles y ventanas arquitectónicas.

Para resolver este problema técnico, la solicitud en estudio una herramienta de corte de mano que comprende un alojamiento que incluye un mango, un sistema de accionamiento y un conjunto de cuchillas unidas al alojamiento.

El objeto de la presente solicitud se relaciona con la Clasificación Internacional de Patentes (CIP): B 26 D 1/00; C 03 B 33/07.

3. De la solicitud de patente

Reivindicaciones (Art 30 D 486, Art 22 PCT)

El capítulo reivindicatorio no es claro porque:

- La reivindicaciones 4, 6 y 8 y las expresiones: *"…que se puede agarrar…"*, "…en donde la operación de motor corresponderá a la cuchilla de corte dinámica entre las cuchillas estáticas." (reivindicación 1), "…cada borde de corte cortado de la cuchilla dinámica cooperando con un borde de corte cortado de una cuchilla estática." (reivindicación 5), *"…a través de donde el corte se produce tal que el corte ocurre generalmente en la arte más gruesa de las cuchillas*." (reivindicación 10); describen funciones, efectos, ventajas o resultados a alcanzar, los cuales no son aspectos susceptibles de patente. Para mayor claridad, el producto reclamado se debe definir técnicamente mediante sus características estructurales. Se sugiere al solicitante eliminar las reivindicaciones y expresiones citadas.

- La reivindicación 5 incluye la expresión *"…incluye un par de lados opuestos de bordes de corte cortados de la cuchilla dinámica…"*, la cual es de carácter general y sugiere de forma imprecisa que la protección se extiende a otras posibles variaciones o modificaciones, lo que no permite compararlo con el estado de la técnica. Asimismo, dicha expresión no cumple con lo establecido en el artículo 30 de la Decisión 486, por cuanto no se exponen de forma clara las características constructivas de los lados opuestos de bordes de la cuchilla. Es decir, la expresión citada no es suficiente para comprender la configuración del elemento al que se refiere. Se sugiere al solicitante replantear esta reivindicación exponiendo detalladamente las características estructurales incluidas en la reivindicación citada.

- El término: "aproximadamente" (reivindicaciones 2, 7, 17, 19), es impreciso, por lo cual no permite distinguir la invención del estado de la técnica. Se sugiere sustituirlo por un término preciso o un rango concreto.

- Se sugiere hacer la conversión de unidades (reivindicaciones 2, 3, 7, 20), al Sistema Internacional.

4. Determinación del Estado de la Técnica

El estado de la técnica se determinó con base en la fecha de presentación de la solicitud de prioridad: octubre 20 de 2011, y se encontraron los siguientes documentos que anticipan el objeto de esta solicitud:

Ítem	Documento	Título	Fecha de Publicación
D1	US 2003/0029043	'Extended life cutting blades for hand-held cutting tools'	13/Febrero/2003
D2	WO 2006/104523	'Waste ejecting blade assemblies for hand-held cutting tools'	05/Octubre/2006

El documento D1[1] divulga una cuchilla de vida extendida que es adaptada para ser montada en una herramienta de corte de mano con múltiples orientaciones operativas (resumen).

El documento D2[2] divulga cuchillas eyectables para herramientas de corte de mano y métodos para cortar materiales como fibra-cemento (resumen).

5. Examen de Patentabilidad (Art 14 D486)

Novedad (Art 16 D486)

La reivindicación 1 consiste en: "*Una herramienta de corte de mano, que comprende: un alojamiento que incluye un mango que se puede agarrar;...*" (Ver página 26 del radicado Nº 14-084688-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D1	D2
Una herramienta de corte de mano caracterizada por:	Herramienta de corte de mano (10) caracterizada por:	Herramienta de corte (10) de mano caracterizada por:
Un alojamiento que incluye un mango.	El alojamiento (22) preferiblemente tiene un mango (27) (Párr. [0022]).	El alojamiento (22) preferiblemente tiene un mango (27) (Párr. [024]).
Un sistema de accionamiento contenido dentro del alojamiento incluyendo un motor y transmisión.	La salida de la unidad de motor (20) puede ser convertida en un movimiento reciproco con una cabeza (30) teniendo una carcasa (32) y un ensamble conductor reciprocante (36) (Párr. [0023]).	La salida de la unidad de motor (20) puede ser convertida en un movimiento reciproco con una cabeza (30) teniendo una carcasa (32) y un ensamble conductor reciprocante (36) (Párr. [025]).
Un conjunto de cuchillas unidas al alojamiento, incluyendo un par de cuchillas de corte estáticas que sobresalen hacia el exterior del alojamiento y una cuchilla de corte dinámica situada y acoplada operativamente a las cuchillas estáticas y acoplada a la transmisión.	Un conjunto de cuchillas (50) con una primera cuchilla (60a), una segunda cuchilla (60b) y un miembro de corte (90) entre la primera y segunda cuchillas (60a) y (60b) (Párr. [0024]).	Un conjunto de cuchillas (50) con una primera cuchilla (60a), una segunda cuchilla (60b) y un miembro de corte (90) entre la primera y segunda cuchillas (60a) y (60b) (Párr. [026]).

1 https://www.google.ca/patents/US20030029043?dq=2003029043&hl=es&sa=X&ei=yqJGVcTCHsuZNrK7gYgM&ved=0CCYQ6AEwAQ

2 https://www.google.ca/patents/WO2006104523A3?cl=en&dq=WO2006104523&hl=es&sa=X&ei=1ahGVf-nPIGNNr_sgHA&ved=0CB0Q6AEwAA

De acuerdo con la tabla anterior, las características esenciales de la herramienta de la reivindicación 1 habían sido divulgadas previamente en los documentos D1 y D2, por lo tanto, la materia reivindicada no es nueva.

Asimismo, los documentos D1 y D2 divulgan las características de las reivindicaciones dependientes así:

- Reivindicaciones 2, 3 y 7: el primer lado de la superficie de la cuchilla es distanciado de la superficie interior del primer dedo por 0.040 – 0.055 pulgadas. La superficie superior de la cuchilla reciprocante puede ser de entre 0.140 y 0.165 pulgadas (D1: Párrs. [0007] y [0008]).

- Reivindicación 9: Cada cuchilla incluye una punta despuntada (D1: Figs. 4a – 4c).

- Reivindicación 5 y 10: El borde a través de la superficie superior (96) y la primera superficie lateral (94) define un primer borde de corte (97) de la cuchilla reciprocante (D1: Fig. 1; Párr. [0025]; D2: Fig. 2).

Las reivindicaciones 4 a 6 y 8 están afectadas en el numeral 4 de la presente comunicación.

6. Conclusión

Los requisitos de Patentabilidad de la presente solicitud están afectados así:

Ítem	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	US 2003/0029043	1 a 10	Novedad/Nivel Inventivo
D2	WO 2006/104523	1 a 10	Novedad/Nivel Inventivo

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta (60) días contados a partir del día siguiente de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Se invita al solicitante se sirva indicar, si así lo considera, su renuncia al término faltante de sesenta (60) días para dar respuesta a este requerimiento y presentarla por escrito.

Finalmente, se le recuerda al solicitante que si como respuesta a este requerimiento llegara a modificar el capítulo reivindicatorio y éste contenga más de diez (10) reivindicaciones, no pagará la tasa de modificación voluntaria pero sí la correspondiente al pago por reivindicación adicional.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única No. 10 de 2001.

JOSÉ LUIS SALAZAR LÓPEZ
Director de Nuevas Creaciones (c)

El anterior requerimiento fue notificado por fijación en lista, de fecha 2015-05-19

Elaboró: Monica Andrea Gutierrez Almonacid
Revisó: Sonia Andrea Diaz Pirazan

US 20030029043A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2003/0029043 A1**

Fladgard et al. (43) **Pub. Date: Feb. 13, 2003**

(54) **EXTENDED LIFE CUTTING BLADES FOR HAND-HELD CUTTING TOOLS**

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(22) Filed: **Aug. 11, 2001**

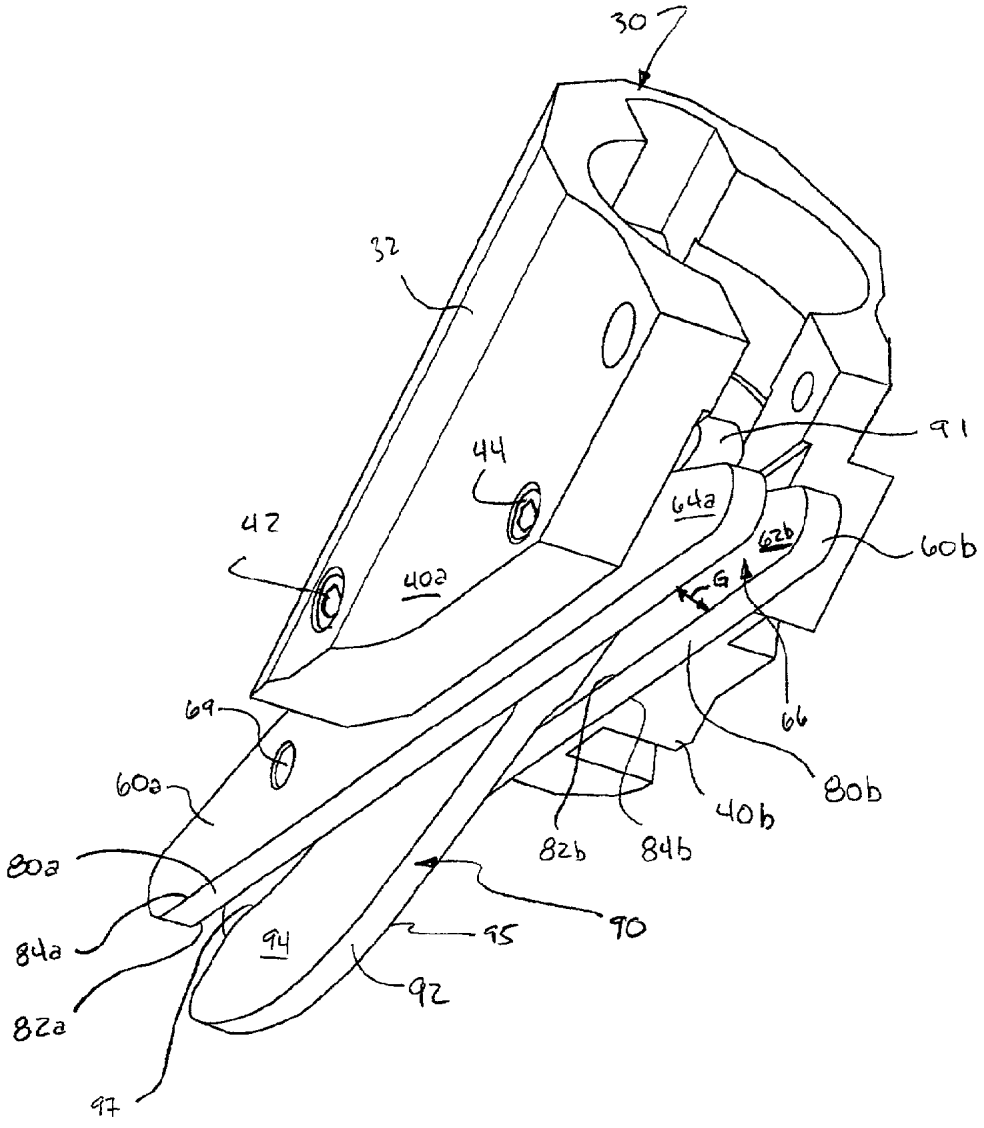
Publication Classification

(51) **Int. Cl.**[7] **A46B 13/00**

(52) **U.S. Cl.** **30/228**; 451/356

(57) **ABSTRACT**

An extended-life cutting blade is adapted for mounting on a hand-held cutting tool in multiple operative orientations. A single cutting blade may provide up to four independent shear edges, each of which has a useful life. The blade can be easily changed from an orientation adapted to cut a workpiece with one shear edge to a different operative orientation adapted to cut with a different shear edge by selecting an appropriate mount on the blade.



