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EazyPower Corporation

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4. APODERADO

Juan Rodriguez de la Cruz

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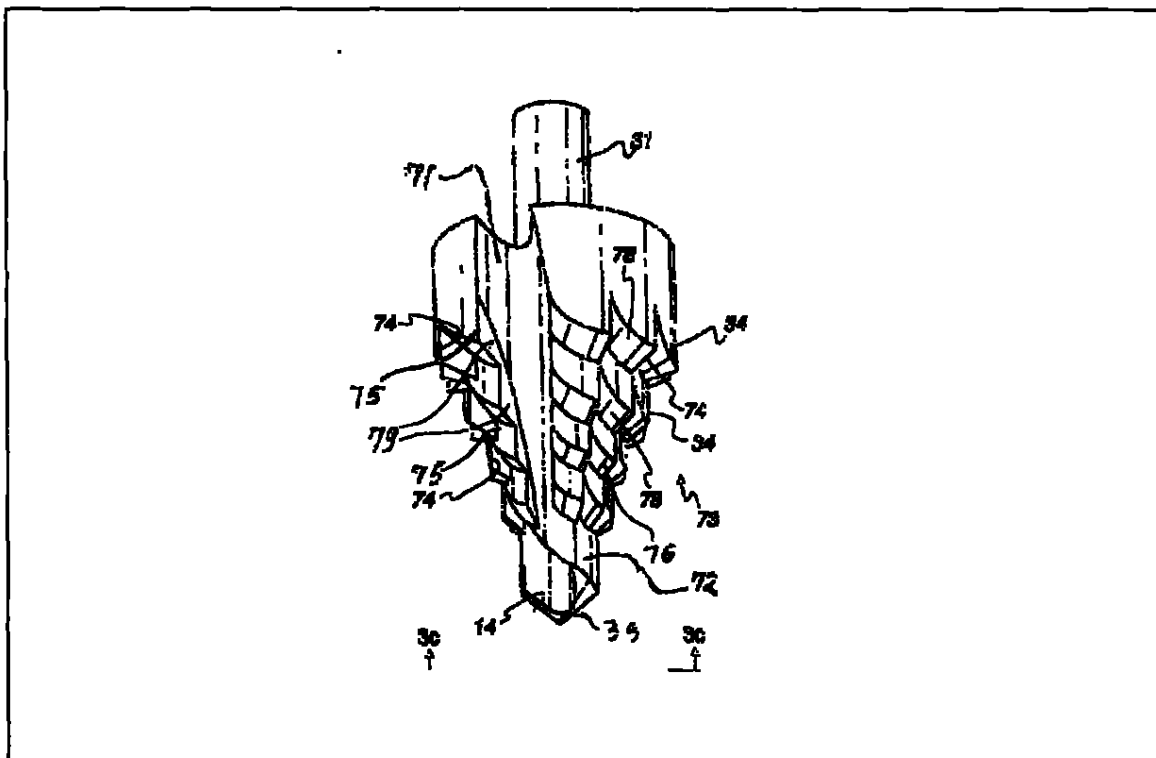
1) SOLICITUD DE:			
☒ Patente de invención		☐ Patente de Modelo de Utilidad	
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2) SOLICITANTE (71)	Solicitante: EAZYPOWER CORPORATION Dirección: 4008 W. Belden Avenue, Chicago, IL 60639 Estados Unidos Nacionalidad o Domicilio: Chicago, Illinois, Estados Unidos Lugar de constitución: Illinois, Estados Unidos		IDENTIFICACIÓN C.C. ☐ NIT: ☐ C.E. ☐ OTRO ☐ Cual _____ NÚMERO _____
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3) REPRESENTANTE O APODERADO	Nombre: DILIA MARIA RODRIGUEZ D'ALEMAN Dirección: Carrera 11 N°. 88-53 Piso 8 Bogotá D.C. Teléfono: 6181088 Fax: 6350824 E. Mail: info@clarkemodet.com.co		IDENTIFICACIÓN C.C. ☒ NIT: ☐ C.E. ☐ OTRO ☐ NÚMERO: 41.654.882 TP: 20824 CSJ
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10)

ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Comprobante de pago por reivindicación de prioridad
- ☐ Documento que acredite la existencia y representación legal cuando el solicitante sea persona Jurídica
- ☒ Poderes, si fuera el caso
- ☐ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☒ Copia de la solicitud Internacional. (Resumen, descripción, reivindicación, Dibujos).
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicación, Dibujos)
- ☐ Copia del examen preliminar efectuado por la IPEA
- ☐ De ser el caso, copia del contrato de acceso
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- ☐ Arte final 12 x 12 y 8 x 8 cm
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionados parcial o totalmente con la invención de esta solicitud.
- ☒ Otros:
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11) FIGURA CARACTERÍSTICA:



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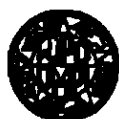
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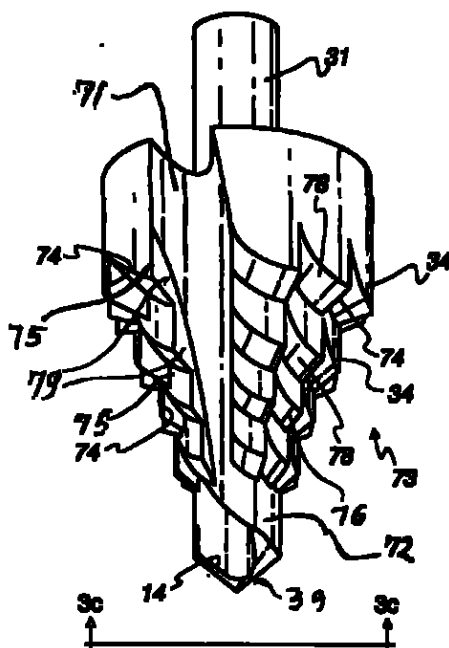
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(54) Title: DAMAGED BOLT AND SCREW REMOVING DEVICES



(57) Abstract: A bit for removing a broken fastener comprises a tip from which extend two or more notches separated by scraping surfaces formed from two-sided frusto-conically-shaped regions. The scraping surfaces are bounded on one side by a cutting edge and on the other side by a non-cutting edge and are configured to cut into the fastener when the bit is rotated in a direction opposite to the fastener's direction of engagement. Specific embodiments include configurations where the cutting edges extend at different angles with respect to the bit axis and where the scraping surfaces comprise a plurality of serrations.

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DAMAGED BOLT AND SCREW REMOVING DEVICES

This patent application claims the benefit of U.S. Provisional Patent Application No. 60/485,506, filed on April 25, 2003.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the field of hardware tool bits, and more particularly, the present invention relates to a device for removing damaged fasteners still embedded or otherwise engaged with a workpiece.

2. Description of the Prior art

The use of fasteners, such as screws, bolts, and other threaded joining devices continues to increase. However, the more a fastener is used, the more likely that it becomes rounded off, broken, or otherwise rendered useless. At that point, the fasteners must be removed, and/or the workpiece replaced or abandoned.

A myriad of screw removing bits exist. Generally, the bits are typical in that each

bit has a first end and a second end. The first end is adapted to be received by a rotating chuck or a rotating tool shaft, such as the shaft of a screw driver, either manually or power-driven. The second end of the bit is configured to impart rotational torque to the fastener while the latter is still held fast by the workpiece.

5 The second end of the bit mimics the end of a standard drill bit. Several broken bolt extractors feature a left-handed cutting edge. For example, U.S. Patent No. 4,777,850 discloses two such edges. However, such devices still require considerable power to impart the rotational torque necessary to "bite" into the fastener to begin left-handed extraction.

10 U.S. Patent No. 6,595,730 B2 awarded to Bergamo on July 22, 2003 discloses a bit for removing damaged screws. This device is designed to engage the exterior surface of the fasteners and not interior surfaces of the fastener. As such, "purchase" of the fastener by the device is relegated to that exterior surface.

15 A need exists in the art for a broken bolt or broken screw extraction device to facilitate easier removal of fasteners held tight by a workpiece. The device should be able to be utilized in hand-actuated handles or electrically activated tools. The device should engage as much of the interior surface of a wayward fastener so as to decrease the likelihood of a spin off of the device from the fastener while concomitantly increasing the likelihood of extraction of the fastener with minimal force required.

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SUMMARY OF THE INVENTION

It is an object of the present invention to provide a broken bolt or broken screw remover that overcomes many of the disadvantages of the prior art.

