

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO	
RAD: 14-166919- -3	FECHA: 2015-07-28 13:51:49
DEP: 2020 DIRECCION DE NUEVAS CREACIONES	EVE: 378 FASE NACIONAL INCLUIDO CAPITULO I
TRA: 11 PCT-PATENTE DE INVENCION CAPITULOS I Y II	FOLIOS: 9
ACT: 519 TRASLADOINFORME	

DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado(a)/Señor(a)
LUZ CLEMENCIA DE PÁEZ

Asunto: Radicación: 14-166919- -3
Trámite: 11
Evento: 378
Actuación: 519
Oficio: 8919
Folios: 9

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/US2013/026109				
Fecha de Presentación Internacional	14/02/2013				

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° 14-166919-00000-0000	31/Julio/2014
Reivindicaciones:	Rad. N° 14-166919-00000-0000	31/Julio/2014
Dibujos:	Rad. N° 14-166919-00000-0000	31/Julio/2014
Prioridad:	US 61/600,437	17/Febrero/2012

2. Análisis de la Prioridad

Se acepta la reivindicación de prioridad porque ésta solicitud fue presentada dentro del plazo establecido (Art. 9 D 486) y su contenido técnico corresponde con el de la prioridad reivindicada.

3. 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 estudiarán las reivindicaciones 1 a 38.

Título de la solicitud: "Conjunto de desgaste" (Fl. 1).

El problema planteado en esta solicitud consiste en lograr elementos que pueda instalarse en equipos de minería y excavaciones, que soporten grandes cargas y esfuerzos generados cuando estén en funcionamiento y expuestos a materiales muy abrasivos.

Para resolver este problema técnico, la solicitud en estudio propone un conjunto de desgaste para equipos para movimiento de suelos que consta de una parte de montaje, una parte de trabajo y un área reductora de tensión.

El objeto de la presente solicitud se relaciona con la Clasificación Internacional de Patentes (CIP): E 02 F 9/28.

4. De la solicitud de patente

Título

El título es de carácter general y no refleja de forma clara el objeto de la invención. Se sugiere al solicitante modificar el título de tal manera que refleje dicho objeto, en lo posible, refiriéndose a alguna característica constructiva del objeto reclamado. Por ejemplo: "Herramienta para movimiento de suelos con base de montaje y porción desgastable"

Reivindicaciones (Art 30 D 486, Art 22 PCT)

El capítulo reivindicatorio no es claro porque:

- Las reivindicaciones 6, 12, 14, 18, 21, 33 y las expresiones: "...el área reductora de tensión proporciona flexibilidad entre la parte de montaje y la parte de trabajo." (reivindicación 1) "...para envolverse alrededor de un borde de excavación del equipo para movimiento de suelos." (reivindicación 5), "...para recibir la pieza de desgaste..." (reivindicación 7), "...para asegurar la pieza de desgaste a la base." (reivindicación 15), "...donde las cargas se aplican al asiento durante las operaciones de movimiento de suelos y se transfieren a través de las bridas al equipo para movimiento de suelos." (reivindicación 17), "...adaptada para soldarla al borde excavador de una cuchara excavadora..." (reivindicación 17), "...donde el reductor de tensión es más flexible que el asiento y la brida soldada..." (reivindicación 17), "...para apoyar contra la característica de retención de la base y sujetar la pieza de desgaste a la base." (reivindicación 24), "...adaptada para formar parte del exterior de la cuchara..." (reivindicación 30), "...adaptada para contactarse con el suelo durante el funcionamiento del equipo para movimiento de suelos..." (reivindicación 35); 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 la reivindicación y las expresiones citadas.

- Las expresiones “...y el material de reductor de tensión es más dúctil que el material del asiento.” (reivindicación 13), “...donde el reductor de tensión comprende un primer material y el asiento comprende un segundo material donde el primer material es más dúctil que el segundo material.” (reivindicación 22), “...el reductor de tensión es más estrecho y forma una región angostada.” (reivindicación 23), “una superficie amplia” (reivindicación 37), son de carácter relativo y general por lo cual no permite distinguir la invención del estado de la técnica. Lo anterior, teniendo en cuenta que no se especifica el material al que se refieren las reivindicaciones citadas y las expresiones “más estrecho”, “angostada” y “amplia” no tienen referencia a ninguna otra característica. Además, por la forma como están redactadas dichas expresiones, pueden también considerarse como resultados a alcanzar. Se sugiere al solicitante eliminar dichas expresiones.
- Las expresiones “...donde la parte de montaje está fijada al equipo para movimiento de suelos...” (Reivindicación 1), “...adaptada para soldarla al borde excavador de una cuchara excavadora, donde la cuchara tiene una cara interior, una cara exterior y una cara frontal del borde...”, “...a lo largo de las caras interior y exterior del borde excavador y está separada del borde excavador...”, “...asegurada en la cara interior del borde de excavación...” (reivindicación 24), al mencionar donde puede instalarse la invención, se refieren a la forma como se utiliza el producto reclamado. Asimismo, el equipo para movimiento de suelos y sus componentes son objetos ajenos al componente de desgaste como tal. Por lo tanto, se sugiere al solicitante eliminar las expresiones citadas y hacer referencia solamente al componente de desgaste.

5. 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: febrero 17 de 2012, y se encontraron los siguientes documentos que anticipan el objeto de esta solicitud:

Ítem	Documento	Título	Fecha de Publicación
D1	US 6'145.224	'Ground engaging tolors dor earthworking implements and retainer therefor'	14/Nooviembre/2000
D2	US 2007/0204490	'Wear assembly'	06/Septiembre/2007

El documento D1¹ divulga un implemento para trabajo de tierra adaptado para el movimiento de suelos en una dirección primaria, que consta de una herramienta de movimiento de suelo reemplazable retenida en una porción de herramienta de montaje por medio de un retenedor elongado (resumen).

El documento D2² divulga un ensamble de desgaste para proteger el borde frontal de un canelón de excavación que elimina cualquier necesidad de agujeros en el labio (resumen).

6. Examen de Patentabilidad (Art 14 D486)

1 <https://docs.google.com/viewer?url=patentimages.storage.googleapis.com/pdfs/US6145224.pdf>

2 <https://docs.google.com/viewer?url=patentimages.storage.googleapis.com/pdfs/US20070204490.pdf>

Novedad (Art 16 D486)

La reivindicación 1 consiste en: *“Un componente de desgaste para equipos para movimiento de suelos que comprende una parte de montaje, una parte de trabajo y un atea reductora de tensión entre la parte de montaje y la parte de trabajo....”* (Ver página 23 del radicado N° 14-166919-00000-0000).

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

Características esenciales	D1	D2
Componente de desgaste caracterizado por:	Herramienta para movimiento de suelo caracterizada por:	Ensamble de desgaste caracterizado por:
Una parte de montaje.	Una parte de montaje (14, 29) (Fig. 6; Col. 3, líneas 33 a 38).	Una parte de montaje (21, 22) (Fig. 8; Párr. [0022]).
Una parte de trabajo.	Una parte de trabajo (34) (Fig. 6; Col. 3, líneas 44 a 49).	Una parte de trabajo (49) (Fig. 8; Párr. [0026]).
Un área reductora de tensión entre la parte de montaje y la parte de trabajo.	Un área reductora de tensión (28, 106, 6, 48) entre la parte de montaje y la parte de trabajo (Fig.6).	Un área reductora de tensión (27) entre la parte de montaje y la parte de trabajo (Fig.8).

De acuerdo con la tabla anterior, las características esenciales del componente 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:

- Reivindicación 2: La parte de montaje (14,29) se extiende a cada lado de la parte de trabajo (34) y dicha área reductora de tensión (18, 106, 6) está entre la parte de montaje y la parte de trabajo (D1: Figs. 4 y 6).
- Reivindicación 4: Dicha parte de montaje (14, 29) está orientada hacia atrás de la parte de trabajo (34) (D1: Figs. 4 y 6).
- Reivindicación 5: La parte de trabajo (34) es un asiento que recibe y soporta la pieza de desgaste (18) (D1: Figs. 3).

La reivindicación 17 consiste en: *“Una base para montar una pieza de desgaste en la superficie de un equipo para movimiento de suelos, que incluye:..”* (Ver página 25 del radicado N° 14-166919-00000-0000).

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

Características esenciales	D1	D2
Base para montar una pieza de desgaste caracterizada por:	Herramienta para movimiento de suelo caracterizada por:	Ensamble de desgaste caracterizado por:
Bridas soldadas en extremos opuestos de la base, cada una de dichas bridas soldadas esta acoplada a la superficie con soldaduras.	Un borde de corte (12) sobre el cual es montado por soldadura una pluralidad de bridas de montaje (14). Cada brida de montaje (14) tiene una porción (16) para montar de manera reemplazable una herramienta para movimiento de suelo (18) (Col. 2, líneas 65 a 67; Col. 3,	Una base (20) que cuenta con una primera pierna (21) que incluye agujeros (27) para facilitar el soldado de la base al labio. Soldadura también es provista a lo largo del elemento (30) y ranuras (31) en el final de la segunda pierna (22) (Párr. [0022]). La cara frontal (49) de la
Un asiento entre las bridas soldadas, el asiento carece de soldaduras con la superficie.		

	líneas 1 a 4).	base tiene una forma curva uniforma para proveer una
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De acuerdo con la tabla anterior, las características esenciales de la base de la reivindicación 17 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:

- Reivindicación 19: Un área reductora de tensión (28, 106, 6, 48) entre la parte de montaje y la parte de trabajo (D1: Fig.6). Un área reductora de tensión (27) entre la parte de montaje y la parte de trabajo (D2: Fig.8).
- Reivindicación 20: Los reductores de tensión incluyen ranuras transversales (D1: (6), Fig. 4), (D2: (27), Fig. 8).

La reivindicación 24 consiste en: *“Un conjunto de desgaste que comprende: una base adaptada para soldarla al borde excavador de una cuchara...”* (Ver páginas 25 y 26 del radicado N° 14-166919-00000-0000).

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

Características esenciales	D1	D2
Un conjunto de desgaste que comprende:	Herramienta para movimiento de suelo caracterizada por:	Ensamble de desgaste caracterizado por:
Una base.	Un borde de corte (12) sobre el cual es montado por soldadura una pluralidad de bridas de montaje (14). Cada brida de montaje (14) tiene una porción (16) para montar de manera reemplazable una herramienta para movimiento de suelo (18) (Col. 2, líneas 65 a 67; Col. 3, líneas 1 a 4).	Una base (20) que cuenta con una primera pierna (21) que incluye agujeros (27) para facilitar el soldado de la base al labio. Soldadura también es provista a lo largo del elemento (30) y ranuras (31) en el final de la segunda pierna (22) (Párr. [0022]). La cara frontal (49) de la base tiene una forma curva uniforme para proveer una superficie suave para el miembro de desgaste (15) (Párr. [0026]).
Un asiento.		
Una brida soldada en la parte de atrás del asiento.		
Una característica de retención.	El retenedor (22) se posiciona en las ranuras (28) y (54) de la base y la herramienta de movimiento de suelo (18) (Col. 4, líneas 51 a 58).	La base (20) comprende una pierna interior (22) que incluye un soporte (50) para la traba (56). La pierna (72) de la pieza de desgaste incluye una abertura (86) adaptada para recibir la traba (56) (Párrs. [0026] y [0032]).
Una pieza de desgaste se recibe sobre la base e incluye una abertura alineada generalmente con la característica de retención.		
Una traba se recibe en la abertura.		
Donde el asiento está acoplado con la brida soldada mediante un reductor de tensión.	Un área reductora de tensión (28, 106, 6, 48) entre la parte de montaje y la parte de trabajo (Fig.6).	Un área reductora de tensión (27) entre la parte de montaje y la parte de trabajo (Fig.8).

De acuerdo con la tabla anterior, las características esenciales de la base de la reivindicación 24 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:

- Reivindicación 25: La pieza de desgaste incluye patas separadas donde una primera pata incluye una abertura y la segunda pata es más corta que la primera pata (D1: Figs. 3 y 5; D2: Figs. 6 y 7).
- Reivindicación 26: La base define un eje longitudinal y la pieza de desgaste se recibe sobre la base a lo largo de ese eje (D1: Figs. 2 y 3).
- Reivindicación 27: La base (20) comprende una pierna interior (22) que incluye un soporte (50) para la traba (56) (D2: Párr. [0026]).
- Reivindicación 29: Un borde de corte (12) sobre el cual es montado por soldadura una pluralidad de bridas de montaje (14) (D1: Col. 2, líneas 65 a 67). Una base (20) que cuenta con una primera pierna (21) que incluye agujeros (27) para facilitar el soldado de la base al labio. Soldadura también es provista a lo largo del elemento (30) y ranuras (31) en el final de la segunda pierna (22) (D2: Párr. [0022]).

La reivindicación 30 consiste en: *“El labio de una cuchara de excavación que tiene una estructura interna ahuecada y una superficie exterior que comprende:...”* (Ver página 27 del radicado N° 14-166919-00000-0000).

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

Características esenciales	D1	D2
El labio de una cuchara de excavación caracterizada porque:	Herramienta para movimiento de suelo caracterizada por:	Ensamble de desgaste caracterizado por:
Una superficie superior, una superficie inferior y una cara frontal del borde que se extiende a través de la parte frontal del elemento principal interconectando las superficies superior e inferior.	Una superficie superior, una superficie inferior y una cara frontal del borde que se extiende a través de la parte frontal del elemento principal interconectando las superficies superior e inferior (Figs. 1 a 3).	Una superficie superior, una superficie inferior y una cara frontal del borde que se extiende a través de la parte frontal del elemento principal interconectando las superficies superior e inferior (Fig. 1).
Una base para montar una pieza de desgaste en el elemento principal que incluye un asiento desasociado del labio que recubre el elemento frontal, una brida soldada en la parte de atrás del asiento soldada a la superficie superior del labio y una segunda brida soldada en la parte de atrás del asiento soldada a la superficie inferior del labio.	Un borde de corte (12) sobre el cual es montado por soldadura una pluralidad de bridas de montaje (14). Cada brida de montaje (14) tiene una porción (16) para montar de manera reemplazable una herramienta para movimiento de suelo (18) (Col. 2, líneas 65 a 67; Col. 3, líneas 1 a 4).	Una base (20) que cuenta con una primera pierna (21) que incluye agujeros (27) para facilitar el soldado de la base al labio. Soldadura también es provista a lo largo del elemento (30) y ranuras (31) en el final de la segunda pierna (22) (Párr. [0022]). La cara frontal (49) de la base tiene una forma curva uniforme para proveer una superficie suave para el miembro de desgaste (15) (Párr. [0026]).