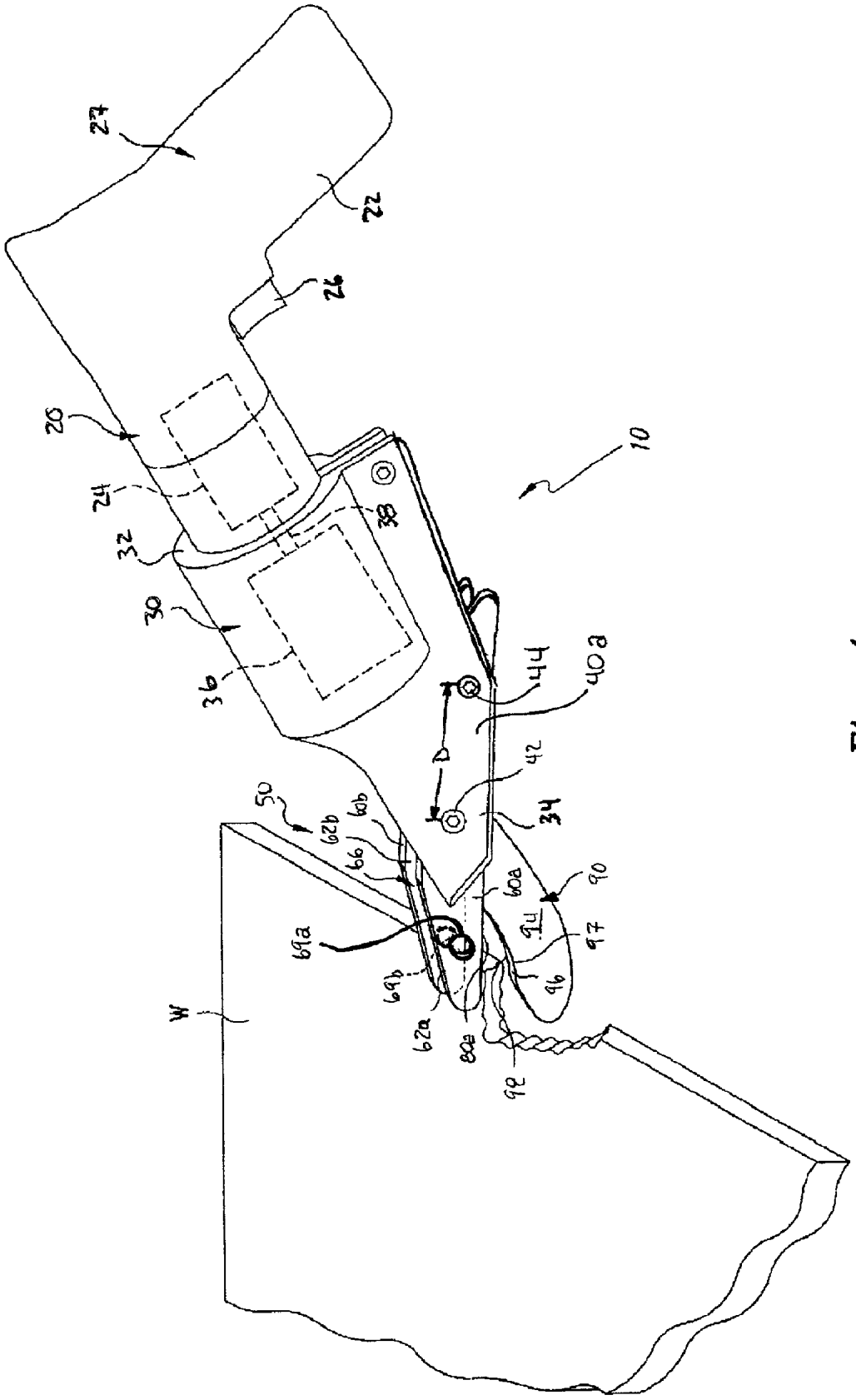

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Fig. 1

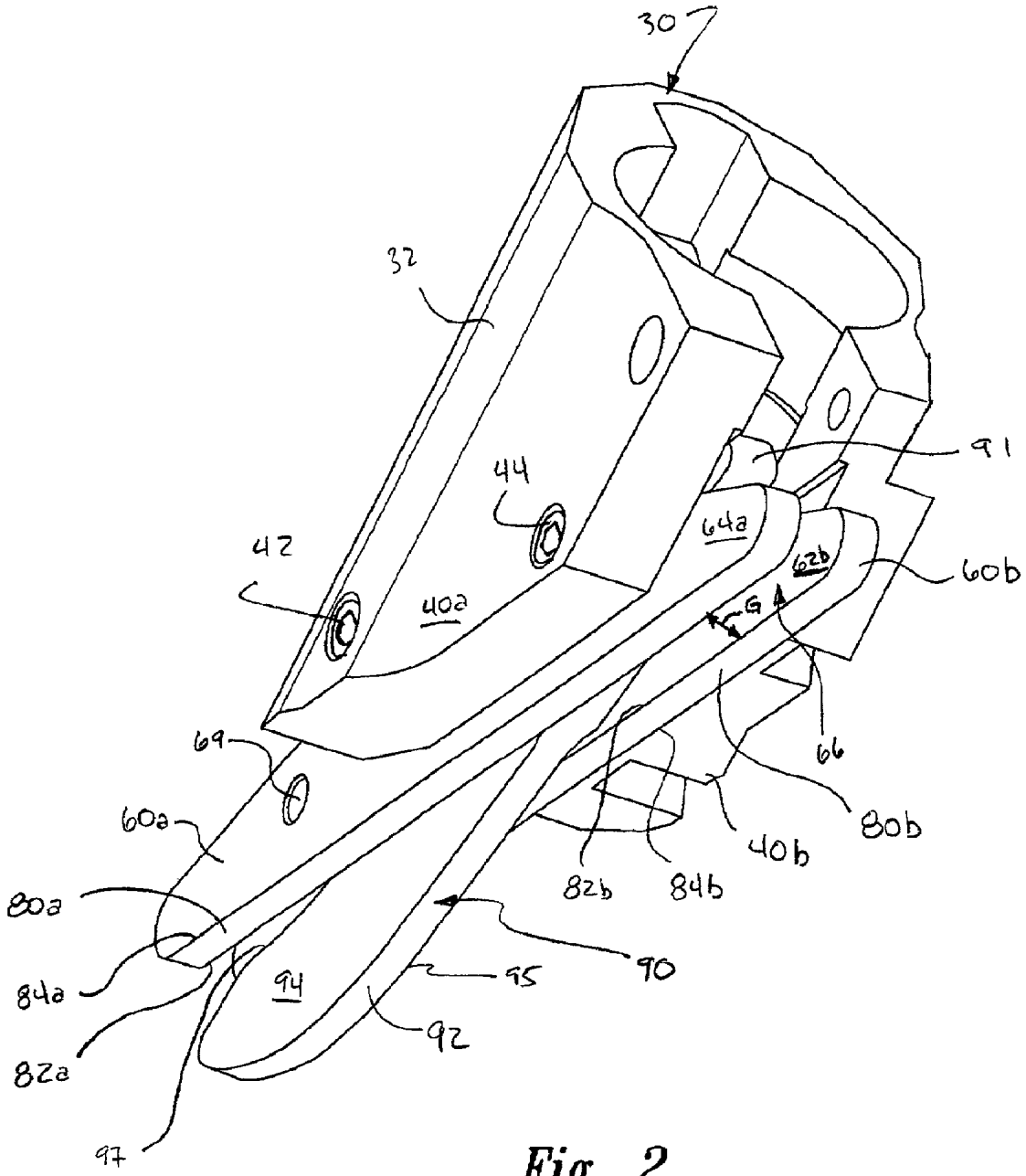
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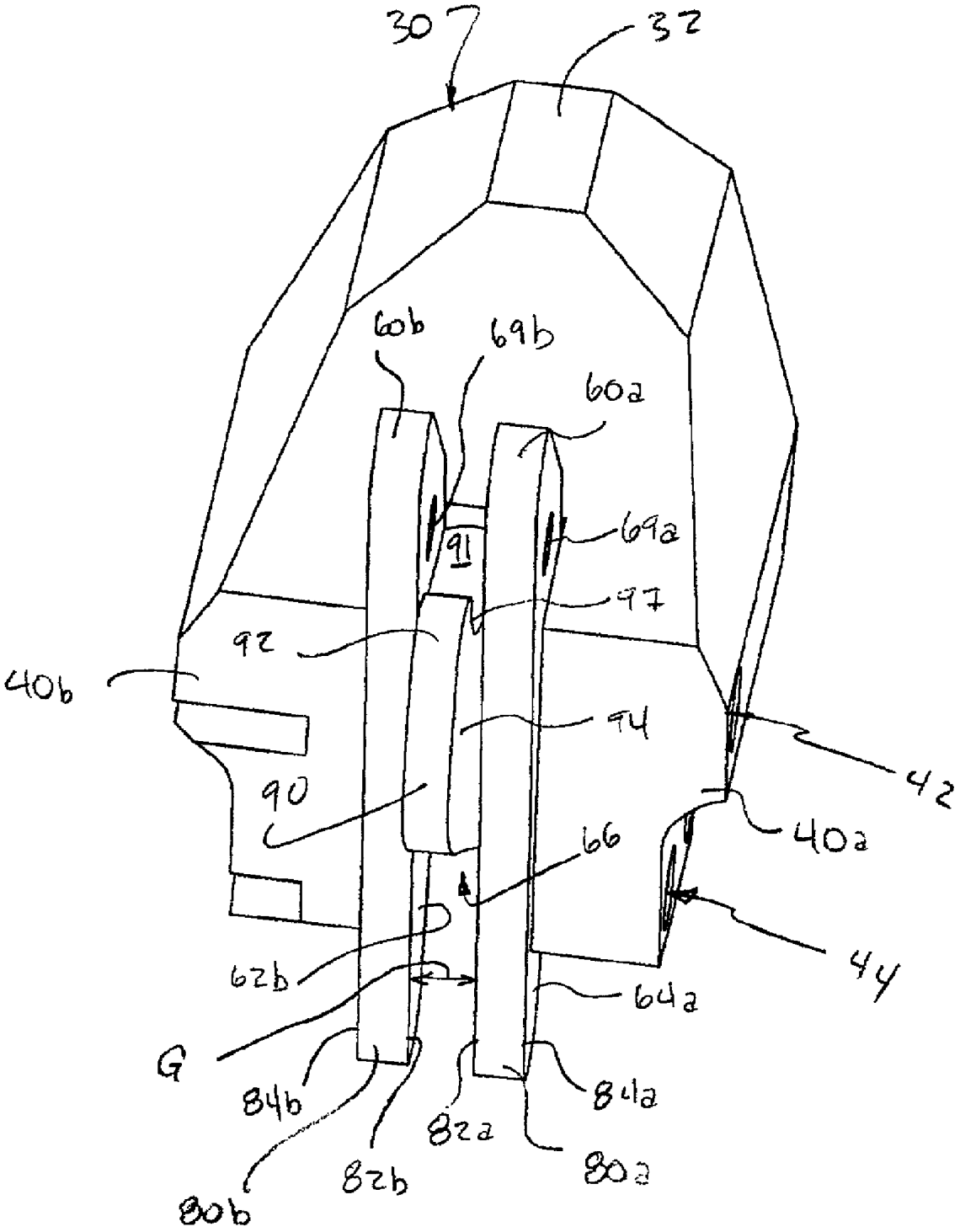
Fig. 2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80a
80b

Fig. 3

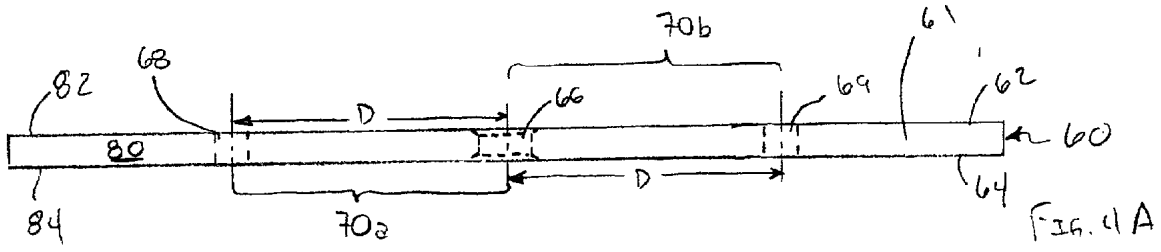


FIG. 4A

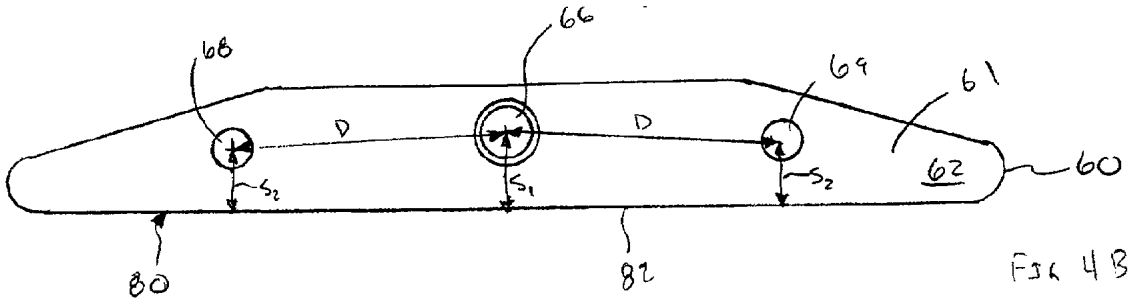


FIG 4B

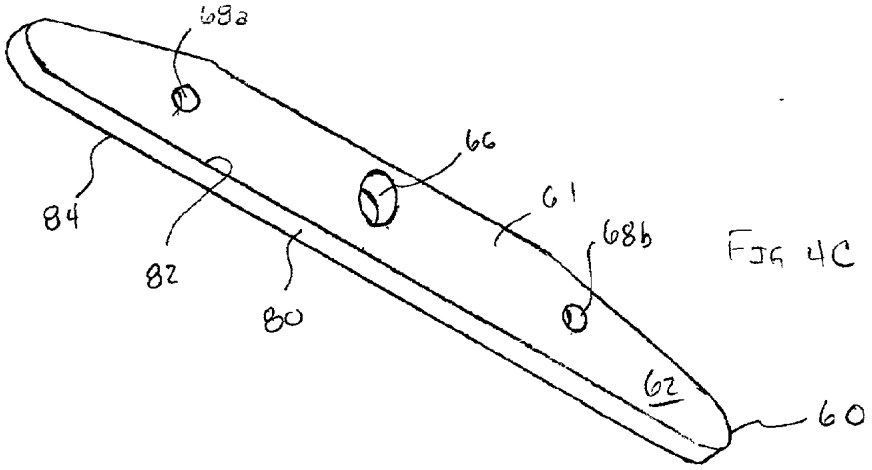


FIG 4C

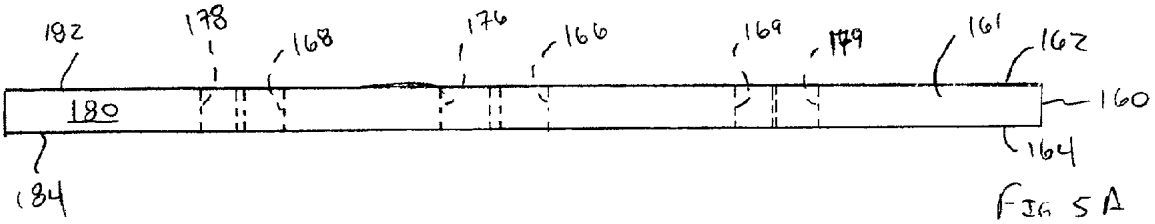


FIG. 5A

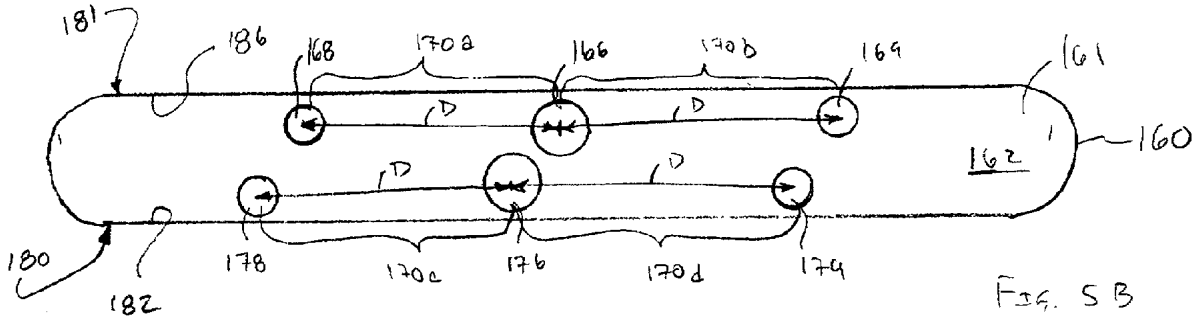


FIG. 5B

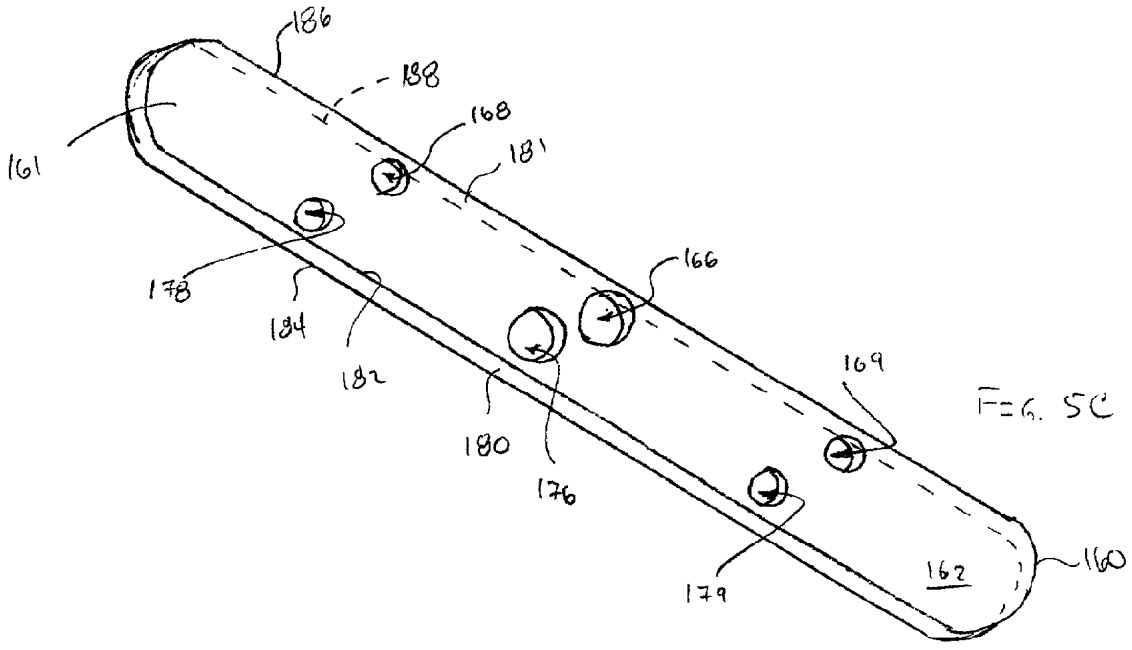
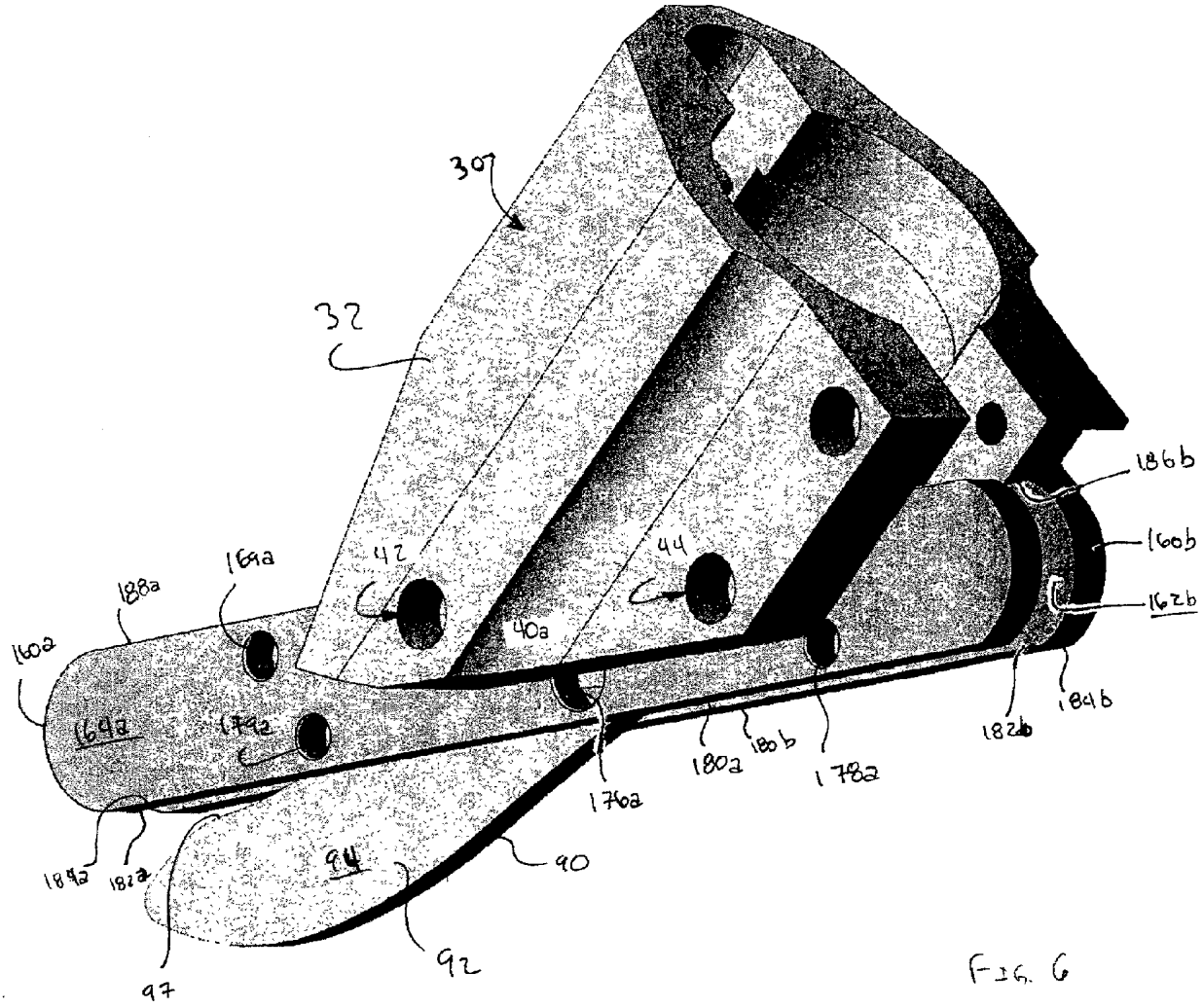