It is a further object of the present invention to provide a broken bolt/screw

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remover that requires only low levels of torque to extract a fastener. A feature of the invention is that the fastener has a pair of generally radially projecting cutting edges, with each of the cutting edges defining an angle with respect to the axis of the remover. An advantage of the invention is that the different cutting edge angles enhance the bite of the bit into interior surfaces of the fastener. The cutting edges also can contain serrations running substantially perpendicular to the longitudinal axis of the cutting edge to provide additional purchase of the fastener.

Yet another object of the present invention is to provide a broken bolt/screw remover which also has drilling function. A feature of the invention is that it comprises a left-handed countersink drill bit containing serrations which extend generally longitudinal to the axis of the bit. An advantage of the invention is that the drilling feature of the remover causes more interior surfaces of the fastener to be made available to the cutting edges of the serrations, and assures withdrawal of the remover with the fastener attached to the bit while the threaded cavity in the workpiece is left intact.

Still another object of the present invention is to provide a step drill with fastener remover capabilities. A feature of the invention is a plurality of generally longitudinally-extending serrations interposed between axially spaced steps in the drill bit. These serrations extend in a left hand cutting fashion. An advantage of the invention is that this one embodiment can be utilized to extract fasteners having a myriad of different shank diameters.

BRIEF DESCRIPTION OF THE DRAWING

The foregoing invention and its advantages may be readily appreciated from the following detailed description of the invention, when read in conjunction with the

accompanying drawing in which:

FIG. 1aa is an elevational view of the invented bit , in accordance with features of the present invention;

FIG. 1ab is a top view of FIG. 1aa taken along the line 1ab-1ab;

5 FIG. 1ac is an elevational view of FIG. 1aa rotated 180 degrees around its longitudinal axis, in accordance with features of the present invention;

FIG. 1ba is an elevational view of the invented bit with serrated regions, in accordance with features of the present invention;

FIG. 1bb is a top view of FIG. 1ba taken along the line 1ba-1ba;

10 FIG. 1bc is an expanded view of the invented bit with serrated regions depicted in FIG. 1ba, in accordance with features of the present invention

FIG. 1ca is an elevational view of an alternate invented bit with serrated regions, in accordance with features of the present invention;

FIG. 1cb is a top view of FIG. 1ca taken along the line 1cb-1cb;

15 FIG. 1cc is an elevational view of an alternate invented bit with serrated regions, in accordance with features of the present invention;

FIG. 1cd is a top view of FIG. 1ca taken along the line 1cd-1cd;

FIG. 1da is a detailed view of the serrated regions depicted in FIG. 1ba, in accordance with features of the present invention

20 FIG. 1db is a detailed view of an alternate configuration of the serrated regions depicted in FIG 1ba, in accordance with features of the present invention;

FIG. 2a is an elevational view of an easyout bit further defining a left handed drill bit with serration portions, in accordance with features of the present invention;

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FIG. 2b is an expanded view of the cutting edge of FIG. 2a, in accordance with features of the present invention;

FIG. 3a is a side view of a step drill bit with cutting threads, in accordance with features of the present invention;

5 FIG. 3b is a side view of an alternate step drill bit with serration portions, in accordance with features of the present invention;

FIG. 3c is a top view of FIG. 3b taken along the line 3c-3c;

FIG. 4a is a perspective view of an alternative fastener extraction device, in accordance with features of the present invention;

10 FIG. 4b is a top view of FIG. 4a taken along the line 4b-4b;

FIG. 5a is a modified spade flat, in accordance with features of the present invention;

FIG. 5b is an alternate modified spade flat, in accordance with features of the present invention;

15 FIG. 6a is an elevational view of a modification of the invented bit, in accordance with features of the present invention; and

FIG. 6b is a top view of FIG. 6a taken along the line 6b-6b.

DETAILED DESCRIPTION OF THE INVENTION

20 The present invention provides a bit configuration and various bit/threaded configurations on a single device to allow for easier fastener extraction.

FIG. 1aa provides salient features of the invented bit, the bit designated generally as numeral 10. As with any typical bit, the bit generally comprises a shaft 12 with a first end 13 terminating in a tip 19. While the tip 19 is depicted as generally

pointed, standard split tips also can be utilized such that the cutting surfaces 14 are not coplanarly aligned with each other or with the tip. This split point configuration minimizes and even prevents "walk out" of the bit from the workpiece. As such, the configuration serves as a means for maintaining the bit on the fastener during rotational motion of the bit.