De acuerdo con la tabla anterior, las características esenciales de la base de la reivindicación 30 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:

- Reivindicación 34: El retenedor (22) se posiciona en las ranuras (28) y (54) de la base y la herramienta de movimiento de suelo (18) (D1: Col. 4, líneas 51 a 58). La base (20) comprende una pierna interior (22) que incluye un soporte (50) para la traba (56). La pierna (72) de la pieza de desgaste incluye una abertura (86) adaptada para recibir la traba (56) (D2: Párrs. [0026] y [0032]).

La reivindicación 35 consiste en: *“Un equipo para movimiento de suelos, que comprende: una superficie desgastable adaptada para contactarse:...”* (Ver página 28 del radicado N° 14-166919-00000-0000).

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

Características esenciales	D1	D2
El labio de una cuchara de excavación caracterizada porque:	Herramienta para movimiento de suelo caracterizada por:	Ensamble de desgaste caracterizado por:
Una superficie desgastable.	Una superficie desgastable (Figs. 1 a 3).	Una superficie desgastable (Fig. 1).
Un componente de desgaste asegurado a la superficie desgastable, el componente de desgaste incluye una parte de trabajo y una parte de soldadura en cada uno de los lados opuestos de la parte de trabajo, cada una de las partes de soldadura esta soldada a la superficie de desgaste, y la parte de trabajo carece de soldadura con la superficie desgastable.	Un borde de corte (12) sobre el cual es montado por soldadura una pluralidad de bridas de montaje (14). Cada brida de montaje (14) tiene una porción (16) para montar de manera reemplazable una herramienta para movimiento de suelo (18) (Col. 2, líneas 65 a 67; Col. 3, líneas 1 a 4).	Una base (20) que cuenta con una primera pierna (21) que incluye agujeros (27) para facilitar el soldado de la base al labio. Soldadura también es provista a lo largo del elemento (30) y ranuras (31) en el final de la segunda pierna (22) (Párr. [0022]). La cara frontal (49) de la base tiene una forma curva uniforme para proveer una superficie suave para el miembro de desgaste (15) (Párr. [0026]).

De acuerdo con la tabla anterior, las características esenciales de la base de la reivindicación 35 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:

- Reivindicación 36: La superficie desgastable es un borde de excavación con superficies interior y exterior, y la base se envuelve alrededor del borde de excavación con dicha parte de soldadura soldada a la superficie interior y otra dicha parte de soldadura soldada a la superficie exterior (D1: Figs. 1 a 3; Col. 2, líneas 65 a 67; Col. 3, líneas 1 a 4; D2: Fig. 1; Párr. [0026]).
- Reivindicación 37: La superficie desgastable es una superficie amplia y la base recubre la superficie desgastable con cada dicha parte de soldadura soldada a la superficie desgastable (D1: Figs. 1 a 3; D2: Fig. 1).
- Reivindicación 38: Un área reductora de tensión (28, 106, 6, 48) entre la parte de montaje y la parte de trabajo (D1: Fig.6). Un área reductora de tensión (27) entre la parte de montaje y la parte de trabajo (D2: Fig.8).

Las reivindicaciones 6, 12, 14, 18, 21, 22, 23 y 33 fueron afectadas en el numeral 5 de la presente comunicación.

7. Conclusión

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

Ítem	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	US 6'145.224	1, 2, 4, 5, 17, 19, 20, 24, 25, 26, 29, 30, 34, 35, 36, 37, 38	Novedad/Nivel Inventivo
D2	US 2007/0204490	1, 17, 19, 20, 24, 25, 27, 29, 34, 35, 36, 37, 38	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.



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El anterior requerimiento fue notificado por fijación en lista, de fecha 2015-08-04

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



US006145224A

United States Patent [19]

Stickling

[11] **Patent Number:** **6,145,224**
[45] **Date of Patent:** **Nov. 14, 2000**

[54] **GROUND ENGAGING TOOLS FOR EARTHWORKING IMPLEMENTS AND RETAINER THEREFOR**

5,881,150 3/1999 Persson 379/433
5,937,551 8/1999 Moehnke et al. 37/459

FOREIGN PATENT DOCUMENTS

1652484 1/1972 Germany .
WO 98/44208 10/1998 WIPO .
WO 99/23315 5/1999 WIPO .

OTHER PUBLICATIONS

U.S. application Serial No. 08/825,822, filed Mar. 31, 1997.

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Assistant Examiner—Meredith C. Petravick
Attorney, Agent, or Firm—O. Gordon Pence

[75] Inventor: **Christopher J. Stickling**, Dunlap, Ill.

[73] Assignee: **Caterpillar Inc.**, Peoria, Ill.

[21] Appl. No.: **09/187,678**

[22] Filed: **Nov. 6, 1998**

[51] **Int. Cl.**⁷ **E02F 9/28**

[52] **U.S. Cl.** **37/458; 37/456**

[58] **Field of Search** 37/458, 457, 456,
37/455

[57] **ABSTRACT**

An earthworking implement adapted to normally engage the ground in a primary direction of travel has a replaceable ground engaging tool retained onto a tool mounting portion of the implement by an elongated retainer. The tool mounting portion has an exterior surface with a first retainer pocket providing a first abutment surface facing in a direction substantially away from the primary direction of travel. The ground engaging tool, in turn, has an interior surface with a second retainer pocket positionable in alignment with the first retainer pocket and provides a second abutment surface disposed in a generally spaced, diametrically opposing relationship to the first abutment surface. An elongated retainer is positionable within the retainer pockets and has a pair of opposite solid end portions oriented to abut the first and second abutment surfaces such that the end portions restrict the tool from coming off the mounting portion in the direction of the primary direction of travel.

[56] **References Cited**

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5,423,138	6/1995	Livesay et al.	37/456
5,724,756	3/1998	Gale	37/458
5,765,301	6/1998	Clendenning	37/457

20 Claims, 5 Drawing Sheets

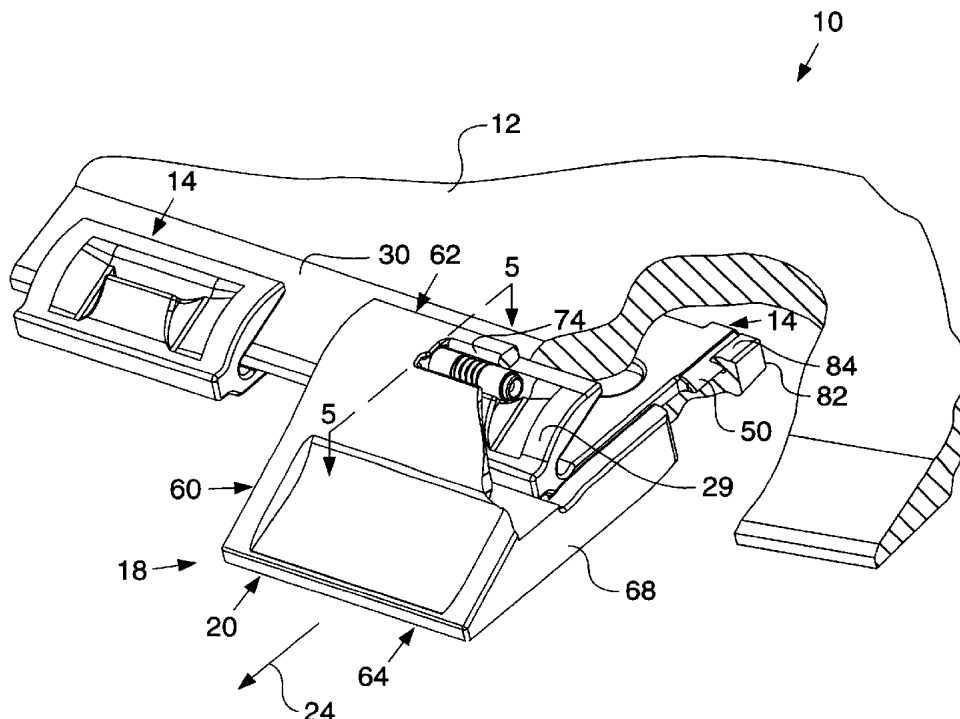


FIG. 1

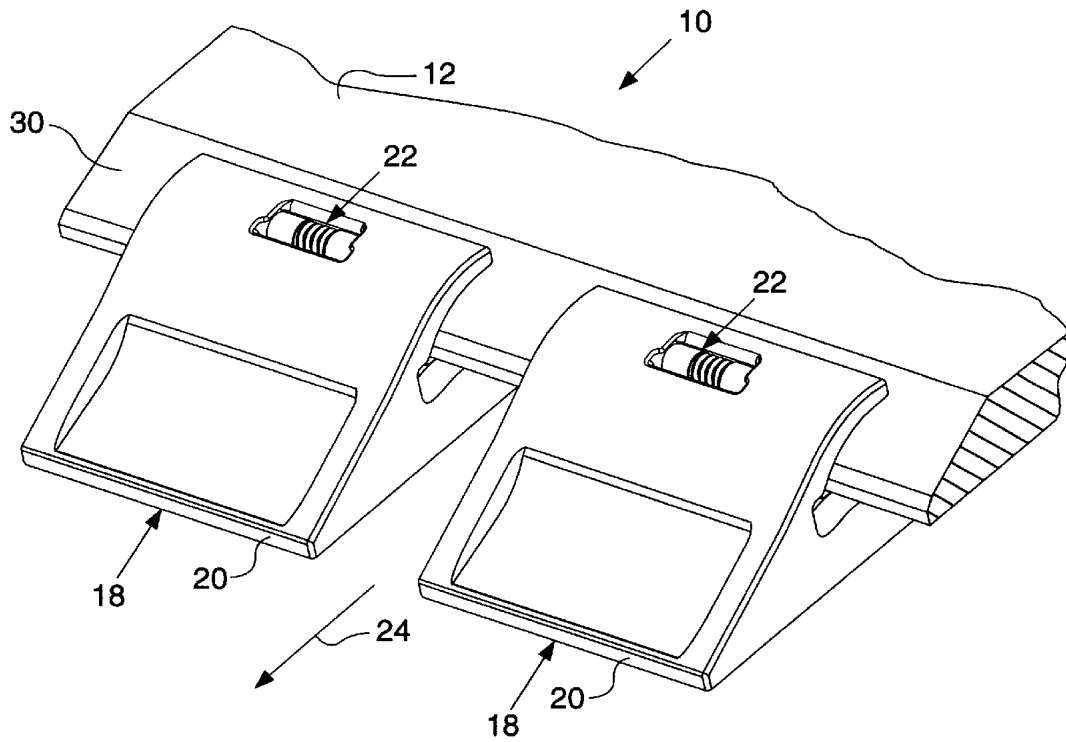


FIG. 2

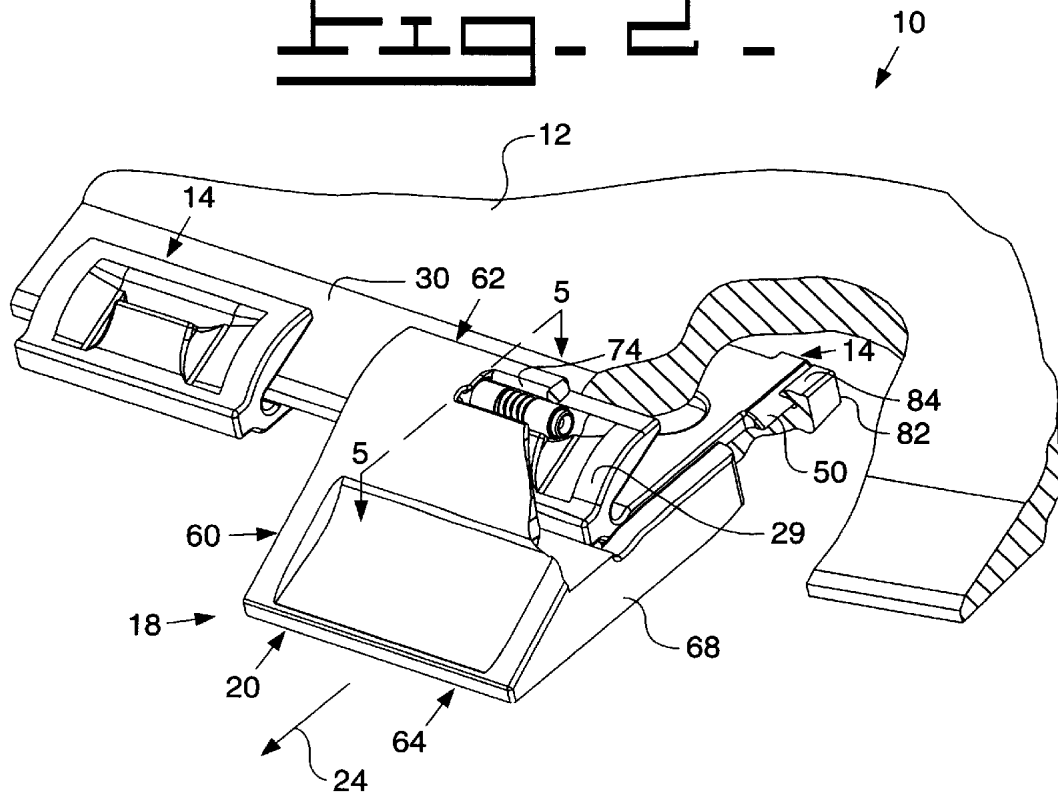


FIG. 3.