FIG. 5C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182b
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180b
178a
176a
182a
188a
94
90
92
97

FIG. 6

EXTENDED LIFE CUTTING BLADES FOR HAND-HELD CUTTING TOOLS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority from U.S. patent application Ser. No. 60/_____, entitled "EXTENDED CUTTING BLADES FOR HAND-HELD CUTTING TOOLS," filed Aug. 10, 2001, and identified by Perkins Coie LLP Docket No. 31957-8010.

TECHNICAL FIELD

[0002] The present invention relates to hand-held cutting tools, such as those used to cut fiber-cement siding.

BACKGROUND

[0003] The exteriors of houses and other types of buildings are commonly covered with siding materials that protect the internal structures from external environmental elements. The siding materials are typically planks or panels composed of wood, concrete, brick, aluminum, stucco, wood composites or fiber-cement composites. Wood siding is popular, but it is costly and flammable. Wood siding also cracks causing unsightly defects, and it is subject to infestation by insects. Aluminum is also popular, but it deforms easily, expands and contracts in extreme climates and is relatively expensive. Brick and stucco are also popular in certain regions of the country, but they are costly and labor intensive to install.

[0004] Fiber-cements siding (FCS) offers several advantages compared to other types of siding materials. FCS is made from a mixture of cement, silica sand, cellulose and a binder. To form FCS siding products, a liquid fiber-cement mixture is pressed and then cured to form FCS planks, panels and boards. FCS is advantageous because it is non-flammable, weather-proof, and relatively inexpensive to manufacture. Moreover, FCS does not rot or become infested by insects. FCS is also advantageous because it may be formed with simulated wood grains or other ornamental designs to enhance the appearance of a building. To install FCS, a siding contractor cuts the panels or planks to a desired length at a particular job site. The siding contractor then abuts one edge of an FCS piece next to another and nails the cut FCS pieces to the structure. After the FCS is installed, trim materials may be attached to the structure and the FCS may be painted.

[0005] Although FCS offers many advantages over other siding materials, it is difficult and expensive to cut. Siding contractors often cut FCS with a circular saw having an abrasive disk. Cutting FCS with an abrasive disk, however, generates large amounts of very fine dust that creates a very unpleasant working environment. Siding contractors also cut FCS with shears having opposing blades, as set forth in U.S. Pat. No. 5,570,678 and U.S. Pat. No. 5,722,386, which are herein incorporated in their entireties by reference. Although the shears set forth in these patents cut a clean edge in FCS without producing dust, many siding contractors prefer to use a hand-held tool because they are accustomed to cutting siding with hand saws. Therefore, in light of the positive characteristics of FCS and the need for a hand-held cutting tool, it would be desirable to develop a hand-held cutting tool that quickly cuts clean edges through FCS without producing dust.

[0006] To meet the demand for a hand-held FCS cutting tool, the present inventors developed a hand-held tool with a reciprocating cutting blade which is the subject of U.S. Pat. No. 5,993,303 ("the '303 patent," the entirety of which is incorporated herein by reference). The hand-held tool of the '303 patent may have a hand-held motor unit with a housing, a motor inside the housing, and a switch operatively coupled to the motor to selectively activate the motor. A head having a casing may be attached to the housing of the motor unit. The head may also have a reciprocating drive assembly coupled to the motor.

[0007] The hand-held cutting tool of the '303 patent also has a blade set with first and second fingers attached to either the casing or the motor housing, and a reciprocating cutting member between the first and second fingers. The first finger may have a first guide surface and a first interior surface. Similarly, the second finger may have a second guide surface and a second interior surface. The first and second guide surfaces are preferably in a common plane, and the first and second interior surfaces are spaced apart from one another by a gap distance. The reciprocating cutting member of the blade set has a body with a first width approximately equal to the gap distance and a reciprocating blade projecting from the body. The reciprocating blade has a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, and a top surface. The first side surface of the blade is preferably spaced apart from the first interior surface of the first finger by 0.040-0.055 inches for cutting ¼inch and 5/16inch thick fiber-cement siding. Similarly, the second side surface of the blade is spaced apart from the second interior surface of the second finger by 0.040-0.055 inches. The distance between the first and second side surfaces of the blade and the first and second fingers, respectively, may be approximately 13%-22% of the thickness of the fiber-cement siding workpiece.

[0008] The top surface of the reciprocating blade may also have a width less than the first width of the body. For example, the top surface of the reciprocating blade may be between 0.140 and 0.165 inches, and more preferably between 0.160 and 0.165 inches for cutting ¼inch and 5/16inch thick fiber-cement siding. The top surface may also have a curvature concave with respect to the first and second guide surfaces of the first and second fingers.

[0009] In operation, a drive assembly is operatively coupled to the reciprocating member to reciprocate the blade into and out of the gap between the fingers. As the drive assembly moves the blade into the gap between the fingers, the top surface of the blade and the straight guide surfaces of the fingers shear the fiber-cement siding.

[0010] One drawback of the hand-held tool of the '303 patent, however, is that the fingers can be worn away relatively quickly in cutting the abrasive FCS. If the fingers are worn, the edge of the finger may not cleanly break the surface of the FCS or the spacing between the reciprocating blade and the fingers can fall outside desirable tolerances. FCS is a relatively brittle material that tends to crack along rough edges and unpredictable paths. Excessive wear of the shear edge and/or the interior surface of a finger can lead to unacceptable cutting of the FCS.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] **FIG. 1** is an isometric view of a hand-held cutting tool and a blade set in accordance with one embodiment of the invention.

[0012] **FIG. 2** is a rear isometric view of a casing and blade set in accordance with an embodiment of the invention.

[0013] **FIG. 3** is a front isometric view of the casing and blade set of **FIG. 2**.

[0014] **FIG. 4A** is a bottom elevational view of one blade of the blade set of FIGS. **1-3**.

[0015] **FIG. 4B** is a side elevational view of the blade of **FIG. 4A**.

[0016] **FIG. 4C** is a bottom isometric view of the blade of **FIG. 4A**.

[0017] **FIG. 5A** is a bottom elevational view of a blade in accordance with another embodiment of the invention.

[0018] **FIG. 5B** is a side elevational view of the blade of **FIG. 5A**.

[0019] **FIG. 5C** is a bottom isometric view of the blade of **FIG. 5A**.

[0020] **FIG. 6** is a side isometric view of a casing and blade set in accordance with an embodiment of the invention utilizing a pair of the blades shown in FIGS. **5A-5C**.

DETAILED DESCRIPTION

[0021] Various embodiments of the present invention provide cutting heads and blades for hand-held cutting tools and methods of reconfiguring a cutting head for a hand-held cutting tool. The following description provides specific details of certain embodiments of the invention illustrated in the drawings to provide a thorough understanding of those embodiments. It should be recognized, however, that the present invention can be reflected in additional embodiments and the invention may be practiced without some of the details in the following description.

[0022] **FIG. 1** is an isometric view of a hand-held cutting tool **10** for cutting a workpiece W, which may comprise FCS. The cutting tool **10** has a motor unit **20** with a housing **22**, a motor **24** (shown schematically in phantom) inside the housing **22**, and a switch **26** operatively coupled to the motor **24**. The housing **22** preferably has a handle **27** configured to be gripped by an operator. One suitable motor unit **20** is the No. 3208-90 electric motor unit manufactured by Black and Decker Corporation. Another suitable motor unit **20** is the No. 7802 pneumatic motor unit manufactured by Ingersoll-Rand Corporation.

[0023] The output of the motor unit **20** may be converted into a reciprocal motion with a head **30** having a casing **32** and a reciprocating drive assembly **36** (shown schematically in phantom). The casing **32** is attached to the housing **22** of the motor unit **20**. Additionally, the reciprocating drive assembly **36** is coupled to the motor **24** via a gear assembly **38** (shown schematically in phantom) to translate the rotational output from the motor unit **20** into a reciprocating motion. A suitable head **30** is the shear head manufactured by Kett Tool Co., as set forth in U.S. Pat. No. 4,173,069, entitled "Power Shear Head," which is herein incorporated by reference.

[0024] The cutting tool **10** may also have a blade set **50** with a first blade **60***a* attached to one side of the head **30**, a second blade **60***b* attached to another side of the head **30**, and a cutting member **90** between the first and second blades **60***a* and **60***b*. The first and second blades **60***a* and **60***b* are preferably attached to the head **30** to space the blades **60***a-b* from one another by a gap **66** in which the cutting member **90** may be received. In the illustrated embodiment, the blades **60***a-b* are attached to the casing **32**. The casing **32** may include a pair of spaced-apart flanges **40***a* and **40***b* which define a support of the casing.

[0025] **FIGS. 2 and 3** are perspective views of the blade set **50** used with the hand-held cutting tool **10**. The cutting member **90** may have a body **91** with a first width approximately equal to a gap distance G between the first shear face **62***a* of the first blade **60***a* and the first shear face **62***b* of the second blade **60***b*. The cutting member **90** may also have reciprocating blade **92** projecting from the body **91** between the first and second blades **60***a* and **60***b*. The reciprocating blade **92** has a first side surface **94** facing the first blade **60***a*, a second side surface **95** facing the second blade **60***b*, and a curved top surface **96**. The edge along the top surface **96** and the first side surface **94** defines a first cutting edge **97** of the reciprocating blade **92**, and the edge along the top surface **96** and the second side surface **95** defines a second cutting edge **98** of the reciprocating blade **92**.

[0026] FIGS. **4**A-C illustrate a blade **60** in accordance with one embodiment of the invention. The first blade **60***a* and the second blade **60***b* shown in FIGS. **1-3** may be identical. Only one blade **60** is shown in FIGS. **4**A-C, but it should be understood that the first and second blades **60***a-b* of FIGS. **1-3** may have the same structure shown in FIGS. **4**A-C.

[0027] The blade **60** has a body **61**. The body includes a first shear face **62** and a second shear face **64**. The first and second shear faces **62** and **64** may be substantially planar and parallel to one another. The first and second shear faces **62** and **64** are spaced from one another to define a thickness of the body **61**. A guide surface **80** extends between the first and second shear faces **62** and **64** along a first elongate edge of the body **61**. A first shear edge **82** is defined at the junction between the guide surface **80** and the first shear face **62**. A second shear edge **84** is defined at the junction between the guide surface **80** and the second shear face **64**. The first and second shear edges **82** and **84** may be parallel to one another and spaced from one another by the thickness of the body **61**.

[0028] As noted above, the blade **60** may be carried by the casing **32** of the housing **30**. The blade **60** may be attached to the casing **32** in at least two different operative orientations, with a first mount **70***a* mating with the casing **32** to orient the blade in a first operative orientation and a second mount **70***b* used to mount the blade **60** in a second operative orientation. In the illustrated embodiment, the first mount **70***a* comprises a first pair of mounting holes passing through the thickness of the body **61** and the second mount **70***b* comprises a second pair of mounting holes passing through the thickness of the body **61**. In particular, the blade **60** has a central mounting hole **66**, which may be disposed generally midway along the length of the blade **60**. A first outer

mounting hole **68** is spaced a fixed mounting distance D from the central mounting hole **66** in a first direction and a second outer mounting hole **69** is spaced the same fixed mounting distance D from the central mounting hole **66** in a second direction.

[**0029**] In the illustrated embodiment, the central mounting hole **66** is shared by the first and second mounts **70***a-b*. Hence, the first mount **70***a* includes the central mounting hole **66** and the first outer mounting hole **68**, whereas the second mount **70***b* includes the central mounting hole **66** and the second outer mounting hole **69**. If so desired, more than three mounting holes may be employed. In such a circumstance, the first mount **70***a* may comprise two of these mounting holes while the second mount **70***b* may comprise two different mounting holes.

[**0030**] The mounting distance D is selected to coincide with the distance D between a pair of spaced-apart mounting rods **42** and **44** (best seen in **FIG. 1**). The first mounting rod **42** may pass through the central mounting hole **66** and the second mounting rod **44** may pass through the first outer mounting hole **68** or the second outer mounting hole **69**, depending on the operative orientation of the blade **60**.

[**0031**] The blade **60** of FIGS. **4**A-C illustrate mounting holes **66**, **68** and **69** which pass through the thickness of the body **61**. It should be understood, though, that the mounting holes **66**, **68** and **69** could instead be replaced with mounting points bearing the same spatial relationship as the illustrated mounting holes. Such a mounting point may, for example, comprise a recess (not shown) or protrusion (not shown) carried by one or both of the shear faces **62** and **64**. The casing **32** of the housing **30** may be adapted to mate with such recesses or protrusions to fix the position of the blade **60** in one of the desired operative orientations.

[**0032**] **FIGS. 2 and 3** illustrate the first blade **60***a* and the second blade **60***b* carried by the housing **30**. In particular, the first mounting rod **42** passes through the support flanges **40***a-b*, through the central mounting hole **66** of each of the blades **60***a-b*, and through the body **91** of the cutting member **90**. The first mounting rod **42** may define an axis about which the cutting member **90** may pivot when reciprocating. The second mounting rod **44** passes through the first outer mounting holes **68** (not visible in **FIGS. 2 and 3**) of each of the blades **60***a-b*. Hence, each of the blades **60***a-b* is mounted to the casing **32** via its first mount (**70***a* in FIGS. **4**A-C). The second outer mounting hole **69** is disposed distally of the casing **32**.

[**0033**] The first shear face **62***a* of the first blade **60***a* and the first shear face **62***b* of the second blade **60***b* are oriented toward one another and are positioned adjacent the cutting member **90**. The second shear face **64***a* of the first blade **60***a* abuts the first support flange **40***a* of the casing **32** and may lie flush against the inner surface of the first support flange **40***a*. The second shear face **64***b* of the second blade **60***b* may also be oriented outwardly away from the cutting member **90** and be mounted flush against an inner surface of the second support flange **40***b* of the casing **32**.

[**0034**] With the blades **60***a-b* mounted in this fashion, the first shear edges **82***a-b* of the blades **60***a-b* are positioned to cooperate with the cutting member **90** to shear the workpiece W. This relative positioning of the first shear edges **82***a-b* with respect to the reciprocating cutting member **90** is achieved by the fixed spacing and orientation of the first shear edge **82** of each blade **60** with respect to the first pair of mounting holes **70***a*. This is illustrated in **FIG. 4B** by noting that the central mounting hole **66** is spaced a distance S_1 from the first shear edge **82** and the first outer mounting hole **68** is space a distance S_2 from the first shear edge **82**. The distances S_1 and S_2 may be the same or they may differ from one another.