A second end 15 of the bit is configured to be received in a chuck and as such, a cross section of the second end can be circular, hexagonal, polygonal or any convenient shape to facilitate the tip being acted upon with rotational torque.

The bit typically comprises two longitudinally extending notches 16, each of the notches terminated on one side with a leading or cutting edge 14. The other side of the notch is bounded by a noncutting edge 17. Both the cutting edge 14 and noncutting edge extend from a point proximal to the axis α to the bit periphery. Only one or more than two extending notches are acceptable, but, for the sake of specificity, the following discussion will focus on two-notched configurations. The cutting edge 14 faces in a counter-clock-wise direction for extracting a fastener with a clockwise direction of engagement and conversely for a counterclockwise fastener. Between the cutting edge and noncutting edge is a scraping surface 18 which can be described as a section of a frusto-conically-shaped region. The scraping surface is bound by the cutting edge 14 and noncutting edge 17.

The cutting edge 14 defines an angle β to the longitudinal axis α of the bit. The opposite side of the bit shown in FIG. 1ac defined a very similar configuration, except that its cutting edge 14b is arranged at an angle (γ) to the axis α of the bit that is different than the angle β . FIG. 1ab is a top view of FIG. 1aa taken along the line 1ab-

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1ab.

Surprisingly and unexpectedly, the inventor has found that the difference in the cutting edge angles facilitates greater bite into the shank of the broken fastener. The first angle β can differ from the second angle γ by as much as 50 percent. For example, whereas the first angle is 45 degrees, the second angle γ is 30 degrees. Ideally, the sum of the angles is such that any remaining slot of a broken fastener can simultaneously contact at least portions of each of the cutting edges 14 and 14b. While the cutting edges depicted in FIG. 1aa are rectilinear, in an alternative embodiment the cutting edges define a spiral configuration oriented opposite to the fastener's direction of engagement.

As an alternative to the bit having a straight cutting edge 14b as depicted in FIGs 1aa and 1ac, one of the edges 14a or more edges can be serrated, as depicted in FIG. 1ba. (FIG. 1bb is a top view of FIG. 1ba taken along the line 1bb-1bb.) The serrations 15 start along at least a substantial length of the cutting edge, and extend transversely from the cutting edge in a right handed direction (i.e. opposite the direction of the small arrow labeled B, and circumferentially parallel to the periphery of the bit. The serrations can extend completely across the frusto-conical surface 18 so as to terminate on the noncutting edge 17 (See FIGs 1ba and 1ca), or else the serrations can stop on the surface 18 between the cutting edge 14 and noncutting edge 17 (See FIG. 1cc and FIG. 1cd which is a top view of FIG. 1cc taken along the line 1cc-1cc). The serrations define on the surface 18 a series of teeth 15 with gaps 19 between the teeth, as shown in the detail in FIG. 1bc. A device with more than one scraping surface with serrations provides additional purchase synergy as discussed infra.

FIG. 1ca is analogous to FIG. 1ac except it is the scraping surface at an angle γ with respect to the axis that bears the serrations. FIG. 1cb is a top view of FIG. 1ca taken along the line 1cb-1cb.

The inventors have found that having one cutting edge serrated, and the
5 immediate next cutting edge smooth enhances "bite" of that smooth cutting edge into the fastener for easier extraction from the workpiece. This alternating serrated/smooth cutting edge configuration provides a double action whereby the serrated edge roughens the topography of the fastener surface, thereby serving as a means for enhancing purchase of the smooth cutting surface with the fastener.

10 A plurality of cutting edges on the same bit can be serrated (even on adjacent edges as opposed to a smooth edge intermediate two serrated edges), with one configuration having edges biting into the fastener at different axial locations from each other. The inventive feature of varying the angle of attack of the edges (e.g., the angles β and γ , discussed supra) will minimize the possibility of adjacent serrated edges
15 destroying the carcass of the fastener before the bit can anchor into the carcass for removal.

There are many possible variations in the configuration of the serrations. For instance, a possible embodiment is where serrations are provided on two cutting edges that are at the same angle with respect to the bit axis, with the serrations defining two
20 sets of teeth 15 with separated by gaps 11. FIGs 1da and 1db depict two possible variations within this embodiment. In FIG 1da corresponding teeth 15a'-15b', 15a''-15b'', 15a'''-15b''', etc ... on the two surfaces are azimuthally aligned across a notch 16 while in FIG 1db corresponding teeth are axially displaced with respect to those on the other

side of the notch so as to be azimuthally aligned with the gaps 11 on the other side. The staggered serration configuration provides a means for serrations biting at different radial and axial regions of the fastener.