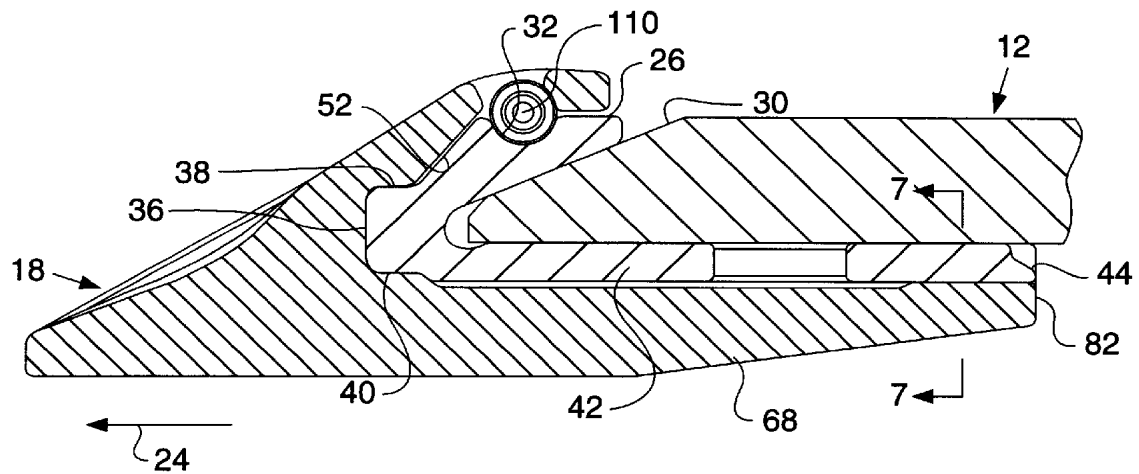


FIG. 4.

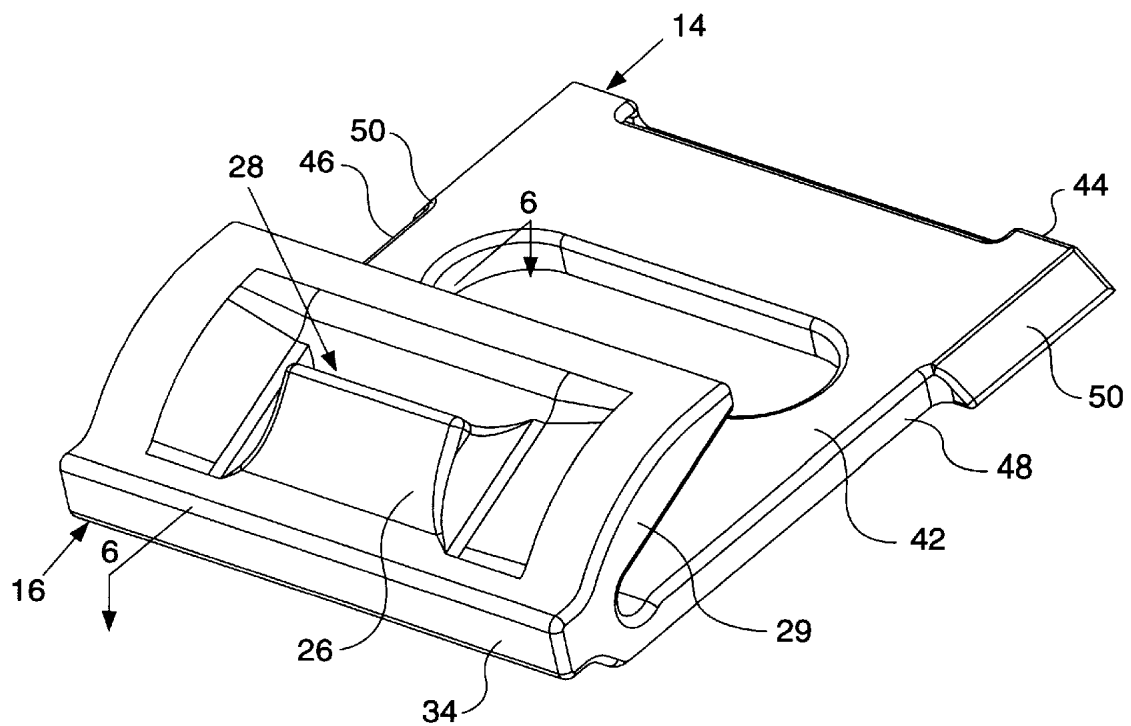


FIG. 5.

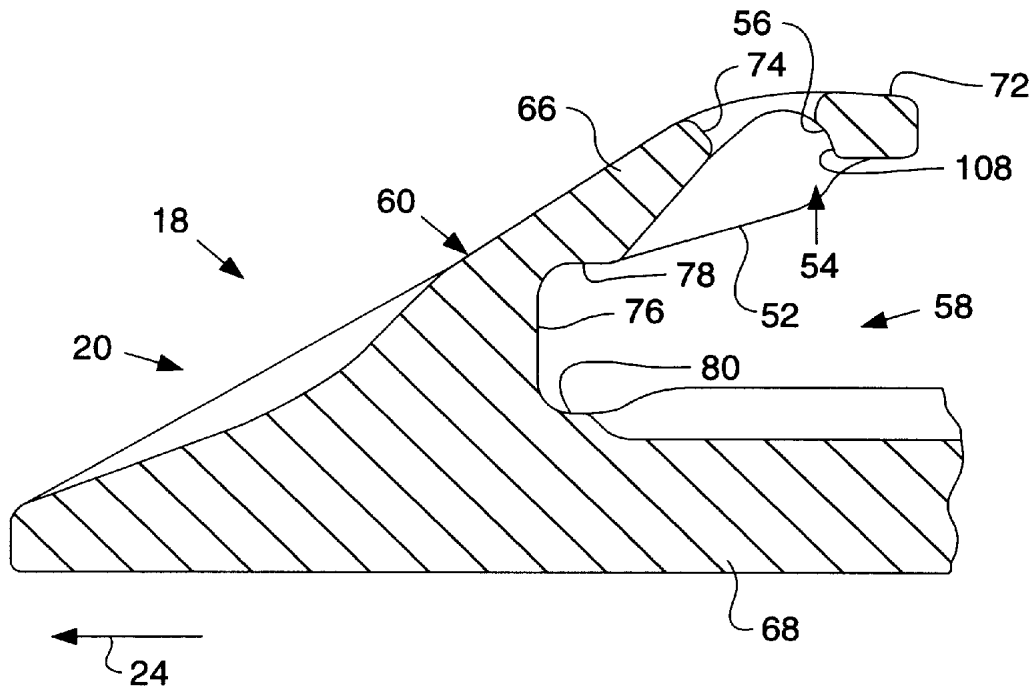


FIG. 6.

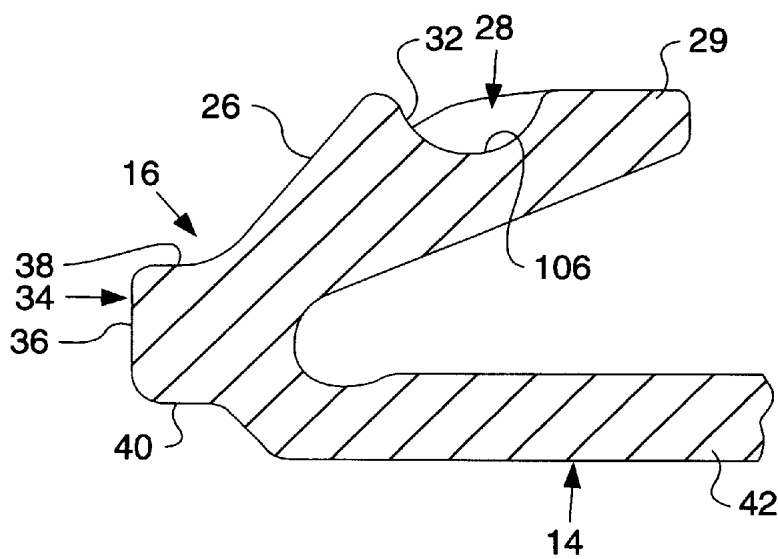


FIG. 7.

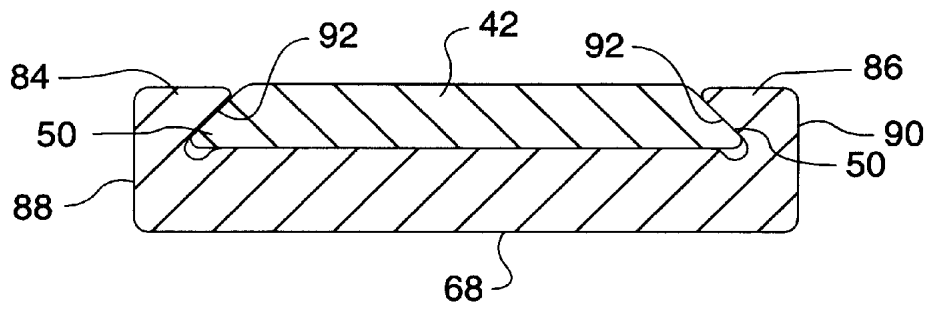


FIG. 8.

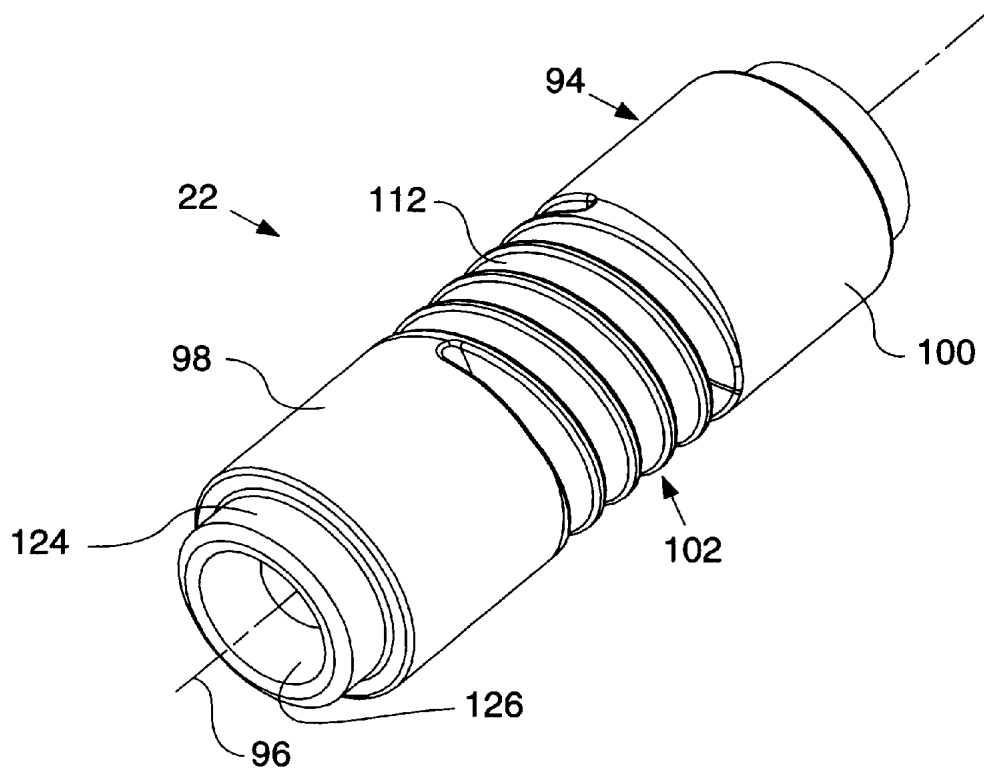


FIG. 9

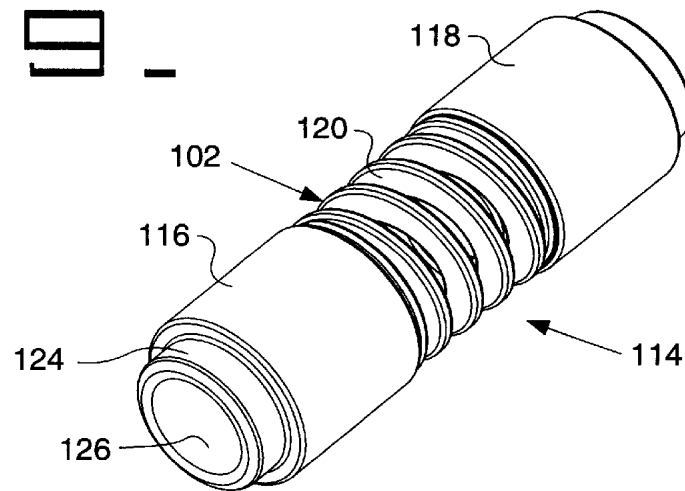


FIG. 10

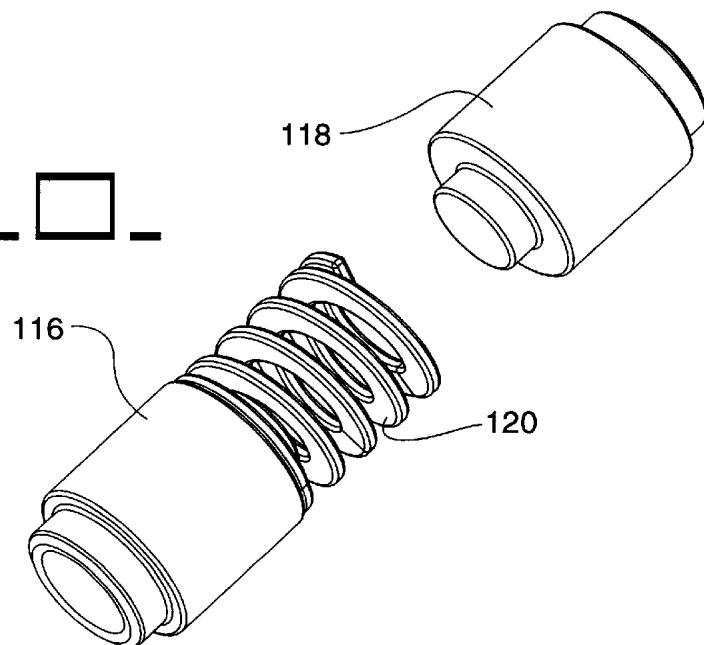
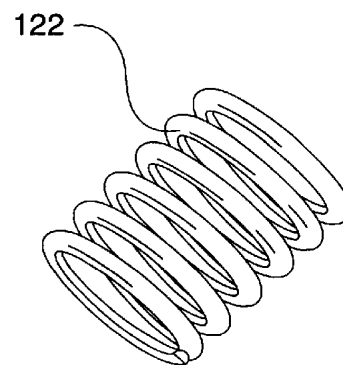


FIG. 11



GROUND ENGAGING TOOLS FOR EARTHWORKING IMPLEMENTS AND RETAINER THEREFOR

TECHNICAL FIELD

The present invention relates generally to ground engaging tools for earthworking implements and the like and, more particularly, to a compression retainer for detachably retaining a replaceable tool onto such implements.