[**0035**] **FIG. 4B** indicates that the second outer mounting hole **69** is also spaced the same distance S_2 from the guide surface **80** of the blade **60**. As a consequence, the orientation and spacing of the second shear edge **84** of the blade **60** with respect to the second mount **70***b* is the same spacing and orientation between the first mount **70***a* and the first shear edge **82**. This allows the blade to be reoriented on the head **30** to position the second shear edge **84** adjacent to the reciprocating cutting member **90** for cooperation therewith to cut a workpiece W simply by switching from the first mount **70***a* to the second mount **70***b*.

[**0036**] When the cutting edge of a finger of the hand-held FCS cutting tool of the '303 patent becomes dull or the facing surface of the finger becomes too worn, the finger is commonly replaced with a new finger. Given the strength and abrasion-resistant requirements of such a finger, though, the finger can be fairly expensive. The effective life of a blade **60** in accordance with the embodiment of FIGS. **1-4** is effectively double the total life of one of the fingers used in connection with the tool of the '303 patent. When the first shear edge **82** of the blade **60** becomes dull, the blade **60** can be detached from the casing **32**. Rather than disposing of the blade **60**, the blade can be flipped lengthwise to position the second outer mounting hole **69** to receive the second mounting rod **44** therethrough. This orients the first shear face **62** outwardly into abutment with the casing **32** and spaces the first shear edge **82** transversely outwardly from the cutting member **90**. Mounting the blade in this position also orients the second shear face **64** inwardly toward the cutting member **90** and positions the second shear edge **84** adjacent the reciprocating blade **92** to cooperate with the cutting member **90** to cut a workpiece W. The second shear edge **84** was previously spaced transversely outwardly from the cutting member **90** when the cutting member **90** sheared the workpiece W with the first shear edge **82**. As a result, the second shear edge **84** will remain sharp and ready for use even if the blade **60** has already been used to cut a number of workpieces W using the first shear edge **82**. FIGS. **5-6** illustrate an alternative embodiment of the invention. The blade **60** of FIGS. **1-4** effectively doubles the useful life of the blade by providing a pair of shear edges **82** and **84**, each of which can be selectively positioned adjacent the reciprocating cutting member **90** to shear a workpiece W. The blade **160** of FIGS. **5-6** effectively quadruples the life of a single blade by providing four spaced-apart shear edges **182**, **184**, **186**, and **188**, each of which can be positioned to cut a workpiece with the cutting member **90**.

[**0037**] Much like the blade **60** of FIGS. **4**A-C, the blade **160** of FIGS. **5**A-C has a first shear face **162** and a second shear face **164**. The shear faces **162** and **164** are spaced from one another to define a thickness of the body **161**. A first guide surface **180** extends between the first and second shear faces **162** and **164** along a first elongate edge of the body **161**. A second guide surface **181** extends between the first and second shear faces along a second elongate edge of the

body **161**. The first and second guide surfaces **180** and **181** may be generally parallel to one another, as shown. A first shear edge **182** is defined at the junction between the first guide surface **180** and the first shear face **162**. A second shear edge **184** is defined at the junction between the first guide surface **180** and the second shear face **164**. A third shear edge **186** is defined at the junction between the second guide surface **181** and the first shear face **162**. A fourth shear edge **188** is defined at the junction between the second guide surface **181** and the second shear face **164**.

[**0038**] The blade **160** has at least five mounting points by which the blade **160** can be mounted to the housing **30** of the hand-held tool **10**. These mounting points are typified in the drawings as mounting holes which pass through the thickness of the body **161**. In an alternative embodiment, the mounting points may comprise protrusions or recesses in the faces **162** and **164** of the blade **160**, much as noted above in connection with the blade **60**.

[**0039**] The blade **160** may include at least one central mounting hole **166**, a first outer mounting hole **168**, a second outer mounting hole **169**, a third outer mounting hole **178**, and a fourth outer mounting hole **179**. If a single central mounting hole **166** is employed, each of the outer mounting holes **168**, **169**, **178**, and **179** may be spaced the same fixed mounting distance D from the central mounting hole **166**. In the illustrated embodiment, the blade **160** includes two central mounting holes. The first central mounting hole **166** is spaced the fixed mounting distance D from the first outer mounting hole **168** and from the second outer mounting hole **169**. A second central mounting hole **176** is spaced the same mounting distance D from the third outer mounting hole **178** and the fourth outer mounting hole **179**.

[**0040**] The first central mounting hole **166** and the first outer mounting hole **168** define a first pair of mounting holes **170***a*. The first central mounting hole **166** and the second outer mounting hole **169** define a second pair **170***b* of mounting holes. The second central mounting hole **176** and the third outer mounting hole **178** define a third pair **170***c* of mounting holes. The second central mounting hole **176** and the fourth outer mounting hole **179** define a fourth pair **170***d* of mounting holes.

[**0041**] **FIG. 6** illustrates a first blade **160***a* and a second blade **160***b* attached to the casing **32** of the housing **30**. Each of the blades **160***a-b* is attached to the casing **32** via the first pair (**170***a* in **FIG. 5B**) of mounting holes by passing the first and second mounting rods **42** and **44** therethrough. This orients the first shear edge **182***a* of the first blade **160***a* and the first shear edge **182***b* of the second blade **160***b* adjacent the cutting member **90** to cut a workpiece W.

[**0042**] Because the mounting holes of each pair **170** are spaced from one another the same mounting distance D, the blade **160** can be reoriented in four different operative orientations by passing the mounting rods **42** and **44** through different pairs **170** of mounting holes in the blade **160**. Each of the pairs **170** of mounting holes is spaced a fixed distance from and has a fixed orientation with respect to an associated one of the shear edges. In particular, the first pair **170***a* of mounting holes is associated with the first shear edge **182**, the second pair **170***b* of mounting holes is associated with the second shear edge **184**, the third pair **170***c* of mounting holes is associated with the third shear edge **186**, and the fourth pair **170***d* of mounting holes is associated with the fourth shear edge **188**. By attaching the blade **160** to the casing **32** with the mounting rods **42** and **44** extending through any one of the four pairs **170** of mounting holes, the shear edge associated with the selected pair of mounting holes will be positioned to cooperate with the cutting member **90** to shear a workpiece W. As a consequence, by simply flipping the blades **160***a* and **160***b* to different operative orientations with respect to the casing **32**, each blade **160***a-b* can provide four different shear edges for cutting workpieces W. This effectively quadruples the life of the blades.

[**0043**] Another embodiment of the invention provides a method of reconfiguring a cutting head for a hand-held cutting tool such as the cutting tool **10** shown in **FIG. 1**, though other designs (including, but not limited to, the embodiment of FIGS. **5-6**) may be employed instead. In a first operative orientation of the blades **60***a* and **60***b*, the first shear edge **62** of each blade is positioned adjacent the reciprocating cutting member **90** for cooperation therewith and the second shear edge **64** of each blade **60** is spaced transversely outwardly of both the reciprocating cutting member **90** and the first shear edge **62**. In one method of the invention, the first mount **70***a* of the first blade **60***a* is detached from the casing **32**. The body **61** of the first blade **60***a* is turned and the second mount **70***b* of the first blade **60***b* is mated to the casing **32** to attach the first blade **60** to the casing **32** in a second operative orientation. In this second operative orientation, the second shear edge **64***a* of the first blade **60***a* is positioned adjacent the reciprocating cutting member **90** for shearing a workpiece W and the first shear edge **62** of the first blade **60** is positioned transversely outwardly of both the reciprocating cutting member **90** and the second shear edge of the first blade. Much the same process can be used to reorient the second blade **60***b* to position its second shear edge **64***b* adjacent the cutting member **90**.

[**0044**] From the foregoing, it will be appreciated that specific embodiments of the invention have been described herein for purposes of illustration, but that various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

I/we claim:

1. A cutting blade for a hand-held cutting tool, comprising:

a body having first and second shear faces, the first and second shear faces being spaced from one another;

at least three mounting holes passing through the body, a first pair of said mounting holes being spaced a predetermined mounting distance from one another and a second pair of said mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the second pair not being included in the first pair of mounting holes;

a first shear edge adapted to cooperate with a reciprocating cutting member to shear a workpiece, the first shear edge being spaced from the first pair of mounting holes by a fixed distance and in a fixed orientation with respect thereto; and

a second shear edge adapted to cooperate with the reciprocating cutting member to shear the workpiece, the

second shear edge being spaced from the first shear edge, the second shear edge being spaced from the second pair of mounting holes by said fixed distance and in said fixed orientation with respect to the second pair of mounting holes.

2. The cutting blade of claim I wherein there are three mounting holes, one of the mounting holes of the first pair comprising one of the mounting holes of the second pair.

3. The cutting blade of claim 1 wherein the at least three mounting holes comprise a central mounting hole, a first outer mounting hole and a second outer mounting hole, the central mounting hole being spaced from each of the first and second outer mounting holes by said mounting distance, the first pair of mounting holes comprising the central mounting hole and the first outer mounting hole and the second pair of mounting holes comprising the central mounting hole and the second outer mounting hole.

4. The cutting blade of claim 1 further comprising a blunt first guide surface extending transversely between the first and second shear faces along a first elongate edge of the body.

5. The cutting blade of claim 4 wherein the first shear edge is positioned at a junction of the first guide surface and the first shear face and the second shear edge is positioned at a junction of the first guide surface and the second shear face.

6. The cutting blade of claim 4 wherein the first guide surface is flat to lie flush against a face of the workpiece while the workpiece is sheared.

7. The cutting blade of claim 1 wherein the at least three mounting holes includes a third pair of mounting holes, the mounting holes of the third pair being spaced said mounting distance from one another, at least one of the mounting holes of the third pair being included in neither of the first and second pairs of mounting holes, the cutting blade further comprising a third shear edge adapted to cooperate with the reciprocating cutting member to shear the workpiece, the third shear edge being spaced from the first and second shear edges, the third shear edge being spaced from the third pair of mounting holes by said fixed distance and in said fixed orientation with respect to the third pair of mounting holes.

8. The cutting blade of claim 6 wherein the at least three mounting holes includes a fourth pair of mounting holes, the mounting holes of the fourth pair being spaced said mounting distance from one another, at least one of the mounting holes of the fourth pair being included in none the first, second and third pairs of mounting holes, the cutting blade further comprising a fourth shear edge adapted to cooperate with the reciprocating cutting member to shear the workpiece, the fourth shear edge being spaced from the first, second and third shear edges, the fourth shear edge being spaced from the fourth pair of mounting holes by said fixed distance and in said fixed orientation with respect to the fourth pair of mounting holes.

9. A cutting blade for a hand-held cutting tool, comprising:

a body having spaced-apart first and second shear faces, the first and second shear faces being parallel to one another;

at least five mounting holes passing through the body and defining first, second, third and fourth pairs of mounting holes, the mounting holes of each pair being spaced a predetermined mounting distance from one another, the mounting distance being the same for each of the pairs, at least one of the mounting holes of each of the first, second, third and fourth pairs of mounting holes being included in none of the other three pairs of mounting holes; and

spaced-apart first, second, third and fourth shear edges, each of which is adapted to cooperate with a reciprocating cutting member to shear a workpiece, the first shear edge being spaced from the first pair of mounting holes by a fixed distance and in a fixed orientation with respect to the first pair of mounting holes, the second shear edge being spaced from the second pair of mounting holes by said fixed distance and in said fixed orientation with respect to the second pair of mounting holes, the third shear edge being spaced from the third pair of mounting holes by said fixed distance and in said fixed orientation with respect to the third pair of mounting holes, and the fourth shear edge being spaced from the fourth pair of mounting holes by said fixed distance and in said fixed orientation with respect to the fourth pair of mounting holes;

whereby the blade can be reoriented on a cutting head to position any one of the first, second, third and fourth shearing edges adjacent the reciprocating cutting member for cooperation therewith by attaching the blade to one of the first, second, third and fourth pairs of mounting holes, respectively.

10. The cutting blade of claim 9 wherein one of the mounting holes of the first pair comprises one of the mounting holes of the second pair.

11. The cutting blade of claim 9 wherein one of the mounting holes of the third pair comprises one of the mounting holes of the fourth pair.

12. The cutting blade of claim 9 wherein there are six mounting holes, one of the mounting holes of the first pair comprising one of the mounting holes of the second pair and one of the mounting holes of the third pair comprising one of the mounting holes of the fourth pair.

13. The cutting blade of claim 12 wherein neither of the holes of the first pair comprises a hole of the third or fourth pair and neither of the holes of the second pair comprises a hole of the third or fourth pair.

14. The cutting blade of claim 9 further comprising spaced-apart first and second guide surfaces, the first guide surface extending transversely between the first and second shear faces along a first elongate edge of the body and the second guide surface extending transversely between the first and second shear faces along a second elongate edge of the body.

15. The cutting blade of claim 14 wherein each of the first and second guide surfaces are flat to lie flush against a face of the workpiece while the workpiece is sheared.

16. A cutting blade for a cutting tool, comprising:

a body having spaced-apart first and second shear faces, the first and second shear faces defining a thickness of the body;

a blunt guide surface extending between the first and second shear faces along an elongate lower edge of the body;

a first shear edge defined at the junction between the guide surface and the first shear face and a second shear edge defined at the junction between the guide surface and the second shear face;

at least three mounting holes, two of said mounting holes being associated with the first shear edge and being spaced from one another by a fixed mounting distance and two of said mounting holes being associated with the second shear edge and being spaced from one another by said fixed mounting distance.

17. The cutting blade of claim 16 wherein there are three mounting holes, a central one of the mounting holes being associated with the first and second shear edges and being equidistant from each of the other two mounting holes.

18. A cutting blade for a hand-held cutting tool of the type having a motor, a casing having a support adapted to carry a pair of fixed cutting blades in a spaced-apart relationship, and a reciprocating cutting member which pivots about a transverse axis to reciprocate between the fixed cutting blades, the cutting blade comprising:

a body having spaced-apart first and second shear faces, the first and second shear faces defining a thickness of the body;

a first guide surface extending between the first and second shear faces along a first elongate edge of the body;

a first shear edge defined at the junction between the first guide surface and the first shear face and a second shear edge defined at the junction between the first guide surface and the second shear face, the first and second shear edges being parallel to and spaced from one another by the thickness of the body;

a first mount adapted to mate with the support of the housing to position the first shear edge adjacent the reciprocating cutting member for shearing a workpiece and to position the second shear edge transversely outwardly of both the reciprocating cutting member and the first shear edge; and

a second mount adapted to mate with the support of the housing to position the second shear edge adjacent the reciprocating cutting member for shearing a workpiece and to position the first shear edge transversely outwardly of both the reciprocating cutting member and the second shear edge.

19. The cutting blade of claim 18 wherein the first mount comprises a first pair of mounting holes passing through the thickness of the body and being spaced a predetermined mounting distance from one another, and the second mount comprises a second pair of mounting holes passing through the thickness of the body and being spaced said mounting distance from one another.

20. The cutting blade of claim 19 wherein there are three mounting holes, one of the mounting holes of the first pair comprising one of the mounting holes of the second pair.

21. The cutting blade of claim 18 wherein the first mount comprises a central mounting point and a first distal mounting point, and the second mount comprises said central mounting point and a second distal mounting point, the first and second distal mounting points being equidistant from the central mounting point.

22. The cutting blade of claim 18 wherein the blade further comprises a second guide surface extending between the first and second shear faces along a second elongate edge of the body, the second guide surface being spaced from the first guide surface; a third shear edge defined at the junction between the second guide surface and the first shear face; and a fourth shear edge defined at the junction between the second guide surface and the second shear face.

23. The cutting blade of claim 22 wherein the blade further comprises a third mount adapted to mate with the support of the housing to position the third shear edge adjacent the reciprocating cutting member for shearing a workpiece with the fourth shear edge being spaced transversely outwardly from both the reciprocating cutting member and the third shear edge; and a fourth mount adapted to mate with the support of the housing to position the fourth shear edge adjacent the reciprocating cutting member for shearing a workpiece with the third shear edge being spaced transversely outwardly from both the reciprocating cutting member and the fourth shear edge.