Furthermore, it should be noted that the inverted bits need not terminate into a sharp apex. Rather, bits terminating in rounded or blunted apexes are suitable for fasteners having particularly large-diameter shanks or for fasteners where a central cavity has been fashioned during a previous attempt to extract the fastener. FIG 6a depicts an exemplary embodiment of such a blunted apex bit where the scraping surfaces 18 are inclined at different angles with respect to the axis (See FIG. 1aa) and may also comprise serrations (See FIG. 1ba). FIG. 6b is a top view of FIG. 6a taken along the line 6b-6b.

FIG. 2a depicts an embodiment of the inverted broken fastener remover, designated as numeral 20, which comprises a standard "easy out" configuration (whereby the easyout defines a tapering, left handed spiral). This embodiment comprises a plurality of left-handed cutting surfaces 22 terminating in a drill bit 28. The bit 28 can have the configuration described in FIGs 1aa and 1ba.

Also, the fastener remover bit 20 with the easyout configuration can include a plurality of serrations 24 along the cutting surface(s) 22 of the bit 20, these cutting surfaces defining helical regions extending circumferentially along the periphery of the bit 20. The serrations can exist along one or more than one of the cutting edges 14 of the bit. A salient feature of this embodiment is a plurality of left hand serrations 24 which extend preferably (but not necessarily) parallel to the longitudinal axis α of the shank 12 of the bit. These serrations bite in to the recess of the screw head. FIG. 2b

depicts a detail of a cutting edge 14 showing that the serrations 24 define teeth 25 on the cutting edge 14 of the spiral cutting surface 22.

FIGS. 3a and 3b depict a fastener removal bit designated as numeral 30. This removal bit 30 has a first end 31 adapted to be received by a rotating handle or chuck (not shown). A second end 32 of the removal bit 30 terminates in a bit configuration 39 similar to that depicted in FIGs. 1aa-1ba. Generally, the cutting region of the removal bit comprises a step drill configuration 32 and serration edges 33 positioned intermediate the steps 34 of the configuration such that the serrations extend radially from radially-facing surfaces of the steps. Also, these serration edges 33 generally extend parallel to the longitudinal axis of the bit 30, defining a left hand (counter-clockwise) drill cutting configuration.

In FIG. 3a, the steps 34 are axially spaced and otherwise arranged so that various fastener shank diameters can be accommodated with the removal bit 30. As such, steps have self-tapping screw threads 37 which are spaced apart to provide the anchoring necessary to withdraw the fastener in an axial direction once the bit is buried into the fastener shank, while the threaded cavity in the workpiece is left intact.

FIG. 3b depicts an alternative step drill bit 73, wherein the steps 34 are configured to comprise counter-clockwise cutting edges 74 and scraping surfaces 78. More specifically, the bit 73 has a first end that terminates in a tip 72 with two or more notches 71 extending longitudinally along the shaft 31 from the tip, said notches separated by a plurality of cutting edges 79, said edges 74 arranged on scraping surfaces 75 which are positioned along the axis and successively radially displaced further from the axis in a direction from the first end to the second end. The cutting

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edges are 79 configured to cut into the fastener in progressive radial steps when the bit is rotated in a direction opposite to the fastener's direction of engagement at the same time as the cutting edges cut azimuthally into the fastener. Depending regions of said surfaces 75 comprise a plurality of teeth 76, each of said teeth defining one cutting edge 74 adapted to bite the fastener in a direction along the longitudinal axis of the fastener. Thus each of the steps 34 constitutes a hole saw that bites into the fastener as the drill bit advances into the fastener. FIG. 3c is a view of FIG. 3b taken along line 3c-3c. The embodiment described in FIG. 3b may also comprise features described in conjunction with the embodiments described in FIGs 1aa and 3a. Thus the bit

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73 may comprise serration edges protruding from said surfaces 75 and self-tapping screw threads on one or more of said surfaces. Also, two or more cutting edges 79 may have dissimilar angles with respect to the axis.