BACKGROUND ART

Earthworking implements, such as buckets for loaders and excavators, bulldozers blades or rippers for tractors, bowls for scrapers and other earthworking machines commonly employ ground engaging tools that engage the earth being worked or materials being excavated or loaded. Because of the highly abrasive materials encountered, ground engaging tools wear out rapidly and need to be replaced in order to protect the parent material of the implement and to keep the implement working at peak efficiency. Because of such frequent replacement, it is desirable to be able to quickly and easily remove the worn tool and replace it with a new one. Many types of retention devices, such as pins and the like, have been used in the past to retain the tool onto the implement or a tool mounting portion provided on the implement. Some typical examples of retention devices used for retaining bucket teeth are disclosed in U.S. Pat. No. 5,068,986 issued Dec. 3, 1991 to Larren F. Jones for Excavating Tooth Point Particularly Suited for Large Dragline Buckets; U.S. Pat. No. 5,272,824 issued Dec. 28, 1993 to Erwin D. Cornelius for Tooth Assembly with Leaf Spring Retainer; and U.S. Pat. No. 5,423,138 issued Jun. 13, 1995 to Richard E. Livesay, et al for Tip to Adapter Interface.

Many such prior retention devices perform satisfactorily, but are either complex and expensive, or require special tools or the large exertion of effort to remove and replace the retainers. Other retainers may simply fail during use due to the high loads exerted on such retainers during use, resulting in the loss of the tool from the implement.

The present invention is directed to overcoming one or more of the problems encountered in the use of prior art tools and retention devices.

DISCLOSURE OF THE INVENTION

In accordance with one aspect of the present invention, an earthworking implement adapted to normally engage the ground in a primary direction of travel includes a tool mounting portion having an exterior surface with a first retainer pocket therein. The first pocket provides a first abutment surface facing in a direction substantially away from the primary direction of travel. A replaceable ground engaging tool has an interior surface positionable along the exterior surface of the mounting portion. The interior surface has a second retainer pocket therein positionable in alignment with the first retainer pocket of the mounting portion. The second pocket provides a second abutment surface disposed in a generally spaced, diametrically opposing relationship to the first abutment surface of the first retainer pocket. An elongated retainer having a pair of opposite solid end portions is positionable within the first and second retainer pockets wherein each end portion of the retainer is oriented to abut the first and second abutment surfaces of the mounting portion and the tool, respectively, such that the end portions of the retainer restrict the tool from coming off

the mounting portion in the direction of the primary direction of travel of the implement.

In another aspect of the present invention, the retainer includes an elongated, generally cylindrical steel body disposed along a longitudinal axis. The body has a pair of solid opposite end portions and a compressible middle portion. Each of the end portions has a circular cross-section with centers coincident to the longitudinal axis that are capable of carrying, in compression, a high load oriented radially to the end portions. The compressible middle portion is disposed between the opposite end portions and includes a spring whereby the retainer is provided with a predetermined free length along its longitudinal axis when the spring is in a noncompressed state and a shorter compressed length when the spring is in a compressed state.

In yet another aspect of the present invention, the ground engaging tool includes an elongated body tapering from a wide mounting end portion to a narrow ground engaging end portion. The mounting end portion has an open cavity facing generally away from the primary direction of travel. The cavity is defined by legs including a first leg. The first leg has an interior surface and an exterior surface. The interior surface has an elongated pocket formed therein having providing an abutment facing in a direction of the primary direction of travel. The exterior surface has an opening adapted to allow the passage of the retainer therethrough into the pocket.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view of an implement with a tool mounted onto a mounting portion thereof and being retained by a compression retainer embodying the principles of the present invention;

FIG. 2 is an enlarged perspective view of the tool shown in FIG. 1 with portions broken away to better show the mounting portion and the retainer;

FIG. 3 is a cross-sectional view taken generally along line 3—3 of FIG. 2;

FIG. 4 is a perspective view of the mounting lug for mounting the tool shown by itself;

FIG. 5 is an enlarged fragmentary cross-sectional view of the tool by itself taken generally along line 5—5 of FIG. 2;

FIG. 6 is an enlarged fragmentary cross-sectional view of the mounting lug by itself taken generally along line 6—6 of FIG. 4;

FIG. 7 is a cross-sectional view through the rear of the mounting lug and tool taken generally along line 7—7 of FIG. 3;

FIG. 8 is an enlarged perspective view of one embodiment of the retainer by itself;

FIG. 9 is an enlarged perspective view similar to FIG. 8, but of another embodiment of the retainer;

FIG. 10 is an exploded perspective view of the retainer of FIG. 9; and

FIG. 11 is a perspective view of an alternate spring for the retainer of FIG. 9.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring to the drawings, one exemplary embodiment of the present invention is disclosed in FIG. 1 where an earthworking implement is shown at 10, which in the embodiment depicted is a bucket. The bucket 10 has a cutting edge 12 upon which is mounted, preferably by

welding, a plurality of mounting lugs 14; best shown in FIGS. 2 and 4. Each mounting lug 14 has a tool mounting portion 16 for mounting a replaceable ground engaging tool 18, which in the embodiment depicted in FIG. 1 is a cutting edge protecting shroud 20. The shroud 20 is detachably retained on the mounting portion 16 by an elongated retainer 22, as will be more fully described below.

It should be appreciated that the exemplary embodiments depicted in the drawings and described herein are merely for illustrative purposes, as it is contemplated that the present invention be used for other closely related ground engaging tools and implement applications. Examples of related implements include shovels, bulldozer and motor grader blades, rippers, scraper bowls and the like. Examples of tools for such implements include bucket tips, cutting edges, corner and side protectors, tooth couplers and adapters and the like. Such implements, mounting members and tools therefor are all well known in the art and all of such uses are intended to be covered by the present invention even though they have not been specifically shown or described herein, as those skilled in the art are readily able to incorporate the teachings of the present invention into such other applications.

Earthworking implements, such as bucket 10, are adapted to normally engage the ground in a primary direction of travel. In other words, they are manipulated to dig or scoop material in a particular direction by the earthworking machine and/or the operator of such machine. In the case of bucket 10, for instance, the primary direction of travel is typically parallel to and in a direction away from the cutting edge 12 of the bucket, as designated by arrow 24 in FIG. 1.

Mounting lugs 14 are carried in a spaced side-by-side relationship on the cutting edge 12. The tool mounting portion 16 (FIG. 4) of each mounting lug 14 has an exterior surface 26 with a first retainer pocket 28 therein. The exterior surface 26 with the first retainer pocket 28 is preferably located on an upper leg 29 of the mounting lug 14. Such upper leg 29 is adapted to angle upwardly over and embrace the beveled front edge 30 of the cutting edge 12. The first pocket 28 provides a first abutment surface 32 (FIG. 6) facing in a direction substantially away from said primary direction of travel 24.

Each mounting lug 14 includes a nose portion 34 having a first planar force receiving end surface 36 thereon oriented normal to the direction of travel and a pair of spaced second and third force receiving surfaces 38,40, each normal to and adjoining the first force receiving surface and parallel to the direction of travel. The mounting lug 14 also has an elongated lower leg 42 having a distal end 44 opposite the nose portion 34. The lower leg 42 has opposite sides 46,48, each of such sides being provided with an outwardly beveled flange 50 thereon adjacent the distal end 44.

The replaceable ground engaging tool 18 has an interior surface 52 (FIG. 5) positionable along the exterior surface 26 of the mounting portion 16 of lugs 14. Such interior surface 52 has a second retainer pocket 54 therein positionable in alignment with the first retainer pocket 28 of the mounting portion 16. The second pocket 54 provides a second abutment surface 56 disposed in a generally spaced, diametrically opposing relationship to the first abutment surface 32 of the first retainer pocket 28.

The ground engaging tool 18 also has a cavity 58 opening in a direction opposite to the primary direction of travel 24, the cavity 58 being adapted to receive the tool mounting portion 16 for mounting the tool 18 onto the mounting portion 16.

In the present embodiment, as noted earlier, the ground engaging tool 18 is a lip protecting shroud 20 (FIG. 2) adapted to be mounted on the mounting lug 20 for protecting a bucket cutting edge 12. Shroud 20 has an elongated body 60 tapering down from a wide mounting end portion 62 to a narrower ground engaging end portion 64. The mounting end portion 62 has a first leg 66 and a second leg 68 spaced from the first leg 66 so as to define the open cavity 58 therebetween. The first leg 66 has the aforementioned interior surface 52 and also has an opposite exterior surface 72 (FIG. 5), the exterior surface 72 having a retainer opening 74 therein through to the second retainer pocket 54. The cavity 58 further has a first force transferring surface 76 at the juncture of the legs 66,68 and a pair of opposing second and third force transferring surfaces 78,80. The first force transferring surface 76 is preferably oriented normal to the direction of travel. The pair of opposing force transferring surfaces 78,80 are each normal to and adjoin the first force transferring surface 76 and are parallel to the primary direction of travel. The first force transferring surface 76 is positionable in force transferring abutment with the first force receiving surface 36 on the nose portion 34 of the mounting lug 14, while each of the opposing force transferring surfaces 78,80 is positionable in force transferring abutment with a respective one of spaced second and third force receiving surfaces 38,40 on the nose portion 34 of the mounting lug.

The second leg 68 of the shroud 20 has a distal end 82 and a pair of inner flanges 84,86 (FIG. 7) along a respective one of its opposite sides 88,90. Each of the flanges 84,86 have an inwardly beveled portion 92 thereon adjacent the distal end 82 that are adapted to receive a respective one of the outwardly beveled flanges 50 of the lower leg 42 of the mounting lug 14.

As mentioned earlier, the compression retainer 22 (FIG. 8) is for use in detachably retaining replaceable ground engaging tool 18 onto the earthworking implement 10. Retainer 22 includes an elongated, generally cylindrical steel body 94 disposed along a longitudinal axis 96 and has a pair of solid opposite end portions 98,100 and a compressible middle portion 102. Each of the end portions 98,100 have a circular cross-section with centers coincident to the longitudinal axis 96 and are capable of carrying, in compression, a high load oriented radially to the end portions 98,100. The compressible middle portion 102 is disposed between the opposite end portions 98,100 and is axially compressible along longitudinal axis 96, whereby the retainer 22 is provided with a predetermined free length along its longitudinal axis 96 when the spring 104 is in a noncompressed state and a shorter compressed length when the spring 104 is in a compressed state.

The retainer 22 is positionable within the first and second retainer pockets 28,54 (FIGS. 5 and 6) wherein the end portions 98,100 are oriented to abut the first and second abutment surfaces 32,56 of the mounting portion 16 and the tool 18, respectively, such that the end portions 98,100 of the retainer 22 restrict the tool 18 from coming off the mounting portion 16 in the direction of the primary direction of travel of the implement.

It should be noted at this point that the retainer opening 74 in the shroud 20 is provided with a predetermined length that is less than the free length but greater than the compressed length of the retainer 22 in order to permit the insertion of the retainer 22 through the opening 74 when in the compressed state but to prevent the escape of the retainer therethrough when in the noncompressed state.

It should also be noted that the first abutment surface 32 of the tool mounting portion 16 and the second abutment

surface 56 of the ground engaging tool 18 each preferably have cylindrical portions 106,108, respectively, thereon. Each such cylindrical portion 106,108 is also preferably disposed about a central axis 110 (FIG. 3) oriented generally transverse to the primary direction of travel 24 and arranged such that the cylindrical portions 106,108 of the first and second abutment surfaces 32, 56 contact the end portions 98,100 of the retainer 22 in diametrically opposed relationship to each other, whereby the retainer 22 is caused to be loaded in compression, rather than in shear.

The axially compressible middle portion of the retainer is preferably a helical spring 112. The helical spring 112 is also preferably constructed integral with the opposite end portions 98,100. This may be accomplished by casting the retainer 22 through a suitable steel metal casting process, with the helical spring 112 being cast in a double helix configuration as shown in FIG. 8. In such a case, the entire retainer 22 is preferably made of a suitable spring steel material. Alternately as shown in FIGS. 9 and 10, a retainer 114 may be constructed with separate end portions 116,118 and a separate spring element, such as a die spring 120, for ease of manufacture of the retainer. As another alternative, a round wire spring 122, as shown in FIG. 11, could be used. The use of a non-metallic spring element, such as rubber or plastic, is also contemplated and may be employed in place of the steel springs shown herein.

Each of the end portions 98,100 or 116,118 of the retainer have a distal end 124 having a reduced diameter with a concave end face 126 formed therein.

While not shown in the drawings, the retainer disclosed herein may be employed with a bucket equipped with tooth adapters in place of mounting lugs 14. Such tooth adapters mount ground engaging teeth. In such a case, the retainer 22 would be used to detachably mount the teeth onto the adapters in the same fashion as described herein. On some larger buckets, a coupler may be employed between the tooth and adapter. In such a case, the retainer 22 may be used to detachably retain both the tooth onto the coupler and the coupler onto the adapter.

Also, the earthworking implement could be a ripper, rather than a bucket. In this application, the retainer 22 would be employed to retain a ripper tip onto the ripper shank of the ripper.

INDUSTRIAL APPLICABILITY

The earthworking implement 10 constructed in accordance with the present invention affords many advantages of prior devices. For instance, the present retainer 22 is easily assembled into and removed from the retainer pockets 32,54 of the tool mounting portion 16 and the ground engaging tool 18 through retainer opening 74 without the use of special tools and without the exertion of a large amount of effort. To install, the retainer 22 is compressed to its compressed length so as to pass through the retainer opening 74 into the pockets 32,54. This may be accomplished by angling one end of the retainer 22 in the retainer opening and tapping the other end with a hammer to compress the compressible middle portion 102 of the retainer. Once in the pockets 32,54, the retainer 22 will re-expand to its longer noncompressed length so as to prevent its escape out of the pockets through the retainer opening 74. Once in the pockets, the solid end portions 98,100 are adapted to abut the first and second abutment surfaces 32,56 of the mounting portion 14 and ground engaging tool 18, respectively, to prevent the tool from coming off the mounting portion in the primary direction of travel 24. Because all of the load

bearing surfaces are cylindrical and concentric about the longitudinal axis 96 of the retainer 22 and the retainer 22 is free to rotate about such longitudinal axis, the resultant loads exerted on the end portions 98,100 are oriented normal to circular periphery of the end portions. Thus, the end portions are loaded in compression, rather than in shear. This loading characteristic enables the retainer 22 to carry greater loads. The reduced diameter distal ends 124 and the concave end faces 126 on the end portions 98,100 of the retainer 22 are provided to facilitate the removal of the retainer when desired. Such features provide niches for the end of a pry tool (not shown) to work against in order to re-compress the retainer to its compressed length so that the retainer 22 can be removed through the retainer opening 74.