24. A cutting head for a hand-held cutting tool of the type having a motor within a housing, the cutting head comprising:

a casing adapted to connect to the housing, the casing having a casing support;

a first blade having a body, first and second mounts, and parallel, spaced-apart first and second shear edges;

a second blade having a body, first and second mounts, and parallel, spaced-apart first and second shear edges;

the first blade being connected to the casing support by the first mount of the first blade and the second blade being connected to the casing support by the first mount of the second blade such that the first shear edge of the second blade is parallel to and is spaced from the first shear edge of the first blade to define a gap therebetween having a predetermined gap width; and

a cutting member carried between the first and second blades and adapted to be coupled to the motor for reciprocal movement within the gap to shear a workpiece by cooperation of the cutting member with the first edge of the first blade and the first edge of the second blade;

the second mount of the first blade being positioned on the body of the first blade and the second mount of the second blade being positioned on the body of the second blade such that detaching the first and second blades from the casing and reconnecting the first and second blades to the casing support by their respective second mounts will orient the second shear edges of the first and second blades parallel to one another to define a gap therebetween having said gap width and will position the second shear edge of the first blade and the second shear edge of the second blade to cooperate with the cutting member to shear the workpiece.

25. The cutting head of claim 24 wherein the first and second blades are interchangeable with one another.

26. The cutting head of claim 24 wherein the first mount of the first blade comprises a first pair of mounting holes passing through the body of the first blade at locations spaced a predetermined mounting distance from one another; the second mount of the first blade comprises a second pair of mounting holes passing through the body of the first blade at locations spaced said mounting distance from one another.

27. The cutting head of claim 26 wherein the first mount of the second blade comprises a first pair of mounting holes passing through the body of the second blade at locations spaced a predetermined mounting distance from one another; the second mount of the second blade comprises a

second pair of mounting holes passing through the body of the second blade at locations spaced said mounting distance from one another.

28. The cutting head of claim 24 wherein the body of the first blade comprises first and second shear faces and a blunt first guide surface, the first shear edge of the first blade being positioned at a junction of the first guide surface and the first shear face and the second shear edge of the first blade being positioned at a junction of the first guide surface and the second shear face; and the body of the second blade comprises first and second shear faces and a blunt first guide surface, the first shear edge of the second blade being positioned at a junction of the first guide surface and the first shear face and the second shear edge of the second blade being positioned at a junction of the first guide surface and the second shear face.

29. The cutting head of claim 24 wherein the first blade further comprises a third mount and a third shear edge and the second blade further comprises a third mount and a third shear edge, the third mount of the first blade being positioned on the body of the first blade and the third mount of the second blade being positioned on the body of the second blade such that detaching the first and second blades from the casing and reconnecting the first and second blades to the casing support by their respective third mounts will orient the third shear edges of the first and second blades parallel to one another to define a gap therebetween having said gap width and will position the third shear edge of the first blade and the third shear edge of the second blade to cooperate with the cutting member to shear the workpiece.

30. The cutting head of claim 29 wherein the first blade further comprises a fourth mount and a fourth shear edge and the second blade further comprises a fourth mount and a fourth shear edge, the fourth mount of the first blade being positioned on the body of the first blade and the fourth mount of the second blade being positioned on the body of the second blade such that detaching the first and second blades from the casing and reconnecting the first and second blades to the casing support by their respective fourth mounts will orient the fourth shear edges of the first and second blades parallel to one another to define a gap therebetween having said gap width and will position the fourth shear edge of the first blade and the fourth shear edge of the second blade to cooperate with the cutting member to shear the workpiece.

31. A cutting blade for a cutting tool, comprising:

a body having parallel first and second shear faces, the first and second shear faces being spaced from one another to define a thickness of the body;

opposed first and second guide surfaces, the first guide surface extending between the first and second shear faces along a first elongate edge of the body and the second guide surface extending between the first and second shear faces along a second elongate edge of the body;

a first shear edge defined at the junction between the first guide surface and the first shear face and a first pair of mounting points associated with the first shear edge, the first pair of mounting points comprising first and second mounting points spaced from one another by a fixed distance;

a second shear edge defined at the junction between the first guide surface and the second shear face and a second pair of mounting points associated with the second shear edge, the second pair of mounting points comprising first and second mounting points spaced from one another by said fixed distance;

a third shear edge defined at the junction between the second guide surface and the first shear face and a third pair of mounting points associated with the third shear edge, the third pair of mounting points comprising first and second mounting points spaced from one another by said fixed distance; and

a fourth shear edge defined at the junction between the second guide surface and the second shear face and a fourth pair of mounting points associated with the fourth shear edge, the fourth pair of mounting points comprising first and second mounting points spaced from one another by said fixed distance.

32. The cutting blade of claim 31 wherein the first mount point of each of the first, second, third and fourth pairs of mounting points comprises a hole passing through the thickness of the body.

33. The cutting blade of claim 31 wherein each of the mounting points comprises a hole passing through the thickness of the body.

34. The cutting blade of claim 31 wherein the first mounting point of the first pair of mounting points is also the first mounting point of the second pair of mounting points.

35. The cutting blade of claim 31 wherein the first mounting point of the third pair of mounting points is also the first mounting point of the fourth pair of mounting points.

36. The cutting blade of claim 31 wherein the first shear edge is parallel to each of the second, third and fourth shear edges.

37. A cutting blade for a hand-held cutting tool, comprising:

a body having parallel first and second shear faces, the first and second shear faces being spaced from one another to define a thickness of the body;

at least six mounting holes passing through the thickness of the body, a first pair of the mounting holes being spaced a predetermined mounting distance from one another; a second pair of said mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the second pair not being included in the first pair of mounting holes; a third pair of said mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the third pair being included in neither the first pair nor the second pair of mounting holes; a fourth pair of said mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the fourth pair being included in none of the first pair, the second pair and the third pair of mounting holes;

spaced-apart first and second guides surfaces, the first guide surface extending transversely between the first and second shear faces along a first elongate edge of the body and the second guide surface extending transversely between the first and second shear faces along a second elongate edge of the body, the first and second guide surfaces being parallel to one another;

a first shear edge adapted to cooperate with a reciprocating cutting member to shear a workpiece, the first shear

edge being spaced from the first pair of mounting holes by a fixed distance and in a fixed orientation with respect to the first pair of mounting holes;

a second shear edge adapted to cooperate with the reciprocating cutting member to shear the workpiece, the second shear edge being spaced from and parallel to the first shear edge, the second shear edge being spaced from the second pair of mounting holes by said fixed distance and in said fixed orientation with respect to the second pair of mounting holes;

a third shear edge adapted to cooperate with the reciprocating cutting member to shear the workpiece, the third shear edge being spaced from and parallel to the first shear edge and the second shear edge the third shear edge being spaced from the third pair of mounting holes by said fixed distance and in said fixed orientation with respect to the third pair of mounting holes;

a fourth shear edge adapted to cooperate with the reciprocating cutting member to shear the workpiece, the fourth shear edge being spaced from and parallel to the first shear edge, the second shear edge and the third shear edge, the fourth shear edge being spaced from the fourth pair of mounting holes by said fixed distance and in said fixed orientation with respect to the fourth pair of mounting holes;

whereby the blade can be reoriented on a cutting head to position any one of the first, second, third and fourth shearing edges adjacent the reciprocating cutting member for cooperation therewith to shear the workpiece by attaching the blade to one of the first, second, third and fourth pairs of mounting holes, respectively.

38. A cutting head for a hand-held cutting tool of the type having a motor within a housing, the cutting head comprising:

a casing adapted to connect to the housing and carrying a pair of mounting rods, the mounting rods being spaced from one another by a fixed mounting distance;

a first blade including:

a body having spaced-apart first and second shear faces;

at least six mounting holes passing through the body, a first pair of the mounting holes being spaced said mounting distance from one another; a second pair of the mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the second pair not being included in the first pair of mounting holes; a third pair of the mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the third pair being included in neither the first pair nor the second pair of mounting holes; a fourth pair of the mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the fourth pair being included in none of the first pair, the second pair and the third pair of mounting holes;

spaced-apart first and second guides surfaces, the first guide surface extending transversely between the first and second shear faces along a first elongate edge of the body and the second guide surface extending transversely between the first and second shear faces along a second elongate edge of the body;

a first shear edge spaced from the first pair of mounting holes by a fixed distance and in a fixed orientation with respect to the first pair of mounting holes; a second shear edge spaced from the second pair of mounting holes by said fixed distance and in said fixed orientation with respect to the second pair of mounting holes; a third shear edge spaced from the third pair of mounting holes by said fixed distance and in said fixed orientation with respect to the third pair of mounting holes; and a fourth shear edge spaced from the fourth pair of mounting holes by said fixed distance and in said fixed orientation with respect to the fourth pair of mounting holes;

a second blade including:

a body having spaced-apart first and second shear faces; at least six mounting holes passing through the body, a first pair of the mounting holes being spaced said mounting distance from one another; a second pair of the mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the second pair not being included in the first pair of mounting holes; a third pair of the mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the third pair being included in neither the first pair nor the second pair of mounting holes; a fourth pair of the mounting holes being spaced said mounting distance from one another, at least one of the mounting holes of the fourth pair being included in none of the first pair, the second pair and the third pair of mounting holes;

spaced-apart first and second guides surfaces, the first guide surface extending transversely between the first and second shear faces along a first elongate edge of the body and the second guide surface extending transversely between the first and second shear faces along a second elongate edge of the body;

a first shear edge spaced from the first pair of mounting holes by a fixed distance and in a fixed orientation with respect to the first pair of mounting holes; a second shear edge spaced from the second pair of mounting holes by said fixed distance and in said fixed orientation with respect to the second pair of mounting holes; a third shear edge spaced from the third pair of mounting holes by said fixed distance and in said fixed orientation with respect to the third pair of mounting holes; and a fourth shear edge spaced from the fourth pair of mounting holes by said fixed distance and in said fixed orientation with respect to the fourth pair of mounting holes;

the mounting rods of the casing passing through the first pair of mounting holes of the first blade and the first pair of mounting holes of the second blade to releasably connect the first and second blades to the casing, the first shear edge of the first blade being parallel to the first shear edge of the second blade to define a gap therebetween having a predetermined width;

a cutting member carried between the first and second blades and adapted to be coupled to the motor for reciprocal movement within the gap to shear a workpiece by cooperation of the cutting member with the first shear edge of the first blade and the first shear edge of the second blade;

whereby each of the first and second blades can be detached from the casing, rotated, and reattached to the casing by passing the mounting rods through the second, third or fourth pairs of mounting holes of the blade to position any one of the second, third and fourth shearing edges, respectively, of the blade to cooperate with the cutting member to shear the workpiece.

39. A replacement set of cutting blades for use in connection with a hand-held cutting tool of the type having a motor, a casing having a support adapted to carry a pair of fixed cutting blades in a spaced-apart relationship, and a reciprocating cutting member which pivots about a transverse axis to reciprocate between the fixed cutting blades, the replacement set of cutting blades comprising:

a first blade including:

a body having spaced-apart first and second shear faces, the first and second shear faces defining a thickness of the body;

a first guide surface extending between the first and second shear faces along a first elongate edge of the body;

a first shear edge defined at the junction between the first guide surface and the first shear face and a second shear edge defined at the junction between the first guide surface and the second shear face, the first and second shear edges being parallel to and spaced from one another by the thickness of the body;

a first mount adapted to mate with the support of the housing to position the first shear edge adjacent the reciprocating cutting member for shearing a workpiece and to position the second shear edge transversely outwardly of both the reciprocating cutting member and the first shear edge; and

a second mount adapted to mate with the support of the housing to position the second shear edge adjacent the reciprocating cutting member for shearing a workpiece and to position the first shear edge transversely outwardly of both the reciprocating cutting member and the second shear edge; and

a second blade including:

a body having spaced-apart first and second shear faces, the first and second shear faces defining a thickness of the body;

a first guide surface extending between the first and second shear faces along a first elongate edge of the body;

a first shear edge defined at the junction between the first guide surface and the first shear face and a second shear edge defined at the junction between the first guide surface and the second shear face, the first and second shear edges being parallel to and spaced from one another by the thickness of the body;

a first mount adapted to mate with the support of the housing to position the first shear edge adjacent the reciprocating cutting member for shearing a workpiece and to position the second shear edge transversely outwardly of both the reciprocating cutting member and the first shear edge; and

a second mount adapted to mate with the support of the housing to position the second shear edge adjacent the reciprocating cutting member for shearing a workpiece and to position the first shear edge transversely outwardly of both the reciprocating cutting member and the second shear edge.

40. A method of reconfiguring a cutting head for a hand-held cutting tool, the cutting head having a casing adapted to carry first and second blades, and a reciprocating cutting member which reciprocates between the first and second blades, each of the first and second cutting blades including a body having spaced-apart first and second shear edges, the first shear edge being adjacent the reciprocating cutting member for cooperation therewith and the second edge being spaced transversely outwardly of both the reciprocating cutting member and the first shear edge, a first mount mating with the casing, and a second mount adapted to mate with casing, the method including the steps of:

detaching the first mount of the first blade from the casing;

turning the body of the first blade;

mating the second mount of the first blade to the casing to attach the first blade to the casing, thereby positioning the second shear edge of the first blade adjacent the reciprocating cutting member for shearing a workpiece and positioning the first shear edge of the first blade transversely outwardly of both the reciprocating cutting member and the second shear edge of the first blade.

41. The method of claim **40** further comprising cutting the workpiece with the second shear edge of the first blade by reciprocating the reciprocating cutting member after mating the second mount of the first blade to the casing.

42. The method of claim **40** further comprising:

detaching the first mount of the second blade from the casing;

turning the body of the second blade;

mating the second mount of the second blade to the casing to attach the first blade to the casing, thereby positioning the second shear edge of the second blade adjacent the reciprocating cutting member for shearing a workpiece and positioning the first shear edge of the second blade transversely outwardly of both the reciprocating cutting member and the second shear edge of the second blade.

43. The method of claim **42** further comprising cutting the workpiece with the second shear edge of the first blade and the second shear edge of the second blade by reciprocating the reciprocating cutting member after mating the second mount of the first blade to the casing.

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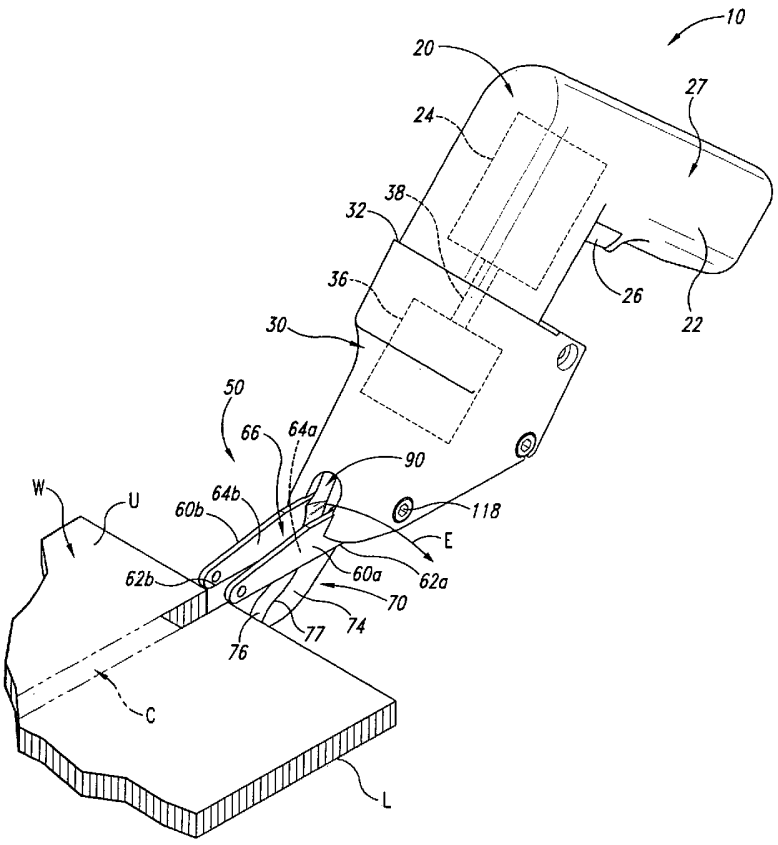

(57) Abstract: Waste ejecting blade assemblies for hand-held cutting tools and methods for cutting fiber-cement materials are disclosed herein. In one embodiment, the blade assembly includes first and second fingers attachable to the cutting tool, and a reciprocating cutting member between the first and second fingers. The cutting member includes a body pivotally coupled to the first and second fingers and a blade projecting from the body. The blade includes a top surface between opposing side surfaces and a waste ejection member at a rear portion of the top surface. The waste ejection member includes a ramp having a front edge, a back edge, and an inclined portion between the front and back edges. The inclined portion is canted toward the first or second finger and configured to direct a waste portion of the workpiece away from the blade toward the first or second finger.