FIG. 4a depicts another bit, designated generally as numeral 40 and FIG. 4b is a top view of FIG. 4a taken along the line 4b-4b. This bit comprises a "glass drill" 44 in the shape of a solid rod, terminating with a carbide insert 42. The insert 42 consists of a 2-notch bit as depicted in FIGs 1aa and 1ba in the limit where each of the notches 43 is between 150 and 180 degrees. Thus the present embodiment resembles a flat "spade" bit positioned transversely to the longitudinal axis of the rod. The distal end of the insert defines a plurality of left handed cutting edges 14, each which may or may not be at the same angle relative to the longitudinal axis of the rod. Optionally, one or both of these edges define scraping surfaces that contain serrations 15 extending transversely from the cutting edge. Each of these edges are configured in a left handed configuration, so that right-hand fasteners are extracted thereby. However, and with all

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bits depicted herein, the cutting edges can be configured as right-hand facing so as to facilitate removal of left-handed fasteners. FIG. 4b is a view of FIG. 4a taken along line 4b-4b.

The invented screw/bolt remover configuration can be integrally molded with other typical tool bits. For example, and as depicted in FIG. 5a, elements of the invented configuration depicted in FIGs. 1aa and 1ba can be integrally molded with a typical spade flat bit (FIG. 5a is a view of spade flat shown in slot of broken fastener) to optimize an already familiar tool. A typical spade drill comprises a shank adapted to be received in the chuck of a torque-imparting tool, the shank terminating in a flat cutting element often called a "spade flat." The spade flat typically comprises cutting edges parallel to the shank and a cutting tip aligned with the shank and/or side cutting tips parallel to the shank but laterally displaced from the ends of the shank.

In FIGs 5a and 5b the spade flat hybrid 50 is depicted as positioned at the slot of a broken screw 54, the screw countersunk into a workpiece 56. In operation, the cutting edges 14 of the spade flat hybrid 50 burrow into the head 58 of the screw. The center of the slot of the screw is shown as a pilot hole for the user of the hybrid bit 50.

In Fig. 5a the invented hybrid tool, designated as numeral 50 defines cutting edges 14 in a counter-clockwise facing position of the spade flat 52 and on a tip 51 similar to either of the configurations depicted in FIGs. 1aa and 1ba. The bit 50 also comprises side cutting tips 53.

In Fig. 5b the spade flat terminates in a triangular cutting element 59.

As with the embodiments depicted in FIG. 1, the spade flat can alternatively include a non-cutting edge and a scraping surface, having either a smooth or serrated

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topology.

The spade flat depicts a 1/4" size. However, this is for example only. Rather, a myriad of spade flat sizes are suitable, depending on the diameter of the residual fastener head 58 or shank remaining.

5 Another embodiment of a spade flat is depicted in FIG. 5b where the cutting edges 14 assume a triangular shape.

It should be noted that the above described embodiments all depict left handed cutting configurations. However, if left handed fasteners are to be removed, then the herein disclosed embodiments with right handed cutting configurations would be
10 utilized.

It should be further noted that the opposed cutting edges in each of the above-disclosed embodiments generally are configured at angles to the longitudinal axis of the respective bit which are either identical to each other, or different from each other, on the same bit.

15 Also, the invented bits can be configured to include a means for preventing the bits from dislodging from broken fasteners once engagement with said fasteners occurs. In this regard, "finders" may be installed. These are accessories associated with, and co-axial to, the shanks of the bits and in slidable communication therewith. Generally configured as cylinders or tubes, the finders are adapted to slide over the
20 periphery of a fastener which is held fast in a work piece. As such, the finders maintain the bit in a position coaxial to the longitudinal axis of the fastener to assure adequate embedding of the bit into the fastener. The finder also prevents jumping or skipping of the bit from the fastener to adjacent surfaces of the workpiece, thus preventing marring

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or scuffing of said workpiece.

Another addition to the invented device is the positioning of a collar or radial projection about the circumference of the device. The collar or projection would be positioned intermediate the first and second end of the device and serve as a means
5 for preventing penetration of the device into the fastener beyond the distance defined by the tip 19 of the device and the position of the collar.

While the invention has been described in the foregoing with reference to details of the illustrated embodiment, these details are not intended to limit the scope of the invention as defined in the appended claims.