Another advantage of the present invention resides in the particular construction of the mounting lug 14 and shroud 20. In such regard, the opposite sides 46,48 of lower leg 42 of the mounting lug 14 are provided with outwardly beveled flanges 50 adjacent the distal end 44. Such beveled flanges 50 are received within the mating inwardly beveled portions 92 of the second leg 68 of the shroud 20 for securing the second leg 68 to the mounting lug 14 and for transferring torsional loads on the shroud 20 to the mounting lug 14.

Other aspects and advantages of the present invention of this invention can be obtained through a study of the drawings, the disclosure and the appended claims.

What is claimed is:

1. In an earthworking implement adapted to normally engage the ground in a primary direction of travel, the improvement comprising:

a tool mounting portion having an exterior surface with a first retainer pocket therein, said first pocket providing a first abutment surface facing in a direction substantially away from said primary direction of travel;

a replaceable ground engaging tool having an interior surface positionable along said exterior surface of said mounting portion, said interior surface having a second retainer pocket therein positionable in alignment with said first retainer pocket of said mounting portion, said second pocket providing a second abutment surface disposed in a generally spaced, diametrically opposing relationship to said first abutment surface of said first retainer pocket; and

an elongated retainer having a pair of opposite solid end portions, said retainer being positionable within said first and second retainer pockets wherein each of said end portions is oriented to abut both of said first and second abutment surfaces of both of said mounting portion and said tool, respectively, such that said end portions of said retainer restrict said tool from coming off said mounting portion in said direction of the primary direction of travel of said implement.

2. The earthworking implement of claim 1 wherein said elongated retainer has a longitudinal axis and an axially compressible middle portion between said opposite end portions whereby said retainer has a predetermined free length along said longitudinal axis of said retainer when in a noncompressed state and a shorter compressed length when said retainer in a compressed state.

3. The earthworking implement of claim 2 wherein said axially compressible middle portion of said retainer is a helical spring.

4. The earthworking implement of claim 3 wherein said helical spring is integral with said opposite end portions.

5. The earthworking implement of claim 4 wherein said retainer is constructed from spring steel.

6. The earthworking implement of claim 2 wherein said end portions of said elongated retainer each have a cylindrical surface portion thereon and wherein said first abutment surface of said tool mounting portion and said second abutment surface of said ground engaging tool each have cylindrical portions thereon, each such cylindrical portion being disposed about a central axis oriented generally transverse to said primary direction of travel and arranged such that the cylindrical portions of the first and second abutment surfaces contact the retainer in diametrically opposed relationship to each other, whereby said retainer is loaded in compression, rather than in shear.

7. The earthworking implement of claim 6 wherein said ground engaging tool has a cavity opening in a direction opposite to said primary direction of travel, said cavity being adapted to receive said tool mounting portion for mounting said tool onto said mounting portion.

8. The earthworking implement of claim 7 wherein said cavity has a leg with said interior surface and an opposite exterior surface, said exterior surface having a retainer opening therein through to said second retainer pocket, said retainer opening having a predetermined length that is less than the free length but greater than the compressed length of said retainer in order to permit the insertion of said retainer through said opening when in said compressed state but to prevent the escape of said retainer therethrough when in said noncompressed state.

9. The earthworking implement of claim 2 wherein said implement is a bucket.

10. The earthworking implement of claim 2 wherein said mounting member is an adapter and said tool is a bucket tooth.

11. The earthworking implement of claim 2 wherein said implement includes a coupler and said mounting portion is on said coupler.

12. The earthworking implement of claim 2 wherein said implement is a ripper and said mounting member is a ripper shank and said tool is a ripper tip.

13. The earthworking implement of claim 9 wherein said bucket has a cutting edge and wherein said tool mounting portion is provided on a mounting lug carried on said cutting edge and said ground engaging tool is a lip protecting shroud adapted to be mounted on said mounting lug.

14. The earthworking implement of claim 13 wherein said mounting lug includes a nose portion having a first planar force receiving end surface thereon oriented normal to said direction of travel and a pair of spaced force receiving surfaces, each normal to and adjoining said first force receiving surface and parallel to the direction of travel.

15. The earthworking implement of claim 14 wherein said lip protecting shroud has an elongated body tapering down from a wide mounting end portion to a narrower ground engaging end portion, said mounting end portion having a first leg and a second leg spaced from said first leg and defining a said open cavity therebetween, said cavity further having a first force transferring surface at the juncture of said legs and a pair of opposing force transferring surfaces, said

first force transferring surface being positionable in force transferring abutment with said first force receiving surface and each of said opposing force transferring surfaces being positionable in force transferring abutment with a respective one of spaced force receiving surfaces on said nose portion of said mounting lug.

16. The earthworking implement of claim 15 wherein said mounting lug has an elongated lower leg having a distal end opposite said nose portion, said lower leg having opposite sides, each of such sides being provided with an outwardly beveled flange thereon adjacent said distal end, and wherein said shroud has an elongated lower leg having a distal end, said leg having a pair of inner flanges along a respective one of its opposite sides, each of said flanges having an inwardly beveled portion adapted to receive a respective one of the outwardly beveled flanges of the lower leg of the mounting lug.

17. A replaceable ground engaging tool for an earthworking implement adapted to normally engage the ground in a primary direction of travel, said tool being adapted to be detachably mounted to said implement by means of a retainer, said ground engaging tool comprising:

an elongated body tapering from a wide mounting end portion to a narrow ground engaging end portion, said mounting end portion having an open cavity facing generally away from said primary direction of travel, said cavity being defined by legs including a first leg, said first leg having an interior surface and an exterior surface, said interior surface having an elongated pocket formed therein, said pocket having a pair of sides at opposite ends thereof parallel to said primary direction of travel and an abutment facing in a direction of said primary direction of travel, and said exterior surface having an opening adapted to allow the passage of said retainer therethrough into said pocket.

18. The ground engaging tool of claim 17 wherein said tool is a shroud for protecting a bucket cutting edge, said shroud having a second leg spaced from said first leg and defining said open cavity therebetween, said cavity further having a first force transferring surface oriented normal to said direction of travel at the juncture of said legs and a pair of opposing force transferring surfaces, each normal to and adjoining said first force transferring surface and parallel to the direction of travel.

19. The ground engaging tool of claim 18 wherein said second leg of said shroud has a distal end and a pair of inner flanges along a respective one of its opposite sides, each of said flanges having an inwardly beveled portion thereon adjacent said distal end.

20. The ground engaging tool of claim 19 wherein said retainer is an elongated cylindrically shaped compression retainer and wherein elongated pocket includes a cylindrical portion disposed about a central axis oriented in a direction generally transverse to said primary direction of travel of said implement.

* * * * *



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E02F 9/28 (2006.01)(52) **U.S. Cl.** **37/452**

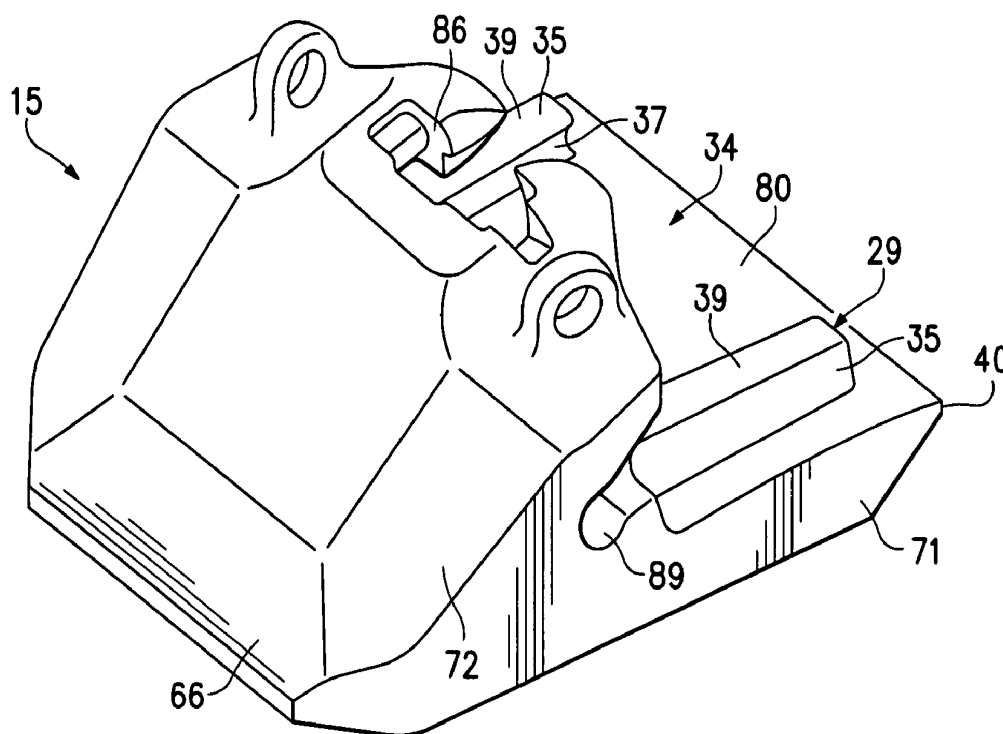
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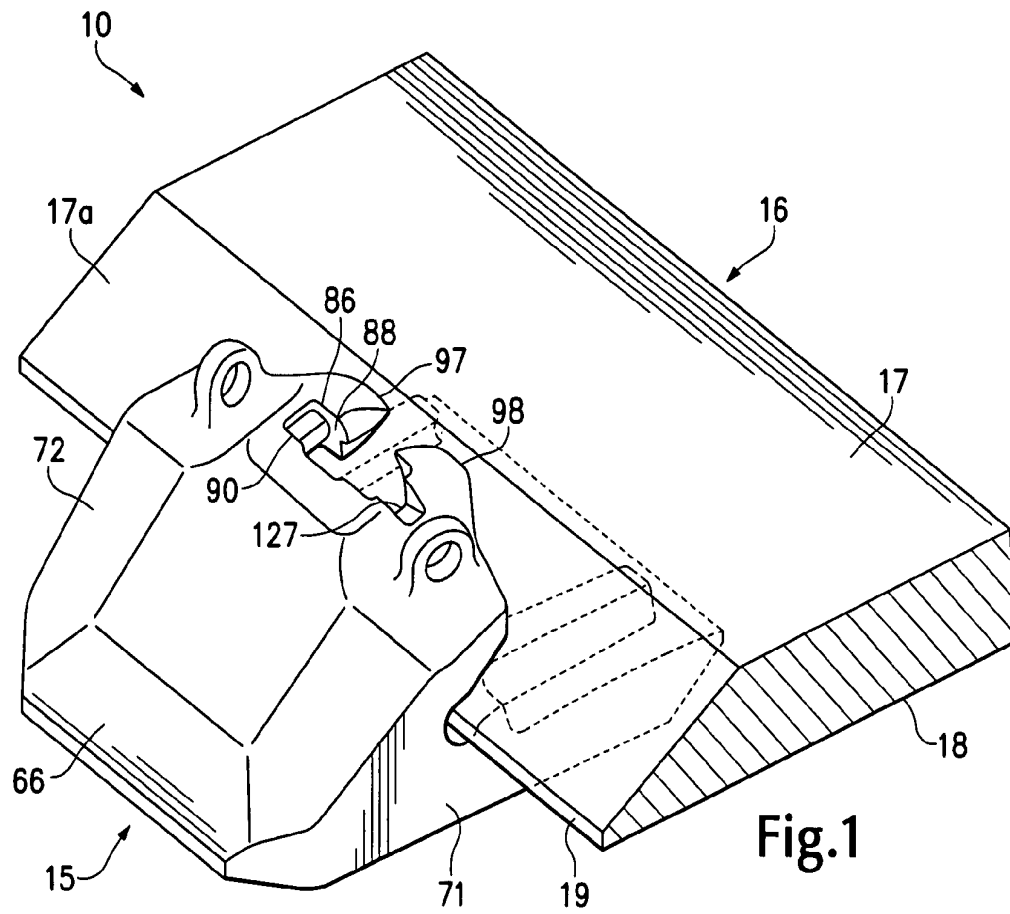
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PORTLAND, OR 97210 (US)**(57) **ABSTRACT**(73) Assignee: **ESCO Corporation, Portland, OR**(21) Appl. No.: **11/799,094**(22) Filed: **Apr. 30, 2007****Related U.S. Application Data**