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WASTE EJECTING BLADE ASSEMBLIES FOR HAND-HELD CUTTING TOOLS

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] The present application claims the benefit of the filing date of U.S. Patent Application No. 11/092,159 entitled WASTE EJECTING BLADE ASSEMBLIES FOR HAND-HELD CUTTING TOOLS, filed March 28, 2005, which is incorporated herein by reference.

TECHNICAL FIELD

[002] The present invention relates to waste ejecting blade assemblies for handheld cutting tools, such as those used to cut fiber-cement siding.

BACKGROUND

[003] The exteriors of houses and other types of buildings are commonly covered with siding materials that protect the internal structures from external environmental elements. The siding materials are typically planks or panels composed of wood, concrete, brick, aluminum, stucco, wood composites, or fibercement composites. Wood siding is popular, but it is costly and flammable. Wood siding also cracks causing unsightly defects, and it is subject to infestation by insects. Aluminum is also popular, but it deforms easily, expands and contracts in extreme climates, and is relatively expensive. Brick and stucco are also popular in certain regions of the country, but they are costly and labor intensive to install.

[004] Fiber-cement siding (FCS) offers several advantages compared to other types of siding materials. FCS is made from a mixture of cement, silica sand, cellulose, and a binder. To form FCS siding products, a liquid fiber-cement mixture is pressed and then cured to form FCS planks, panels, and boards. FCS is advantageous because it is non-flammable, weather-proof, and relatively inexpensive to manufacture. Moreover, FCS does not rot or become infested by insects. FCS is also advantageous because it may be formed with simulated wood grains or other ornamental designs to enhance the appearance of a building. To install FCS, a siding contractor cuts the panels or planks to a desired length at a particular job site. The siding contractor then abuts one

edge of an FCS piece next to another and nails the cut FCS pieces to the structure. After the FCS is installed, trim materials may be attached to the structure and the FCS may be painted.

[005] Although FCS offers many advantages over other siding materials, it is difficult and expensive to cut. Siding contractors often cut FCS with a circular saw having an abrasive disk. Cutting FCS with an abrasive disk, however, generates large amounts of very fine dust that creates a very unpleasant working environment. Siding contractors also cut FCS with shears having opposing blades, as set forth in U.S. Patent No. 5,570,678 and U.S. Patent No. 5,722,386, which are herein incorporated in their entireties by reference. Although the shears set forth in these patents cut a clean edge in FCS without producing dust, many siding contractors prefer to use a hand-held tool because they are accustomed to cutting siding with hand saws. Therefore, in light of the positive characteristics of FCS and the need for a hand-held cutting tool, it would be desirable to develop a hand-held cutting tool that quickly cuts clean edges through FCS without producing dust.

[006] To meet the demand for a hand-held FCS cutting tool, the present inventors developed a hand-held tool with a reciprocating cutting blade that is the subject of U.S. Patent No. 5,993,303 ("the '303 patent," the entirety of which is incorporated herein by reference). The hand-held tool of the '303 patent includes a hand-held motor unit with a housing, a motor inside the housing, and a switch operatively coupled to the motor to selectively activate the motor. A head having a casing is attached to the housing of the motor unit. The head includes a reciprocating drive assembly coupled to the motor. The hand-held cutting tool also includes a blade set having a moving blade between first and second stationary fingers. The moving blade is coupled to the drive assembly to reciprocate between the first and second fingers.

[007] In the operation of the original hand-held cutting tool, the fingers were placed on an FCS workpiece and the moving blade was driven from an open position below the workpiece to a closed position in the gap between the first and second fingers. As the blade moved from the open position to the closed position, it sheared the workpiece along both sides of the blade to form a cut in the workpiece approximately as wide as the gap between the first and second fingers. An operator would accordingly push the

tool along a cutting line as the blade reciprocated between the open and closed positions to cut the workpiece.

[008] One drawback of the hand-held tool of the '303 patent is that the waste material removed from the workpiece (e.g., the kerf material) can obscure the cutting line. For example, the kerf material from the FCS workpiece travels along a cutting surface of the blade after being cut from the workpiece and rolls up or otherwise collects at a rear portion of the blade. As the tool moves along the cutting line, the amount of kerf material can become significant and obscure the operator's view of the cutting line, thus making it difficult to make straight and accurate cuts. Accordingly, it would be desirable to develop a hand-held cutting tool that provides increased visibility of the cutting line throughout the cutting process.

BRIEF DESCRIPTION OF THE DRAWINGS

[009] Figure 1 is an isometric view of a hand-held cutting tool with a blade assembly having a waste ejection member in accordance with one embodiment of the invention.

[010] Figure 2 is a side elevational view of the blade assembly of Figure 1.

[011] Figure 3 is a top plan view of the blade assembly of Figure 1.

[012] Figures 4A and 4B are front end views of a blade assembly and head in accordance with another embodiment of the invention.

[013] Figure 5 is a front end view of a blade assembly and head in accordance with yet another embodiment of the invention.

DETAILED DESCRIPTION

A. Overview

[014] The present invention is directed toward blade assemblies for cutting fiber-cement siding and/or other fiber-cement materials, as well as cutting tools and methods for cutting fiber-cement materials. In one embodiment of the invention, a blade assembly for a fiber-cement cutting tool can include a first finger and a second finger attachable to the cutting tool. The first finger has a first guide surface and a first interior surface transverse to the first guide surface. The second finger has a second guide surface

and a second interior surface transverse to the second guide surface. The first and second interior surfaces are spaced apart from one another, and the first and second guide surfaces define a guide plane.

[015] The blade assembly also includes a reciprocating cutting member between the first and second fingers. The cutting member has a body that is pivotally coupled to the first and second fingers and a blade projecting from the body. The blade includes a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, a top surface between the first and second side surfaces, and a waste ejection member at a rear portion of the top surface. The waste ejection member includes a ramp having a front edge, a back edge, and an inclined portion between the front and back edge. The inclined portion is canted toward the first or second finger. In several embodiments, the inclined portion is canted toward the first or second finger at an angle of 20 degrees to 80 degrees.

[016] Another embodiment of a blade assembly for a fiber-cement cutting tool in accordance with the invention includes a first finger and a second finger attachable to the cutting tool. The first finger has a first guide surface in a first guide plane and a first interior surface. The second finger has a second guide surface in a second guide plane and a second interior surface. The first and second interior surfaces are spaced apart from one another. In this embodiment, the first and second guide planes are offset from each other. For example, the first and second guide planes can be offset from each other by a distance of up to about 0.110 inch. In another embodiment, the first and second guide planes are offset from each other by about 0.0625 inch.

[017] The blade assembly also includes a reciprocating cutting member between the first and second fingers. The cutting member has a body that is pivotally coupled to the first and second fingers and a blade projecting from the body. The blade includes a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, and a top surface between the first and second side surfaces. The top surface includes an arcuate portion configured to be a cutting surface.

[018] Another aspect of the invention is directed toward hand-held cutting tools for severing fiber-cement materials. In one embodiment, the cutting tool can include a hand-held motor unit having a housing, a motor inside the housing, and a switch operatively coupled to the motor to selectively activate the motor. The cutting tool can also include a head having a casing attached to the housing of the motor unit and a reciprocating drive assembly coupled to the motor. The cutting tool further includes a first and a second finger attachable to the head or motor unit. The first finger has a first guide surface and a first interior surface transverse to the first guide surface. The second finger has a second guide surface and a second interior surface transverse to the second guide surface. The first and second interior surfaces are spaced apart from one another, and the first and second guide surfaces define a guide plane.

[019] The cutting tool can further include a reciprocating cutting member between the first and second fingers for severing fiber cement along a cutting path. The cutting member has a body that is pivotally coupled to the first and second fingers and a blade projecting from the body. The blade includes a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, a top surface between the first and second side surfaces, and a waste ejection member at a rear portion of the top surface. The waste ejection member includes a ramp having a front edge, a back edge, and an inclined portion between the front and back edges. The inclined portion is canted toward the first or second finger.

[020] A further aspect of the invention is directed toward a method for cutting fiber-cement materials. The method includes engaging a first surface of the fiber-cement with guide surfaces of two spaced-apart finger portions of a cutting tool and reciprocating a blade between the fingers in a direction transverse to the guide surfaces along a stroke between an open position and a closed position.

[021] The method then includes moving the fiber-cement and/or the cutting tool relative to the other along a cutting path. The method further includes ejecting waste portions cut from the workpiece away from the blade toward one of the finger portions.

[022] Many specific details of certain embodiments of the invention are set forth in the following description and in Figures 1-5 to provide a thorough understanding of such

embodiments. One skilled in the art, however, will recognize that the invention can be practiced without one or more of the specific details explained in the following description. Moreover, although the following disclosure sets forth several embodiments of different aspects of the invention, several other embodiments of the invention can have different configurations or different components than those described in this section. As such, it should be understood that the invention may have other embodiments with additional elements or without several of the elements shown and described below with reference to Figures 1-5.

B. Embodiments of Hand-Held Cutting Tools With Waste Ejecting Blade Assemblies

[023] Figure 1 is an isometric view of a hand-held cutting tool 10 for cutting a fiber-cement material (FCM) workpiece W. The workpiece W has an upper surface U and a lower surface L. In the illustrated embodiment, the cutting tool 10 is cutting the workpiece W along a cutting line C. As described in detail below, a blade assembly 50 of the cutting tool 10 includes a waste ejection member 90. The waste ejection member 90 is positioned on a cutting member 70 to eject a waste portion (e.g., kerf material) from the workpiece W away from the cutting tool 10 so that the kerf material does not block an operator's line of sight to the cutting line C, thereby enabling the operator (not shown) to make a straight and accurate cut along the cutting line.

[024] The cutting tool 10 shown in Figure 1 has a motor unit 20 with a housing 22, a motor 24 (shown schematically in phantom) inside the housing 22, and a switch 26 operatively coupled to the motor 24. The housing 22 preferably has a handle 27 configured to be gripped by the operator. Suitable electric motor units 20 include the No. 3208-90 electric motor unit manufactured by Black and Decker Corporation and the No. 0201-60 electric motor unit manufactured by Milwaukee Electric Tool Corporation. Suitable pneumatic motor units 20 include the No. 7802 pneumatic motor unit manufactured by Ingersoll-Rand Corporation and the No. 1446E-SLH pneumatic motor unit manufactured by Sioux Tools Incorporated.

[025] The output of the motor unit 20 may be converted into a reciprocal motion with a head 30 having a casing 32 and a reciprocating drive assembly 36 (shown

schematically in phantom). The casing 32 is attached to the housing 22 of the motor unit 20. Additionally, the reciprocating drive assembly 36 is coupled to the motor 24 via a gear assembly 38 (shown schematically in phantom) to translate the rotational output from the motor unit 20 into a reciprocating motion. A suitable head 30 is the shear head manufactured by Kett Tool Co., as set forth by U.S. Patent No. 4,173,069, entitled "Power Shear Head," which is herein incorporated by reference.

[026] The blade set or assembly 50 includes a first finger 60a attached to one side of the head 30, a second finger 60b attached to another side of the head 30, and a cutting member 70 between the first and second fingers 60a and 60b. In one embodiment, the first finger 60a is separable from the second finger 60b. Alternatively, the first and second fingers 60a, 60b can be portions (e.g., integral portions) of a single alignment member. In either embodiment, the first finger 60a has a first guide surface 62a and a first interior surface 64a (shown in phantom). Similarly, the second finger 60b has a second guide surface 62b and a second interior surface 64b. The first and second fingers 60a and 60b are preferably attached to the head 30 to space the first and second interior surfaces 64a and 64b apart from one another by a gap 66 in which the cutting member 70 may be received. Additionally, the first and second guide surfaces 62a and 62b are preferably straight to rest flat on the upper surface U of the workpiece W for aligning the cutting member 70 with the workpiece W. In other embodiments described below with respect to Figures 4A-5, the first and second guide surfaces 62a and 62b can be offset from each other so that the cutting tool 10 does not rest completely flat on the workpiece W when cutting the workpiece.

[027] In operation, a top surface 76 of the cutting member 70 lifts and separates the kerf material (not shown) from the workpiece W with each upward stroke of the cutting member 70. To cut a continuous line through the workpiece W, the operator (not shown) pushes the cutting tool 10 across the workpiece W as the cutting member 70 reciprocates. The kerf material from the workpiece W travels along the top surface 76 of the cutting member 70 to the waste ejection member 90. The kerf material is then ejected outwardly (as shown by the arrow E) away from the cutting member 70 and out of the operator's line of sight to the cutting line C.

[028] Figure 2 is a side elevational view and Figure 3 is a top plan view of the blade assembly 50 illustrated in Figure 1. Referring to Figures 2 and 3 together, the cutting member 70 includes a body 71 with a first width approximately equal to a gap distance G (Figure 3) between the first interior surface 64a of the first finger 60a and the second interior surface 64b of the second finger 60b. In alternate embodiments, the body 71 can have a width less than the gap distance G (Figure 3) and one or more spacers (not shown) can be placed between the body 71 and the interior surfaces 64a-b of the fingers 60a-b. The cutting member 70 also includes a blade 72 projecting from the body 71 between the first and second fingers 60a and 60b. The blade 72 has a first side surface 74 facing the opposite direction as the first interior surface 64a, a second side surface 75 (Figure 3) facing the opposite direction as the second interior surface 64b (Figure 3), and the curved top surface 76. The edge along the top surface 76 and the first side surface 74 defines a first cutting edge 77, and the edge along the top surface 76 and the second side surface 75 (Figure 3) defines a second cutting edge 78 (Figure 3).

[029] As best seen in Figures 1 and 3, the cutting member 70 further includes the waste ejection member 90 at a rear portion 80 of the top surface 76 of the blade 72. The waste ejection member 90 is a ramp positioned to direct the kerf material (not shown) from the workpiece W away from the blade 72 and out of the operator's line of sight to the cutting line C. The waste ejection member 90 includes a front edge 92, a back edge 96, and an inclined surface 94 between the front edge 92 and back edge 96. In the illustrated embodiment, the inclined surface 94 is canted toward the first finger 60a. In other embodiments, the inclined surface 94 may be canted toward the second finger 60b instead of the first finger 60a. The inclined surface 94 can be inclined at an angle of 20 degrees to 80 degrees. In one embodiment, for example, the inclined surface 94 is inclined at an angle of about 45 degrees. In other embodiments, the inclined surface 94 may be inclined at a different angle based on the material being cut and/or the thickness of the workpiece W. The waste ejection member 90 can be an integral portion of the cutting member 70, or the waste ejection member 90 can be a discrete element secured to the cutting member 70 at the desired location.

[030] Referring back to Figure 2, the top surface 76 of the cutting member 70 has a generally constant radius of curvature that is concave with respect to the guide surfaces 62a and 62b of the fingers 60a and 60b. Accordingly, the first and second cutting edges

77 and 78 (Figure 3) are also concave with respect to the workpiece W. The curvature of the top surface 76 extends to be at least approximately coterminous with a front surface 82 of the cutting member 70. The length of the constant curvature on the top surface 76 provides a long cutting region (the portion of the cutting edges 77 and 78 that cut through the workpiece W) that can cut to a front portion 83 of the blade 72 as the blade 72 moves upward between the fingers 60a and 60b.

[031] In the embodiment shown in Figure 3, the first side surface 74 is spaced apart from the first interior surface 64a by a distance S_1 to define a first side space 102. Similarly, the second side surface 75 is spaced apart from the second interior surface 64b by a distance S_2 to define a second side space 104. The spacing between the sides 74 and 75 of the blade 72 and the interior surfaces 64a and 64b of the fingers 60a and 60b may be a function of the overall gap distance G between the fingers 60a and 60b. Additionally, the spacing between the sides of the blade and the fingers may be a function of the thickness and type of fiber-cement material of the workpiece W. For example, when the workpiece W is a fiber-cement panel or plank with a thickness of about 0.25-0.3125 inch, the side distances S_1 and S_2 are between 0.035-0.049 inch, and the gap distance G is approximately 0.25 inch. The spacing between the first and second side surfaces 74 and 75 and the fingers 60a and 60b may be selected by adjusting the thickness of the top surface 76 of the blade 72. In one embodiment, for example, with a gap distance G of 0.25 inch between the fingers 60a and 60b, the top surface 76 of the blade 72 may be 0.14 inch wide. It is expected that the particular dimensions (e.g., S_1, S_2, blade width) of the blade assembly 50 for cutting FCM material may be adjusted relative to the particular characteristics of the workpiece W.