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CLAIMS

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

- 1 1. A bit for removing a broken fastener having a direction of engagement, said bit
2 comprising:
 - 3 a) an elongated shaft with a longitudinal axis, said shaft having a first end,
4 and a second end, said first end terminating in a tip;
 - 5 b) a plurality of cutting edges extending radially from said tip, said cutting
6 edges configured to cut into the fastener when the bit is rotated in a direction opposite
7 to the fastener's direction of engagement, wherein each cutting edge defines an angle
8 to the longitudinal axis of the bit and wherein the angles of at least two cutting edges
9 are dissimilar; and
 - 10 c) said second end of the shaft configured to be received by a chuck of a
11 tool which provides rotational torque.

- 1 2. The bit as recited in claim 1 wherein one or more of said cutting edges define
2 scraping surfaces and wherein said surfaces comprise serrations.
- 1 3. The bit as recited in claim 1 further comprising a plurality of tapering spiral cutting
2 surfaces extending from a region proximal to said second end to said cutting edges.
- 1 4. The bit as recited in claim 3 further comprising serrations protruding from said
2 tapering spiral cutting surface in a direction opposite to the fastener's direction of
3 engagement.
- 1 5. The bit as recited in claim 3 wherein said serrations are parallel to said
2 longitudinal axis.
- 1 6. The bit as recited in claim 2 wherein said serrations define a plurality of teeth on
2 the cutting edges.
- 1 7. The bit as recited in claim 2 wherein
2 a first and a second scraping surfaces have identical angles with respect to the
3 longitudinal axis;
4 the first and the second scraping surfaces comprise serrations; and
5 wherein the serrations on the first surface are azimuthally aligned with
6 corresponding serrations on the second surface.

- 1 8. The bit as recited in claim 2 wherein
2 a first and a second scraping surfaces have identical angles with respect to the
3 longitudinal axis;
4 the first and the second scraping surfaces comprise serrations, with each
5 serration defining a crest and a gap; and
6 wherein the crests of the serrations on the first surface are azimuthally aligned
7 with the gaps of corresponding serrations on the second surface.
- 1 9. The bit as recited in claim 1 further comprising:
2 two or more notches extending longitudinally along the shaft intermediate said
3 cutting edges and said second end, said notches separated by a plurality of cutting
4 edges, said edges arranged on surfaces which are positioned along the axis and
5 successively radially displaced further from the axis in a direction from the first end to
6 the second end, said cutting edges configured to cut into the fastener when the bit is
7 rotated in a direction opposite to the fastener's direction of engagement.
- 1 10. The bit as recited in claim 9 wherein said surfaces are parallel to said axis.
- 1 11. The bit as recited in claim 1 comprising two cutting edges that are parallel to each
2 other.
- 1 12. The bit as recited in claim 12 wherein one or more of said cutting edges comprise
2 a plurality of serrations.

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- 1 13. The bit as recited in claim 1 further comprising a spade flat intermediate said tip
2 and said shank.
- 1 14. A bit for removing a broken fastener having a direction of engagement, said bit
2 comprising:
- 3 a) a shaft with a longitudinal axis, a first end, and a second end,
4 b) said first end terminating in a tip with two or more notches extending
5 longitudinally along the shaft from the tip, said notches separated by a plurality of cutting
6 edges, said cutting edges terminating on surfaces which are positioned along the axis
7 and successively radially displaced further from the axis in a direction from the first end
8 to the second end;
- 9 said surfaces comprising serrations protruding therefrom;
10 with said cutting edges and said serrations adapted to cut into the fastener when
11 the bit is rotated in a direction opposite to the fastener's direction of engagement
12 and wherein a plurality of said surfaces comprise self-tapping screw threads
13 protruding from said surfaces; and
14 c) with said second end of the shaft configured to be received in a chuck of a tool
15 which provides rotational torque.

- 1 15. A bit for removing a broken fastener having a direction of engagement, said bit
2 comprising:
- 3 a) a shaft with a longitudinal axis, a first end, and a second end;
- 4 b) said first end terminating in a tip with two or more notches extending
5 longitudinally along the shaft from the tip, said notches separated by a plurality of cutting
6 edges, said edges arranged on scraping surfaces which are positioned along the axis
7 and successively radially displaced further from the axis in a direction from the first end
8 to the second end;
- 9 c) said cutting edges configured to cut azimuthally into the fastener when the
10 bit is rotated in a direction opposite to the fastener's direction of engagement and said
11 axially successive surfaces configured to cut radially into the fastener;
- 12 d) wherein a depending region of said surfaces comprises a plurality of teeth,
13 each of said teeth defining one cutting edge adapted to bite the fastener in a direction
14 along the longitudinal axis of the fastener; and
- 15 e) with said second end of the shaft configured to be received in a chuck of a
16 tool which provides rotational torque.
- 1 16. The bit as recited in claim 15 further comprising serration edges protruding from
2 said surfaces and self-tapping screw threads on one or more of said steps.
- 1 17. The bit as recited in claim 15 wherein two or more cutting edges have dissimilar
2 angles with respect to the axis.