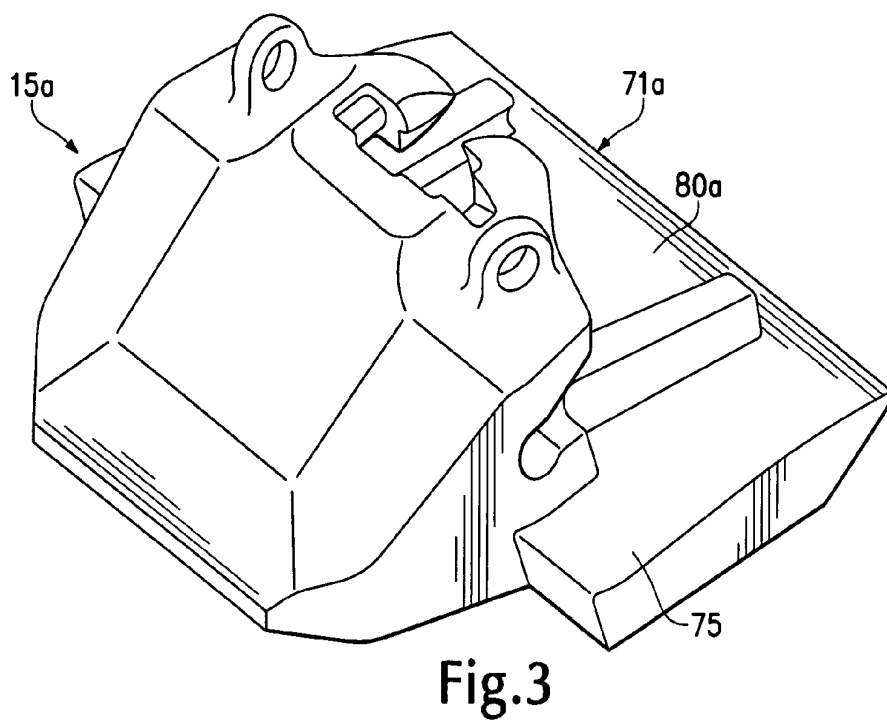
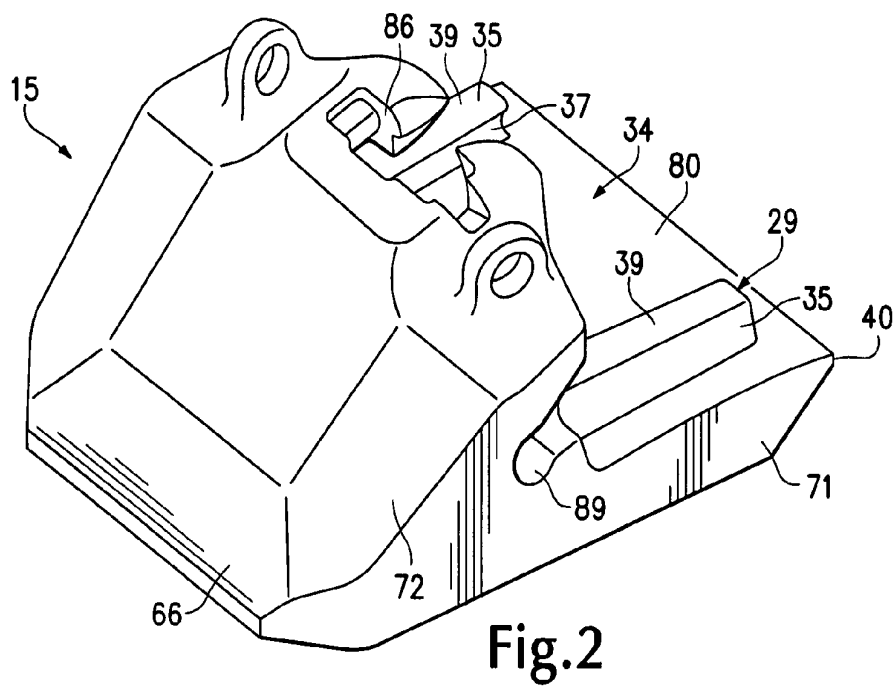
(63) Continuation-in-part of application No. 11/529,447, filed on Sep. 28, 2006.

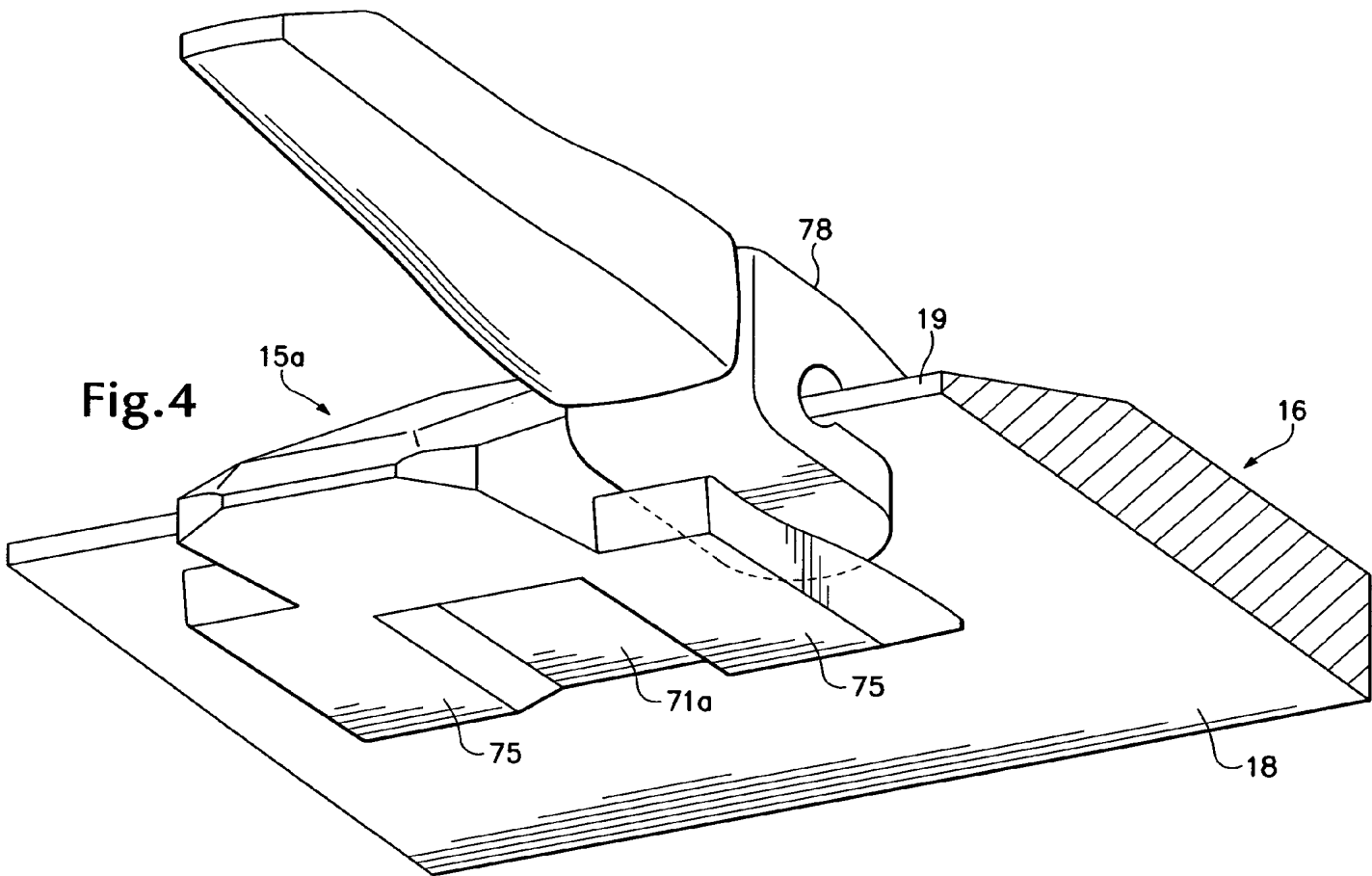
Continuation-in-part of application No. 10/812,348, filed on Mar. 30, 2004, now abandoned.

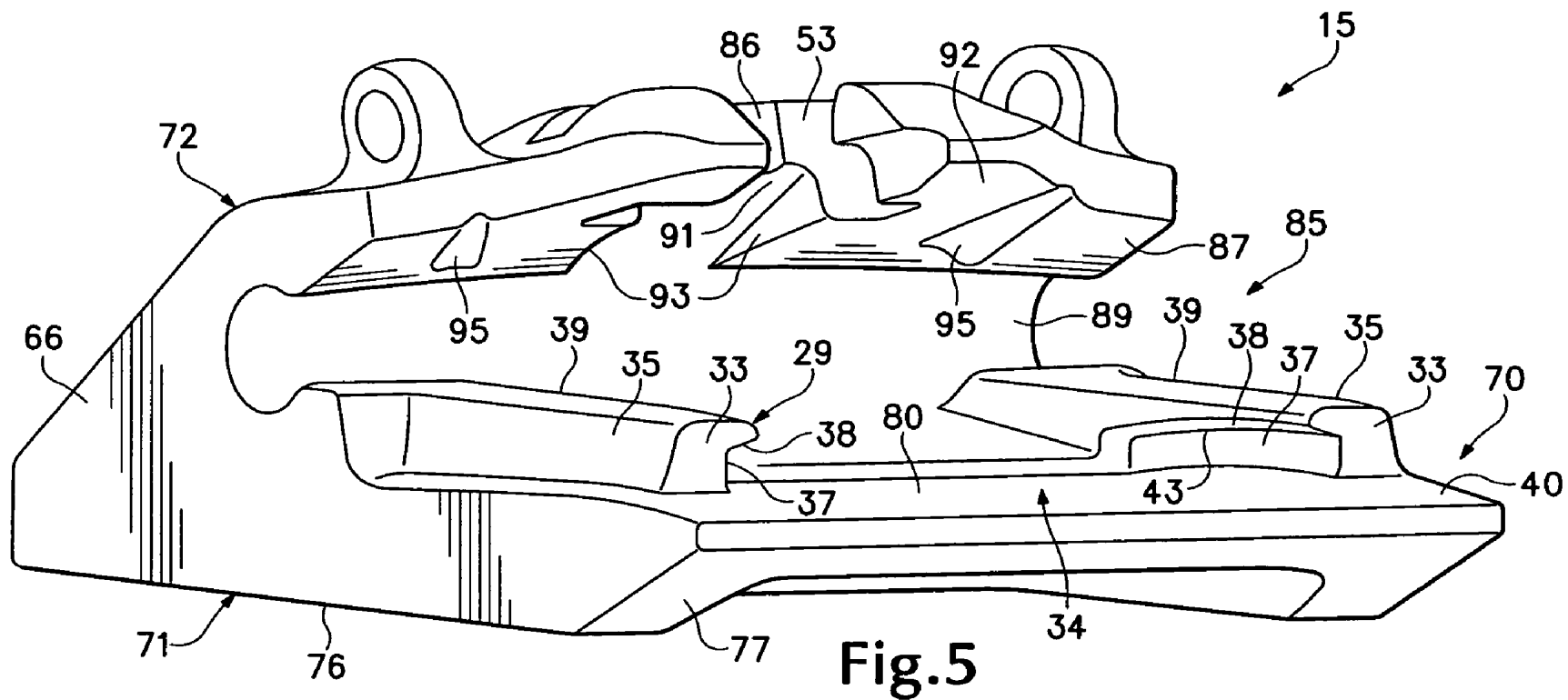
A wear assembly to protect the front edge of an excavating bucket, which is secure, stable, easy to use, readily manufactured, and provides increased safety, and which eliminates any need for holes to be formed in the lip. The wear assembly includes a wear member that has a pair of legs to straddle the front edge of the bucket. One of the legs defines an axial slot, which has opposing grooves for receiving rails of a boss fixed to the bucket. The grooves narrow in a forward direction to permit easier installation and removal of the wear member, to permit use of side wings without interference from adjacent wear parts, and to enable enhanced resistance under some loads.

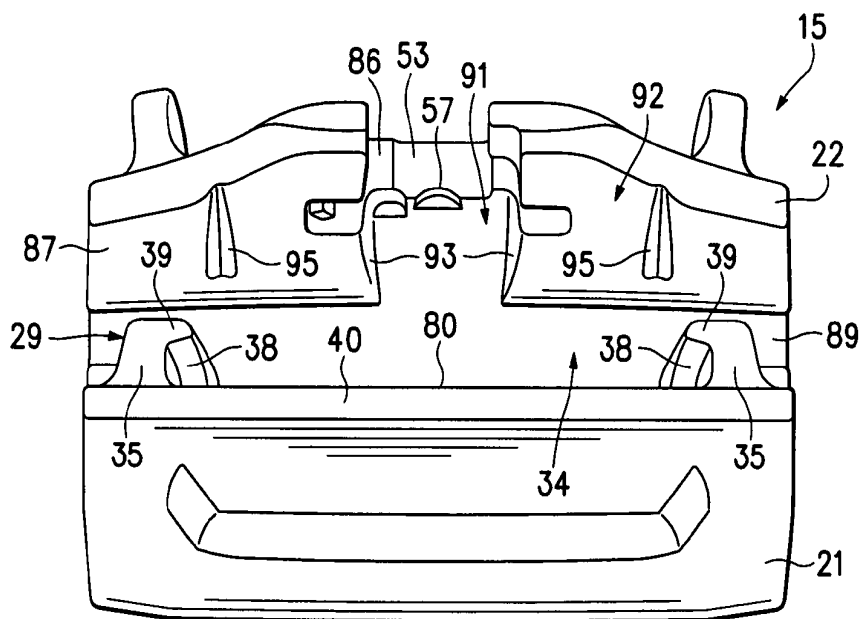
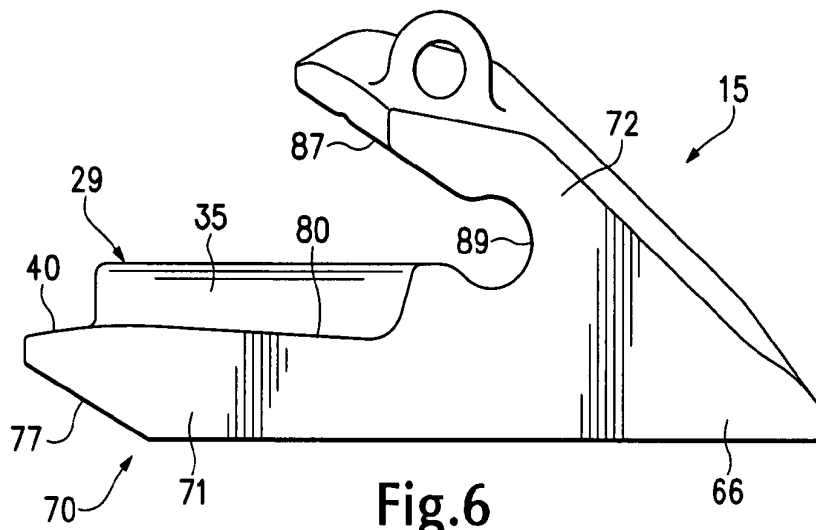