[032] Referring to Figures 2 and 3, the reciprocating cutting member 70 is pivotally coupled to the first and second fingers 60a and 60b by a bushing 110. The bushing 110 is generally cylindrical and has two side portions and a center portion with a larger radius. The center portion is received within an aperture 112 (Figure 3) in the cutting member 70. The two side portions are received within an aperture 114 in each finger 60. The bushing 110 has an aperture 116 to receive a bolt 118 (shown in Figure 1) to secure the bushing 110, the fingers 60a-b and the cutting member 70 to the head 30 (Figure 1). The fingers 60a-b are also fixed to the head 30 by another bolt (not shown), and accordingly, only the cutting member 70 can pivot. In the illustrated embodiment, the

fingers 60a-b are removable so that they can be changed when worn. In several embodiments, each finger 60 can have the same or similar ends so that the individual fingers 60 can be turned around when one end is worn. Furthermore, the first finger 60a is at least similar to the second finger 60b so that the fingers 60a-b are interchangeable. Cutting tools having interchangeable blades are described in greater detail in U.S. Patent Application No. 09/928,259 filed on August 11, 2001, and incorporated by reference herein in its entirety.

[033] The reciprocating cutting member 70 in the illustrated embodiment has a driven end 79 configured to engage the reciprocating drive assembly 36 (shown schematically in Figure 2) of the head 30 (Figure 1). The driven end 79 can have a fork shape with two spaced-apart teeth 73 (Figure 2) that are alternately engaged by a rotating cam of the drive assembly 36. In operation, the motor 24 moves the drive assembly 36 when an operator depresses the switch 26. The drive assembly 36 reciprocates the blade 72 of the cutting member 70 along a reciprocating path R (Figure 2) between an open position (Figures 1 and 2) and a closed position (not shown) in which the top surface 76 of the blade 72 is above the guide surfaces 62a and 62b of the fingers 60a and 60b. In one embodiment, the blade 72 reciprocates at approximately 100-3,000 strokes per minute. As the blade 72 moves from the open position to the closed position, the first cutting edge 77 and the first interior surface 64a shear the workpiece W along one line, and the second cutting edge 78 and the second interior surface 64b shear the workpiece along a parallel line.

[034] One feature of the cutting tool 10 illustrated in Figures 1-3 is that the waste ejection member 90 on the blade 72 enables an operator to consistently make straight and precise cuts in the workpiece W. As described previously, an operator using a conventional cutting tool to make a long cut often encountered problems seeing the cut line because the kerf material would collect at the rear portion of the blade, blocking the operator's view of the line. In contrast, the waste ejection member 90 described above ejects the kerf material from the workpiece W out of the operator's line of sight, thus enabling the operator to view the cut line throughout the cutting operation and make a clean, straight edge along the cut.

C. Additional Embodiments of Hand-Held Cutting Tools with Waste Electing Blade Assemblies

[035] Figure 4A is a front end view of a portion of a cutting tool 410 having a blade assembly 450 configured for cutting an FCM workpiece W in accordance with another embodiment of the invention. The tool 410 can include several features generally similar to the cutting tool 10 described above; like reference numbers accordingly refer to like components in Figures 1-3 and Figure 4A. The cutting tool 410 includes the motor unit (not shown) and the head 30 coupled to the motor unit to operate the blade assembly 450 in a manner generally similar to that discussed above.

[036] In the illustrated embodiment, the blade assembly 450 includes two spaced-apart fingers 460 (identified individually as a first finger 460a and a second finger 460b). The first finger 460a has a first guide surface 462a and a first interior surface 464a. The first guide surface 462a defines a first guide plane that extends transverse to the plane of Figure 4. Similarly, the second finger 460b has a second guide surface 462b and a second interior surface 464b. The second guide surface 462b defines a second guide plane that extends generally parallel to the first guide plane. The first guide plane is offset from the second guide plane by a distance D. The offset distance D is generally small because a large offset will cause inaccurate and/or uneven cuts in the workpiece. For example, the offset distance D can be a distance up to approximately 0.110 inch. More preferably, the offset distance D is approximately 0.0625 inch.

[037] The blade assembly 450 can further include a cutting member 470 pivotally coupled to the head 30 between the fingers 460. The cutting member 470 can be generally similar to the cutting member 70 described above, except that the cutting member 470 does not include the waste ejection member 90. The cutting member 470 includes a body portion 471 coupled to a blade portion 472. The blade portion 472 includes a top surface 476 and a bottom surface 481. The blade portion 472 also has generally flat side surfaces 474 that face opposite the interior surfaces 464a-b of the fingers 460a-b. In one aspect of this embodiment, the side surfaces 474 are generally parallel to the interior surfaces 464a-b of the fingers 460a-b and extend from a top edge 477 (where the side surfaces 474 intersect the top surface 476) to an intermediate edge

478. The cutting member 470 also can have canted surfaces 480 extending from the intermediate edge 478 to the bottom surface 481 and converging toward each other.

[038] Figure 4B is a front end view of the cutting tool 410 of Figure 4A cutting the workpiece W. In operation, the tool 410 is guided along the cutting line C (Figure 1) to sever the workpiece W. The first and second guide surfaces 462a-b rest on the upper surface U of the workpiece W. As mentioned above, the first guide surface 462a is offset from the second guide surface 462b. Accordingly, the tool 410 is slightly tilted with respect to the upper surface U of the workpiece W. In the illustrated embodiment, for example, the tool 410 is slightly tilted from right to left (as shown in Figure 4B) because the second guide plane (i.e., the second guide surface 462a) extends below the first guide plane (i.e., the first guide surface 462b). In other embodiments, the tool 410 may be tilted at a different angle with respect to the workpiece W and/or the tool 410 may be tilted in a different direction.

[039] The blade portion 472 projects below the first and second guide surfaces 462a and 462b and reciprocates up and down between the fingers 460 to cut or sever the workpiece W. As the tool 410 moves along the cut line C (Figure 1), the kerf material (not shown) from the workpiece W is ejected from the blade 472 in the direction of the second guide surface 462b (as shown by the arrow E_2) because of the offset orientation of the tool 410. In this way, the kerf material does not block the operator's line of sight to the cutting line.

[040] The tool 410 can have many of the same advantages as the tool 10 described above with respect to Figures 1-3. For example, the offset orientation of the first and second guide surfaces 462a-b of the cutting tool 410 described above ejects the kerf material from the workpiece W out of the operator's line of sight, thus enabling the operator to view the cut line throughout the cutting operation and make a clean, straight edge along the cut.

[041] Figure 5 is a front end view of a portion of a cutting tool 510 having a blade assembly 550 configured for cutting an FCM workpiece in accordance with yet another embodiment of the invention. The tool 510 can include several features generally similar to the cutting tools 10 and 410 described above with respect to Figures 1-4B. For

example, the tool 510 includes both the waste ejection member 90 and the fingers 460a-b having offset guide surfaces 462a-b. Accordingly, the tool 510 is expected to have many of the same advantages as the cutting tools 10 and 410 described above.

[042] From the foregoing it will be appreciated that, although specific embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

CLAIMS

I/We claim:

1. A blade assembly for a fiber-cement cutting tool, comprising:

a first finger having a first guide surface and a first interior surface transverse to the first guide surface, the first finger being attachable to the cutting tool;

a second finger having a second guide surface and a second interior surface transverse to the second guide surface, the second finger being attachable to the cutting tool to position the first and second guide surfaces in a guide plane and to space the first and second interior surfaces apart from one another; and

a reciprocating cutting member between the first and second fingers, the cutting member having a body and a blade projecting from the body, the body being pivotally coupled to the first and second fingers, the blade having a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, a top surface between the first and second side surfaces, and a waste ejection member at a rear portion of the top surface, the waste ejection member including a ramp having a front edge, a back edge, and an inclined portion between the front and back edges, the inclined portion being canted toward the first or second finger.

2. The blade assembly of claim 1 wherein the inclined portion is canted toward the first finger at an angle of 20 degrees to 80 degrees.

3. The blade assembly of claim 1 wherein the inclined portion is canted toward the first finger at an angle of 45 degrees.

4. The blade assembly of claim 1 wherein the inclined portion is canted toward the second finger at an angle of 20 degrees to 80 degrees.

5. The blade assembly of claim 1 wherein the inclined portion is canted toward the second finger at an angle of 45 degrees.

6. The blade assembly of claim 1 wherein the top surface of the blade has a curvature concave with respect to the first and second guide surfaces.

7. The blade assembly of claim 1 wherein at least a portion of the top surface is configured to be a cutting surface.

8. The blade assembly of claim 1 wherein the top surface has an arcuate portion, and wherein at least a portion of the arcuate portion is configured to be a cutting surface.

9. The blade assembly of claim 1 wherein each of the first and second guide surfaces is flat to lie flush against a face of the workpiece while the workpiece is cut.

10. A blade assembly for a fiber-cement siding cutting tool, comprising:

a first finger having a first guide surface and a first interior surface transverse to the first guide surface, the first finger being attachable to the cutting tool;

a second finger having a second guide surface and a second interior surface transverse to the second guide surface, the second finger being attachable to the cutting tool to position the first and second guide surfaces in a guide plane and to space the first and second interior surfaces apart from one another; and

a reciprocating cutting member between the first and second fingers, the cutting member having a body and a blade projecting from the body, the body being pivotally coupled to the first and second fingers, the blade having a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, a top surface between the first and second side surfaces, and a waste ejection member at a rear portion of the top surface configured to direct a waste portion of the workpiece away from the blade toward the first or second finger.

11. The blade assembly of claim 10 wherein the waste ejection member includes a ramp canted toward the first finger at an angle of 20 degrees to 80 degrees.

12. The blade assembly of claim 10 wherein the waste ejection member includes a ramp canted toward the first finger at an angle of 45 degrees.

13. The blade assembly of claim 10 wherein the waste ejection member includes a ramp canted toward the second finger at an angle of 20 degrees to 80 degrees.

14. The blade assembly of claim 10 wherein the waste ejection member includes a ramp canted toward the second finger at an angle of 45 degrees.

15. The blade assembly of claim 10 wherein the top surface of the blade has a curvature concave with respect to the first and second guide surfaces.

16. The blade assembly of claim 10 wherein at least a portion of the top surface is configured to be a cutting surface.

17. The blade assembly of claim 10 wherein the top surface has an arcuate portion, and wherein at least a portion of the arcuate portion is configured to be a cutting surface.

18. The blade assembly of claim 10 wherein each of the first and second guide surfaces is flat to lie flush against a face of the workpiece while the workpiece is cut.

19. A blade assembly for a fiber-cement siding cutting tool, comprising:

an alignment member attachable to the cutting tool and having a first finger portion with a first guide surface and a first interior surface transverse to the first guide surface, the alignment member further having a second finger portion with a second guide surface and a second interior surface transverse to the second guide surface, the first and second guide surfaces defining a guide plane and the first and second interior surfaces being spaced apart from one another; and

a reciprocating cutting member between the first and second finger portions and movable relative to the finger portions along a path transverse to the guide plane, the cutting member having a blade portion with a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, a top surface between the first and second side surfaces, the top surface having an arcuate portion configured to be a cutting surface, and a ramp at a rear portion of the cutting surface, the ramp including an inclined surface between the first and second edges such that the inclined surface is canted toward the first or second finger.

20. The blade assembly of claim 19 wherein the inclined surface is canted toward the first finger at an angle of 20 degrees to 80 degrees.

21. The blade assembly of claim 19 wherein the inclined surface is canted toward the first finger at an angle of 45 degrees.

22. The blade assembly of claim 19 wherein the inclined surface is canted toward the second finger at an angle of 20 degrees to 80 degrees.

23. The blade assembly of claim 19 wherein the inclined surface is canted toward the second finger at an angle of 45 degrees.

24. The blade assembly of claim 19 wherein the top surface of the blade has a curvature concave with respect to the first and second guide surfaces.

25. The blade assembly of claim 19 wherein each of the first and second guide surfaces is flat to lie flush against a face of the workpiece while the workpiece is cut.

26. A blade assembly for a reciprocating fiber-cement siding cutting tool, comprising:

a first finger having a first guide surface and a first interior surface, the first finger being attachable to the cutting tool to position the first guide surface in a first guide plane;

a second finger having a second guide surface and a second interior surface, the second finger being attachable to the cutting tool to space the first and second interior surfaces apart from one another and to position the second guide surface in a second guide plane, wherein the first and second guide planes are offset from each other; and

a reciprocating cutting member pivotally coupled between the first and second fingers, the cutting member having a body and a blade projecting from the body, the body being pivotally coupled to the first and second fingers, the blade having a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, and a top surface between the first and second side surfaces, the top surface having an arcuate portion configured to be a cutting surface.

27. The blade assembly of claim 26 wherein the first and second guide planes are offset from each other by less than about 0.110 inch.

28. The blade assembly of claim 26 wherein the first and second guide planes are offset from each other by about 0.0625 inch.

29. The blade assembly of claim 26 wherein the first finger has a first top surface opposite the first guide surface and a first thickness between the first top surface and the first guide surface and the second finger has a second top surface opposite the second guide surface and a second thickness between the second top surface and the second guide surface, and wherein the first thickness is greater than the second thickness.

30. The blade assembly of claim 26 wherein the first finger has a first top surface opposite the first guide surface and a first thickness between the first top surface and the first guide surface; and the second finger has a second top surface opposite the second guide surface and a second thickness between the second top surface and the second guide surface, and wherein the first thickness is greater than the second thickness by about 0.0625 inch.

31. The blade assembly of claim 26 wherein the first finger has a first top surface opposite -the first guide surface and a first thickness between the first top surface and the first

guide surface and the second finger has a second top surface opposite the second guide surface and a second thickness between the second top surface and the second guide surface, and wherein the second thickness is greater than the first thickness.

32. The blade assembly of claim 26 wherein the first finger has a first top surface opposite the first guide surface and a first thickness between the first top surface and the first guide surface and the second finger has a second top surface opposite the second guide surface and a second thickness between the second top surface and the second guide surface, and wherein the second thickness is greater than the first thickness by about 0.0625 inch.

33. A blade assembly for a reciprocating fiber-cement siding cutting tool, comprising:

a first finger having a first guide surface and a first interior surface, the first finger being attachable to the cutting tool to position the first guide surface in a first guide plane;

a second finger having a second guide surface and a second interior surface, the second finger being attachable to the cutting tool to space the first and second interior surfaces apart from one another and to position the second guide surface in a second guide plane, wherein the first and second guide surfaces are offset from each other; and

a reciprocating cutting member between the first and second fingers, the cutting member having a body and a blade projecting from the body, the body being pivotally coupled to the first and second fingers, the blade having a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, a top surface between the first and second side surfaces, and a waste ejection member at a rear portion of the top surface, the waste ejection member including a ramp having a front edge, a back edge, and an inclined portion between the front and back edges, the inclined portion being canted toward the first or second finger.

34. A cutting member for a hand-held cutting tool having a motor, a casing having a support adapted to carry a pair of fixed cutting blades in a spaced-apart

relationship, the cutting member positioned to pivot about a transverse axis to reciprocate between the fixed cutting blades, the cutting member comprising:

a body operatively coupled to the motor;

a blade projecting from the body, the blade having spaced-apart first and secondside surfaces and a top surface between the first and second side surfaces; and

a waste ejection member at a distal portion of the top surface, the waste ejection member including a ramp having a front edge, a back edge, and an inclined surface between the front and back edges, the inclined surface being canted toward one of the fixed cutting blades.

35. A fiber-cement cutting tool, comprising:

a hand-held motor unit having a housing, a motor inside the housing, and a switch operatively coupled to the motor to selectively activate the motor;

a head having a casing attached to the housing of the motor unit and a reciprocating drive assembly coupled to the motor;

a first finger attachable to the head or motor unit, the first finger having a first guide surface and a first interior surface transverse to the first guide surface;

a second finger having a second guide surface and a second interior surface transverse to the second guide surface, the second finger being attachable to the head or motor unit to position the first and second guide surfaces in a guide plane and to space the first and second interior surfaces apart from one another; and

a reciprocating cutting member between the first and second fingers for severing fiber-cement along a cutting path, the cutting member having a body and a blade projecting from the body, the body being pivotally coupled to the first and second fingers, the blade having a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, a top surface between the first and second side surfaces, and a waste ejection member at a rear portion of the top surface, the waste ejection member including a ramp having a front edge, a back edge, and an inclined portion between the front and back edges, the inclined portion being canted toward the first or second finger.

36. A fiber-cement cutting tool, comprising:

a hand-held motor unit having a housing, a motor inside the housing, and a switch operatively coupled to the motor to selectively activate the motor;

a head having a casing attached to the housing of the motor unit and a reciprocating drive assembly coupled to the motor;

a first finger having a first guide surface and a first interior surface, the first finger being attachable to the head or motor unit to position the first guide surface in a first guide plane;

a second finger having a second guide surface and a second interior surface, the second finger being attachable to the head or motor unit to space the first and second interior surfaces apart from one another and to position the second guide surface in a second guide plane, wherein the first and second guide planes are offset from each other; and

a reciprocating cutting member pivotally coupled between the first and second fingers, the cutting member having a body and a blade projecting from the body, the body being pivotally coupled to the first and second fingers, the blade having a first side surface facing the first interior surface of the first finger, a second side surface facing the second interior surface of the second finger, and a top surface between the first and second side surfaces, the top surface having an arcuate portion configured to be a cutting surface.

37. A method for cutting fiber-cement, comprising:

engaging a first surface of the fiber-cement with guide surfaces of two spaced-apart finger portions of a cutting tool;

reciprocating a blade between the fingers in a direction transverse to the guide surfaces along a stroke between an open position and a closed position;

moving the fiber-cement and/or the cutting tool relative to the other along a cutting path; and

ejecting waste portions cut from the workpiece away from the blade toward one of the finger portions.

38. The method of claim 37 wherein ejecting waste portions of the workpiece comprises redirecting the waste portions toward the first or second finger with a waste ejection member at a rear portion of the top surface of the blade.

39. The method of claim 37 wherein engaging a first surface of the fibercement with guide surfaces of two spaced-apart finger portions comprises engaging the fibercement with a first guide surface having a first guide plane and a second guide surface having a second guide plane, and wherein the first and second guide planes are offset from each other such that at least one of the first and second guide surfaces does not lie flush against the face of the workpiece while the workpiece is cut.

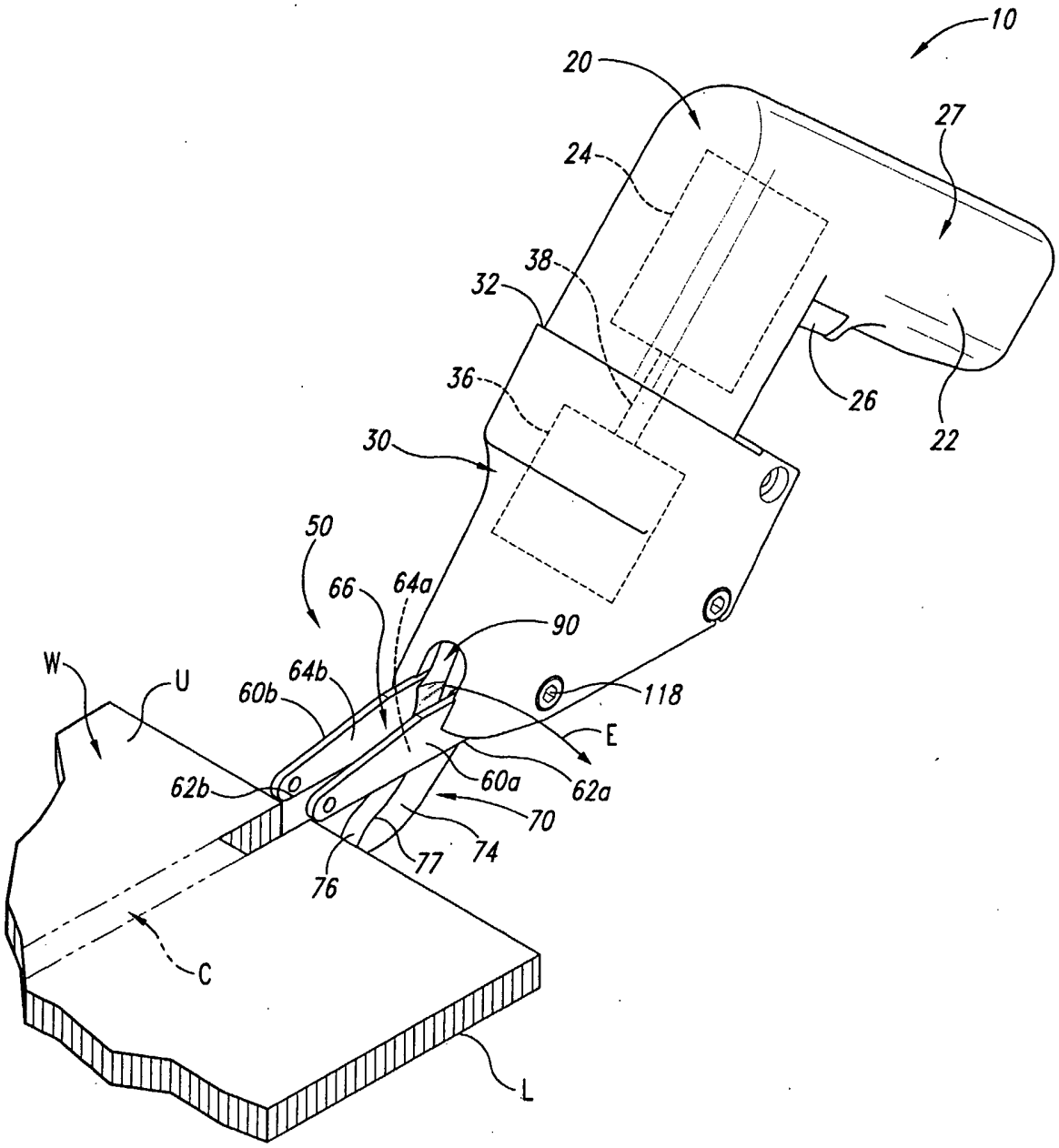
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Fig. 1

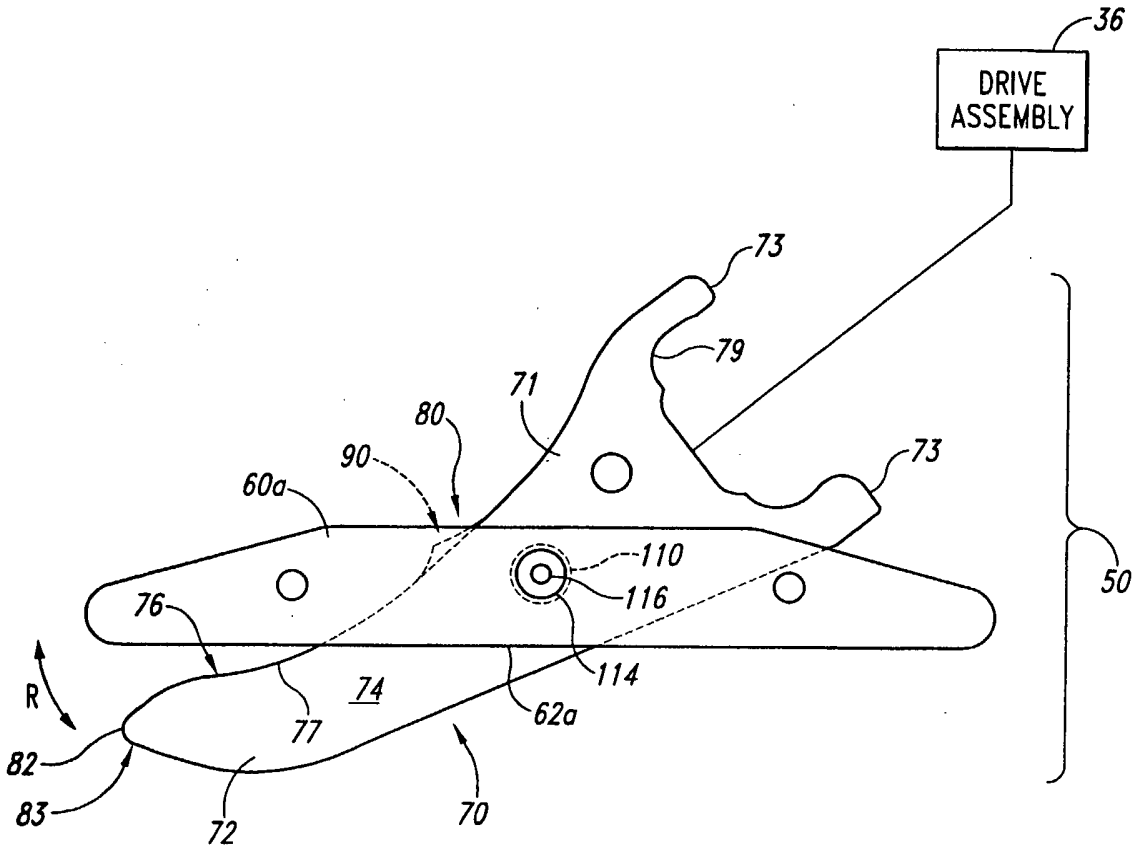
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Fig. 2

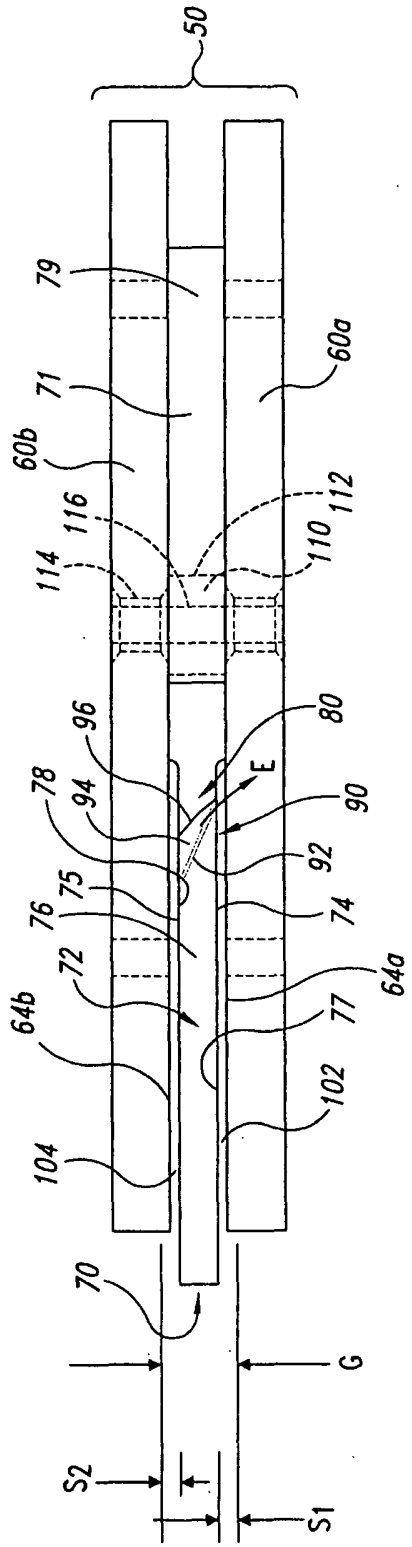
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Fig. 3

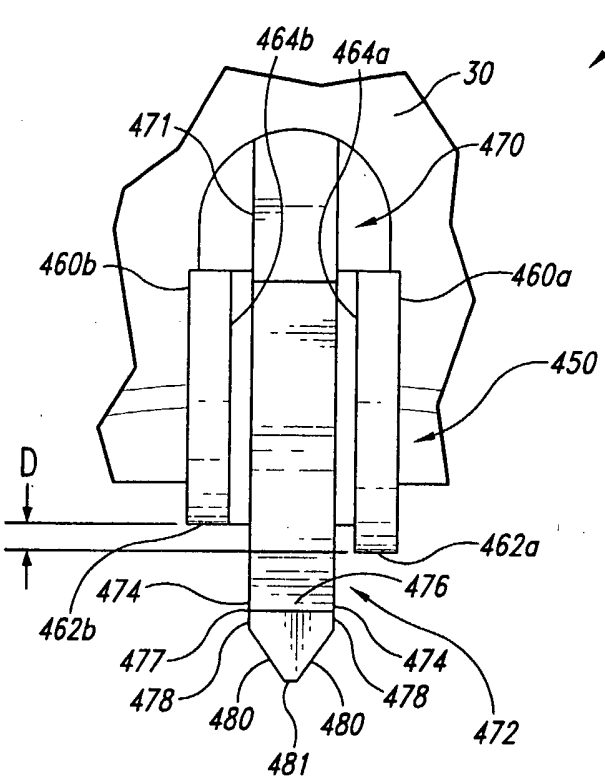
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Fig. 4A

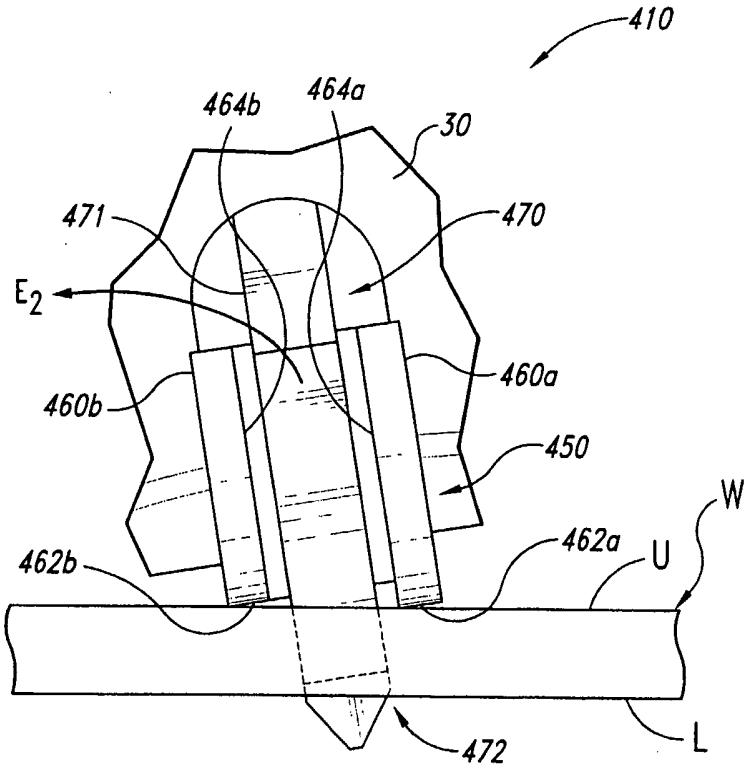
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Fig. 4B

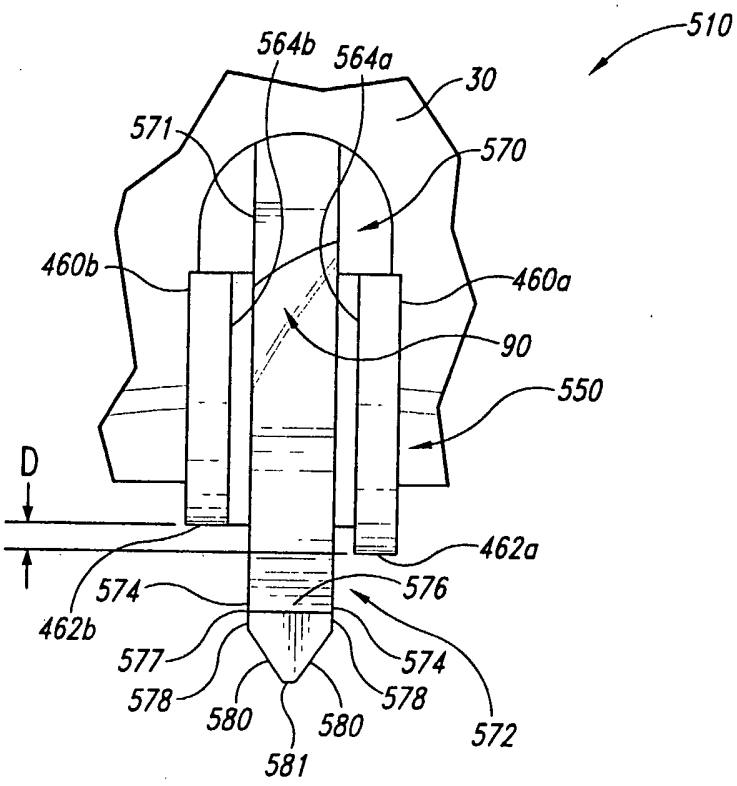
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Fig. 5