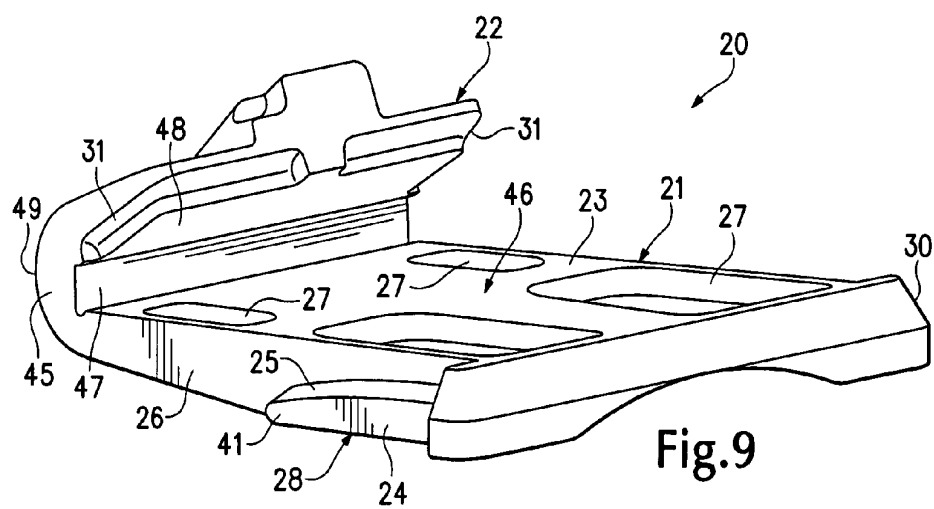
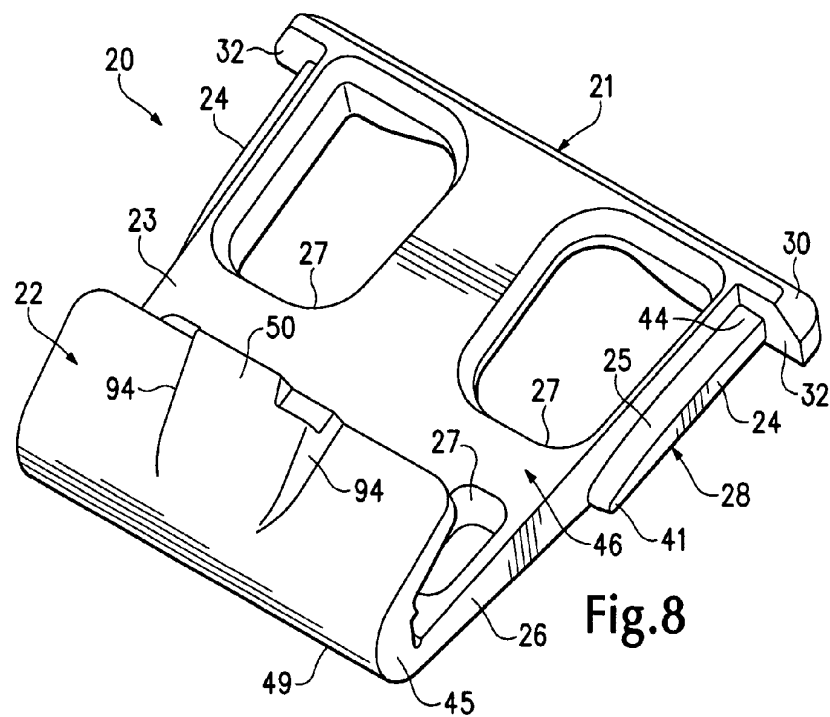


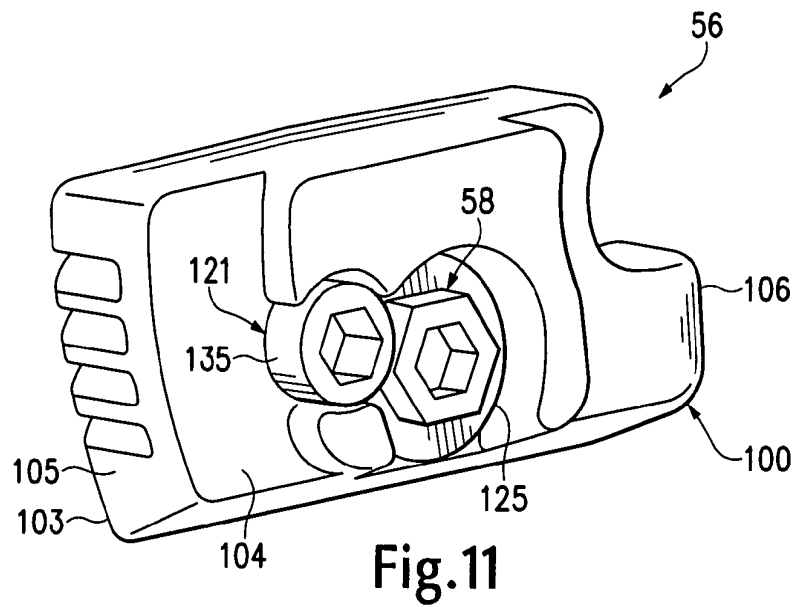
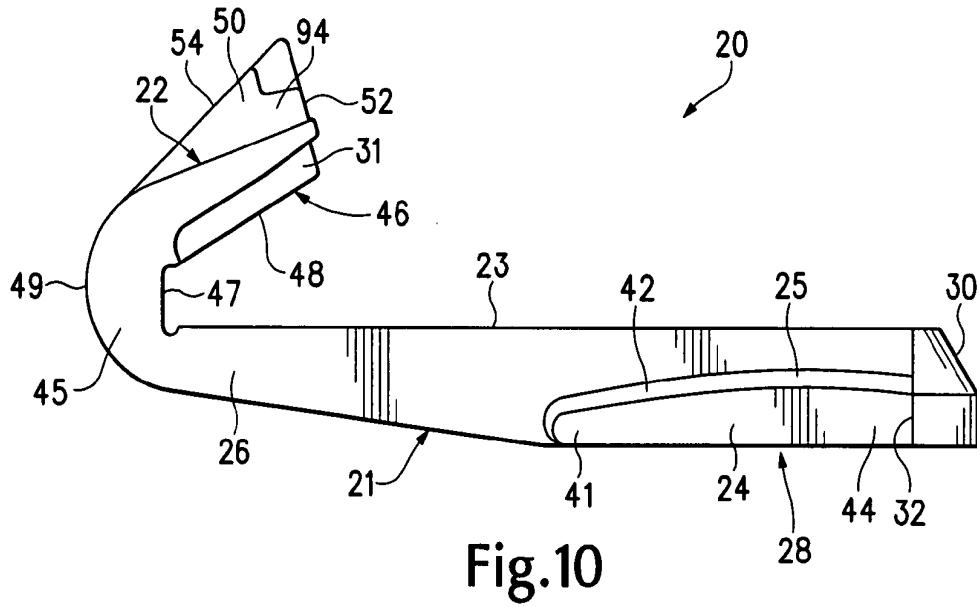


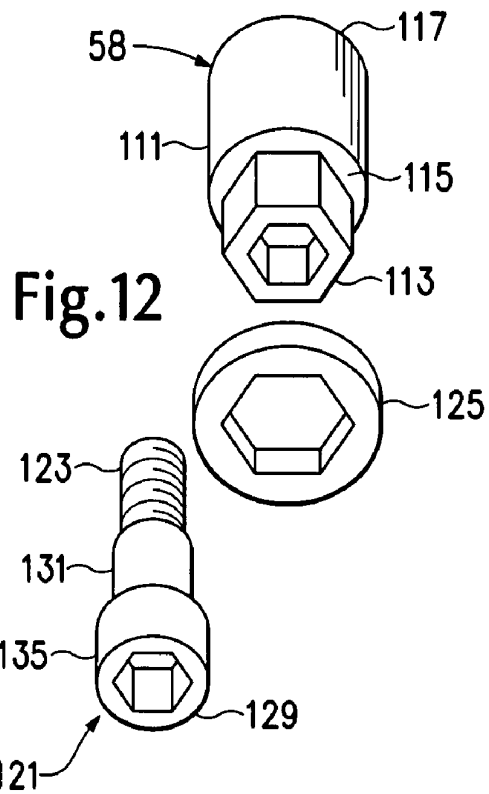
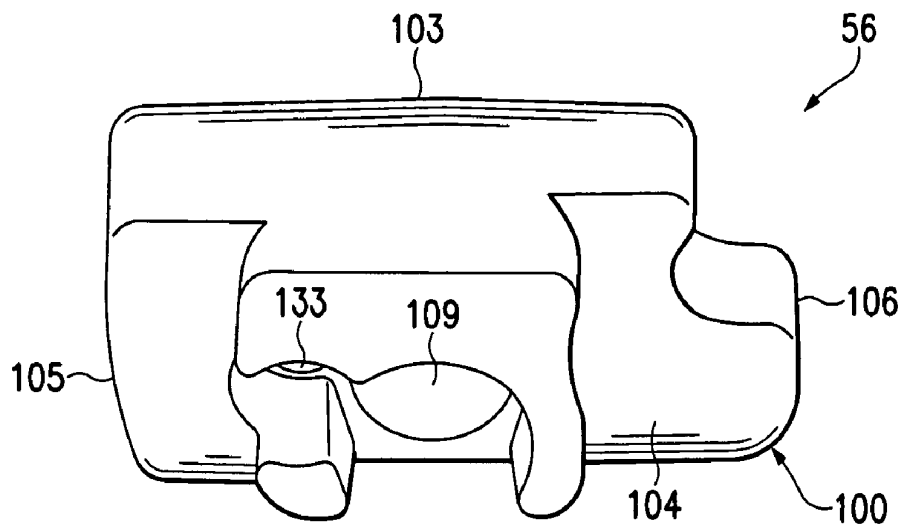












WEAR ASSEMBLY

[0001] This application is a continuation-in-part of co-pending U.S. patent application Ser. No. 11/529,447 filed Sep. 28, 2006, which in turn is a divisional application of U.S. patent application Ser. No. 10/812,348 filed Mar. 30, 2004.

THE FIELD OF THE INVENTION

[0002] The present invention pertains to a wear assembly for an excavating bucket.

THE BACKGROUND OF THE INVENTION

[0003] Excavating buckets for earth working equipment are typically subjected to harsh conditions. A series of wear members are usually provided along the lip of the bucket to improve the digging operation and protect against wear. Wear members have in the past been welded or mechanically secured in many different ways. Nevertheless, there is a need for an improved wear assembly in these environments.

SUMMARY OF THE INVENTION

[0004] The present invention pertains to an improved wear assembly for protecting an excavating bucket from wear, which is secure, stable, easy to use, readily manufactured, and provides increased safety. The present invention further eliminates any need for holes to be formed in the lip.

[0005] In accordance with one aspect of the invention, the wear assembly includes a wear member provided with a connector in the form of a tongue or slot which has rails or grooves, respectively, to couple with a complementary connector on a boss fixed to the bucket. The rails or grooves are formed with a curved and/or narrowing configuration to ease installation and removal of the wear member, permit the use of wings to better protect adjacent parts, and better resist some loads.

[0006] In accordance with another aspect of the invention, the wear member includes an interior which wraps about the front edge of the bucket and a boss fixed to the bucket. The interior has a first recess with a first set of opposed sidewalls to receive an upstanding support on a boss, and a second recess with a second set of opposed sidewalls spaced farther apart than the first set of opposed sidewalls to receive the sides of the boss. By using two sets of recesses, the wear member is more stably mounted and better able to resist side loads.

[0007] In accordance with another aspect of the invention, the wear member includes laterally extending wings to overlie adjacent parts, e.g., an adapter, attached to the lip to provide additional protection.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a perspective view of a wear member straddling a lip of a bucket in accordance with the present invention.

[0009] FIG. 2 is a front perspective view of a wear member of the invention.

[0010] FIG. 3 is a front perspective view of an alternative wear member.

[0011] FIG. 4 is a partial perspective view from the bottom of a lip with the alternative wear member.

[0012] FIG. 5 is a rear perspective view of the wear member of the invention.

[0013] FIG. 6 is a side view of the wear member.

[0014] FIG. 7 is a rear view of the wear member.

[0015] FIG. 8 is a front perspective view of a boss of the present invention.

[0016] FIG. 9 is a rear perspective view of the boss.

[0017] FIG. 10 is a side view of the boss.

[0018] FIG. 11 is a perspective view of a lock of the present invention.

[0019] FIG. 12 is an exploded, perspective view of the lock.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] The present invention pertains to a wear assembly 10 for an excavating bucket. While wear assembly 10 is particularly suited for securing a wear member 15 in the form of a shroud to a lip of a bucket, it could also be used to secure other kinds of wear members (e.g., wings or adapters) to the bucket. In a typical bucket, lip 16 includes an inner face 17, an outer face 18 and a front edge 19. Although the illustrated lip (FIG. 1) shows the inner face 17 with a ramp surface 17a, the invention can be used with other kinds of lips.

[0021] The invention is at times described in relative terms, such as forward, rearward, up, down, vertical, horizontal, etc. to ease understanding of the invention. These terms are generally to be considered relative to the orientation of the components in FIG. 1 (unless otherwise noted), and are not to be considered limitations on the invention. As can be appreciated, the wear member can be used and oriented in a variety of ways.

[0022] A boss or base 20 (FIGS. 8-10) has a pair of legs 21, 22 that straddle the lip 16 about front edge 19. Although first leg 21 is preferably the outer leg and second leg 22 the inner leg, they could be reversed. In the illustrated embodiment, the first or outer leg 21 has an inner surface 23 that sets against and extends along outer face 18 of lip 16. In the preferred construction, first leg 21 includes holes 27 to facilitate welding of the boss to the lip. In this embodiment, welding is also provided along brace 30 and grooves 31 at the end of second leg 22. While boss 20 is preferably welded to the lip, it could be formed (e.g., cast or forged) as an integral part of the lip or secured by mechanical means. In addition, the boss could be formed as a multiple of parts, which are integral or spaced apart, although a one-piece member is preferred for simplicity and strength.

[0023] Outer leg 21 includes a connector 28 that couples to a complementary connector 29 on wear member 15. In the illustrated embodiment, connector 28 is formed as rails 24 extending axially along sidewalls 26 of the boss (FIGS. 9 and 10). The rails project laterally outward from each sidewall 26 to define a generally inverted T-shaped cross-section, though other shapes are possible. Rails 24 include

holding surfaces 25 that are offset from inner surface 23 so as to be spaced from the outer face 18 of the bucket which it faces.

[0024] A brace 30 preferably extends laterally across the rear end of first leg 21 (FIGS. 8-10). The rear ends 44 of rails 24 are preferably fixed to brace 30 to provide additional support to the rails when under load. Such support at the rear end of the rails is particularly advantageous in resisting vertical loads that tend to rotate or swing the wear member about the front edge of the lip. Brace 30 preferably extends outward of first leg 21 to define a stop surface 32 adapted to abut a rear end 40 of wear member 15 and thereby reduce the stress on the boss, which in turn, reduces the stress along front edge 19 of lip 16.

[0025] A front end 45 of boss 20 wraps around front edge 19 of lip 16. The interior 46 of boss 20 (i.e., the surface that faces lip 16) is shaped to generally conform to the shape of the particular lip to which it is fixed. In the illustrated embodiment, the interior 46 of boss 20 includes a corner surface 47 that sets against front edge 19, an inner surface 48 of second leg 22 that sets against ramp 17a, and inner surface 23 of first leg 21 that sets against outer face 18. The inner or second leg 22 preferably overlies only ramp surface 17a so that the boss is outside or below the inner face 17 to avoid impeding the gathering or dumping of the excavated material, but could extend along inner 17 rearward of ramp 17a. Also, other arrangements for attaching the boss are possible. For other kinds of lips, the interior would preferably be changed to generally match the lip profile.

[0026] The front face 49 of boss 20 preferably has a uniform curved shape to provide a smooth surface without corners to act as a thrust bearing face for wear member 15. In this way, the boss is able to provide a better bearing surface than the front of lip 16 with its relatively sharp and thinner front edge 19. Nevertheless, other shapes for front face 49 are possible. Inner leg 22 preferably includes an upstanding support 50 that forms an abutment for lock 56 (FIGS. 8-10). Support 50 includes a rear wall 52 to abut lock 56, a pair of sidewalls 94 and an upper inclined wall 54 that extends upward from front face 49.

[0027] Wear member 15 has a front end 66 and a rear end 70 that is bifurcated to define an outer or first leg 71 and an inner or second leg 72 (FIGS. 1-2 and 5-6). In use, wear member 15 overlies and straddles lip 16 and boss 20. As a result, boss 20 is largely shielded from the movement of abrasive earthen material passing over the component. Wear member 15 includes an interior 85 that includes inner face 80 of outer leg 71, inner face 87 of inner leg 72, and an inner corner surface 89 at the intersection of legs 71, 72 (FIGS. 5 and 6). Inner corner surface 89 has a shape that generally matches front face 49 of boss 20 to abut against it. Accordingly, in the preferred embodiment, inner corner surface 89 has a generally uniform curved surface. Outer leg 71 has a generally flat outer face 76 and a rear deflector face 77 that is inclined forwardly away from lip 16 to direct earthen material away from the wear member during reverse movement of the bucket. Wear member 15a also optionally includes wings 75 that project laterally, preferably from outer leg 71a, to overlie the adjacent wear parts 78 (e.g., adapters) and provide additional protection to the adjacent wear parts 78 (FIGS. 3 and 4). Wings 75 are offset from inner face 80a of outer leg 71a (i.e., spaced further from lip

16) to define clearance for the adjacent wear parts 78 when wear member 15a is fully seated on boss 20.

[0028] Connector 29 of wear member 15 extends along outer leg 21 in the form of a slot 34; i.e., dogleg flanges 35 extend along the inner surface 80 of outer leg 71 to define slot 34 (although slot 34 could be formed in other ways). Grooves 37 are preferably defined by inner surface 80 of outer leg 71 and retaining surface 38 on flange 35. Rails 24 are received into side grooves 37 along flanges 35 such that the distal ends 39 of flanges 35 are received between rails 24 and outer surface 18 with retaining surfaces 38 opposed to holding surfaces 25. Alternatively, connectors 28, 29 could be reversed with a tongue having rails formed on the wear member 15 and a slot having side grooves to be formed on the boss 20.

[0029] Holding surfaces 25 of rails 24 are preferably curved to have a convex shape, and retaining surfaces 38 a complementary concave shape. This curve results in a narrowing of the rail as it extends forwardly. This narrowing of rails 24 allows wear member 15 to be fed onto boss 20 more easily; i.e., grooves 37 are wider at the rear end 40 of wear member 15 as compared to the narrow front ends 41 of rails 24. As a result, the wear member can be tilted at various angles when it is initially fed onto the rails 24 and then directed into the right orientation by the widening of the rails. Moreover, if the wear member is formed with lateral wings, as discussed below, the narrowing rails permit the wear member 15 to be purposefully tilted at an angle to permit the wings to clear the adjacent components as wear member 15 is fed onto boss 20. The narrowing of rails 24 and grooves 37 also enables easier release of wear member 15 as rails and grooves are not slid along each other surfaces after initial release. Further, the corresponding curved portions 42, 43 on holding surface 25 and retaining surface 38 (surfaces 25, 38 could be curved their entire length or only at the front ends) resist certain vertical loads at a more perpendicular orientation and provide a stronger and more stable resistance. As alternatives, rails 24 and grooves 37 could narrow without curved surfaces to achieve some of the benefits of the invention. In addition, the entire rail could be curved. Also, the holding surface could have an inclined but linear configuration such that the rail narrows as it extended forward, but is not curved.

[0030] Inner face 87 of inner leg 72 includes a first recess 91 into which upstanding support 50 is received, and a second recess 92 into which the width of boss 20 is received. The first recess 91 includes a pair of opposed sidewalls 93 to bracket the sides 94 of support 50. The second recess 92 includes a pair of opposed sidewalls 95, spaced farther apart than sidewalls 93, to receive the entire width of boss 20. By using this double set of recesses 91, 92, the wear member 15 is more stably mounted on boss 20 and better able to resist side loads.

[0031] When wear member 15 is installed, it is slid over boss 20 such that inner and outer legs 71, 72 straddle the lip (FIGS. 1-4). Rails 24 are fit within grooves 37 as shroud 15 is moved rearward. As discussed above, wear member 15 can be tilted at various angles and still fit onto the rails for easier installation. The rearward movement of shroud 15 is continued until inside corner surface 89 abuts front face 49 of boss 20. At this juncture, rear ends 33 of flanges 35 of outer leg 71 are preferably placed in close proximity to stop

surface 32. With new cast parts, it is not practical for inside corner surface 89 and rear ends 33 to simultaneously abut front face 49 and stop surface 32, respectively. However, by placing rear ends 33 in close proximity with stop surface 32, the two surfaces will typically abut after a short amount of time as wear develops in the parts or under heavy loading to provide extra support to the shroud and provide enhanced protection for the lip. Outer leg 71 overlies outer leg 21 of boss 20 and outer face 18 of lip 16, and inner leg 72 overlies inner leg 22 of boss 20 and ramp surface 17a of lip 16. Inner leg 72, along inner surface 87, includes two sets of side surfaces 93, 95. Support 50 fits within recess 91 and the entire boss 20 fits within recess 92 for enhanced support and stability.

[0032] Inner leg 72 includes an aperture 86 adapted to receive lock 56. In the preferred embodiment, aperture 86 has a main portion 90 having a generally rectangular configuration to match the shape of the preferred lock, though other shapes are possible, and a stem portion 97 that opens in the rear wall 98 of inner leg 72 to provide clearance for plug member 58. The rear wall 88 of aperture 86 forms a bearing surface to each side of stem portion 92 to abut lock 56.

[0033] In the preferred construction, lock 56 includes a body 101 having a generally parallelepiped configuration that corresponds to the shape of aperture 86 (FIGS. 8-11), though other shapes can be used. The body includes a front wall 103, a rear wall 104, and sidewalls 105, 106. A threaded bore 109 extends through body 101 and opens in front and rear walls 103, 104. Plug member 58 includes a threaded shank 111 to be threaded into bore 109, and a tool-engaging formation 113 on rear end 115. While in the preferred construction formation 113 is formed as a hex-shaped socket, the socket could have other shapes or be replaced with other kinds of flats adapted to cooperate with tools to effect turning of the plug. The front end 117 of plug 58 is adapted to project forward and abut rear wall 52 of support 50. A recess 57 is preferably formed in front wall 53 of aperture 86 to give clearance for the mount of plug 58. In this way, the assembly has a more compact profile. Plug member 58 can be advanced so as to push against rear wall 52 of support 50, which in turn, presses rear wall 104 of lock 56 against rear wall 88 of aperture 86. This movement of plug member 58, then, causes shroud 15 to be pushed tightly against front face 49 of boss 20. A tighter fit reduces the shifting of the shroud during use, which will in turn reduce the amount of wearing among the components. Nevertheless, a lock without an adjustment assembly could also be used.

[0034] A retainer 121 is also preferably provided to resist unintended loosening of plug member 58. In the preferred construction, retainer 121 includes a threaded bolt 123 and a retaining ring 125. Retaining ring 125 has a non-circular internal hole 127 that matches the exterior of head 113 of plug member 58, which is preferably a hex shape. The bolt 123 has a threaded shank 131 that threads into a second threaded bore 133 and a head 135 that tightens against retaining ring 125 to prevent its rotation. Of course, other retainers could also be used.

[0035] When shroud 15 is fit onto lip 16, the front wall 53 of aperture 86 is generally aligned with rear wall 52 of support 50, though it could also be spaced rearward thereof,

to permit lock 56 to fit within aperture 86 and be rearward of support 50. In this way, front wall 103 of lock 56 opposes rear wall 52 of support 50. As plug member 58 is advanced to engage rear wall 52, it preferably extends underneath leg 72. In this way, plug member 58 not only functions as a take up member to tighten the fit of the shroud against the boss, it also functions as a latch to hold the lock in aperture 86. Moreover, since the rear end 115 of plug member 58 sets within stem portion 92 (which can be easily cleared) the plug member can be easily retracted to remove the lock without concern over impacted fines blocking the movement.

[0036] In the preferred construction, one sidewall 105 of lock body 101 has an arcuate shape to fit against an arcuate sidewall 127 of aperture 86 so that the lock can be easily swung into aperture 86 (FIG. 10). Of course, other locks could be used to secure wear member 15 to boss 20.

1. A wear member for a front edge of an excavating bucket comprising a front end and a rear end, the rear end having a first leg and a second leg, the legs being bifurcated to straddle the front edge of the bucket, the second leg having an aperture for receiving a lock for holding the wear member to the bucket, and the first leg having a rearwardly-opening slot for receiving a boss fixed to the bucket, the slot having side grooves for receiving rails of the boss, each said side groove being defined by opposed first and second surfaces, wherein at least a front end of the first surface is curved.

2. A wear member in accordance with claim 1 wherein the slot and grooves are defined by a pair of opposed flanges upstanding on said first leg.

3. A wear member in accordance with claim 1 further including a corner surface between the legs, the corner surface having a concave curved surface.

4. A wear member in accordance with claim 1 wherein the second leg includes an inner surface facing the bucket, the inner surface including a first recess having a pair of opposed first sidewalls for receiving a support on the boss fixed to the bucket and a second recess having a pair of opposed second sidewalls having greater separation than the first sidewalls for receiving outer sides of the boss.

5. A wear member in accordance with claim 1 wherein the first surfaces of the grooves each defines a concave curve.

6. A wear member for a front edge of an excavating bucket comprising a front end and a rear end, the rear end having a first leg and a second leg, the legs being bifurcated to straddle the front edge of the bucket, the second leg having an aperture for receiving a lock for holding the wear member to the bucket, and the first leg having an axial connector for coupling to a complementary connector on a boss fixed to the bucket, the connector having a narrowing depth as the connector extends in a direction toward the front end.

7. A wear member in accordance with claim 6 wherein the connector is a slot with opposed side grooves that each has a depth that narrows in a forward direction.

8. A wear member in accordance with claim 7 in which each said side groove is defined at least by opposed first and second surfaces, wherein the first surface is generally formed with a convex curve.

9. A wear member in accordance with claim 7 wherein the slot and grooves are defined by a pair of opposed flanges upstanding on the first leg.

10. A wear member in accordance with claim 6 further including a corner surface between said legs, said corner surface having a concave curved surface.

11. A wear member in accordance with claim 6 wherein the first leg includes an inner surface facing the bucket, the inner surface including a first recess having a pair of opposed first sidewalls for receiving a support on a boss fixed to the bucket and a second recess having a pair of opposed second sidewalls having greater separation than the first sidewalls for receiving outer sides of the boss.

12. A wear member for a front edge of an excavating bucket comprising a front end, a rear end having an inner leg and an outer leg, the legs being bifurcated to straddle the front edge of the bucket, the inner leg having an inner surface facing the bucket and an aperture for receiving a lock for holding the wear member to the bucket, the inner surface including a first recess having a pair of opposed first sidewalls for receiving a support on a boss fixed to the bucket and a second recess having a pair of opposed second sidewalls having greater separation than the first sidewalls for receiving outer sides of the boss.

13. A wear member in accordance with claim 12 wherein the outer leg includes an axial connector that couples with a complementary connector on a boss fixed to the excavating bucket.

14. A wear member in accordance with claim 13 wherein the axial connector is a slot.

15. A wear assembly for a front edge of an excavating bucket comprising:

a boss fixed to the bucket, the boss having axial rails;

a wear member for a front edge of an excavating bucket comprising a front end and a rear end, the rear end having a first leg and a second leg, the legs being bifurcated to straddle the front edge of the bucket, the

second leg having an aperture for receiving a lock for holding the wear member to the bucket, and the first leg having a rearwardly-opening slot for receiving a boss fixed to the bucket, the slot having side grooves for receiving rails of the boss, each said side groove being defined at least by opposed first and second surfaces, wherein at least a front end of the first surface is curved; and

a lock received in the aperture to secure the wear member to the boss.

16. A wear assembly in accordance with claim 15 wherein the rails and the grooves narrow as they extend forward.

17. A wear assembly in accordance with claim 16 wherein the rails and grooves are each defined by a carved upper surface.

18. A wear assembly in accordance with claim 16 wherein the boss includes a front bearing surface that has a generally uniform curved configuration and the wear member includes a corner surface with a generally uniform curved configuration to bear against the front bearing surface.

19. A wear assembly in accordance with claim 16 wherein the second leg of the wear member includes an inner surface facing the bucket, the inner surface including a first recess having a pair of opposed first sidewalls for receiving a support on the boss fixed to the bucket and a second recess having a pair of opposed second sidewalls having greater separation than the first sidewalls for recessing outer sides of the boss.

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