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Fig. 1da

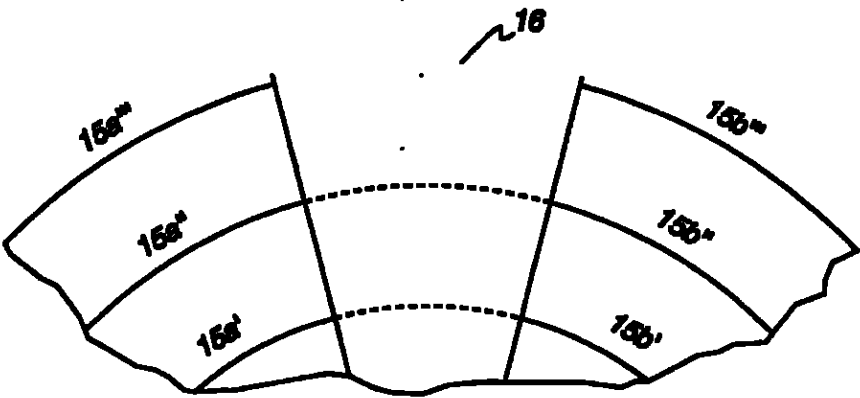
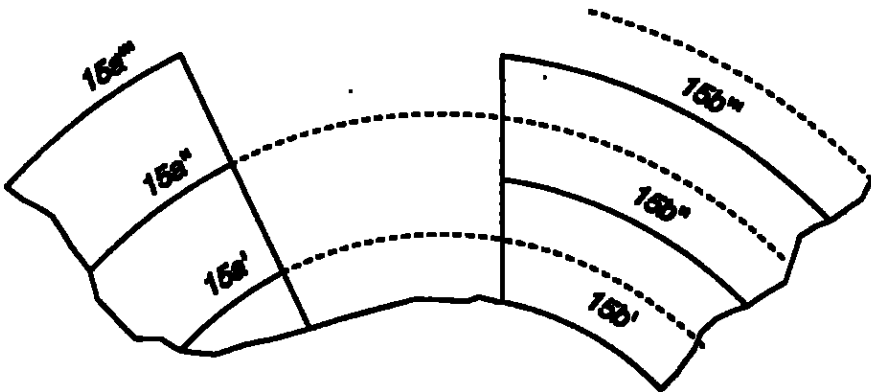


Fig. 1db



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Fig. 2a

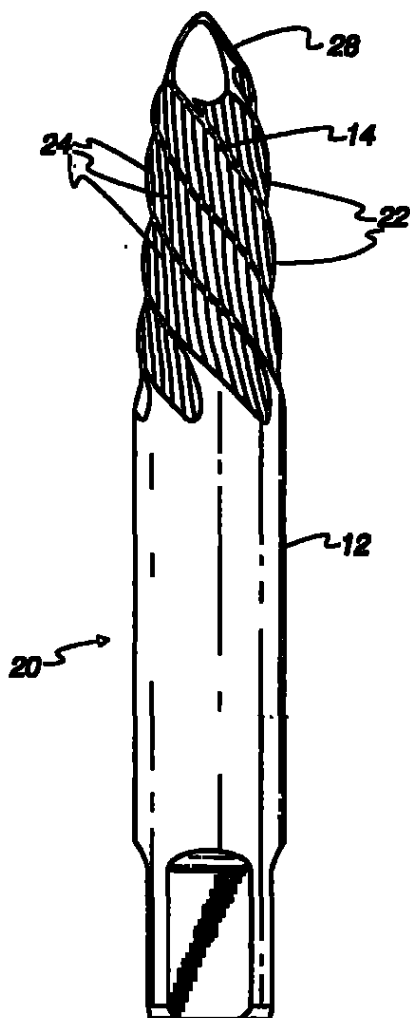
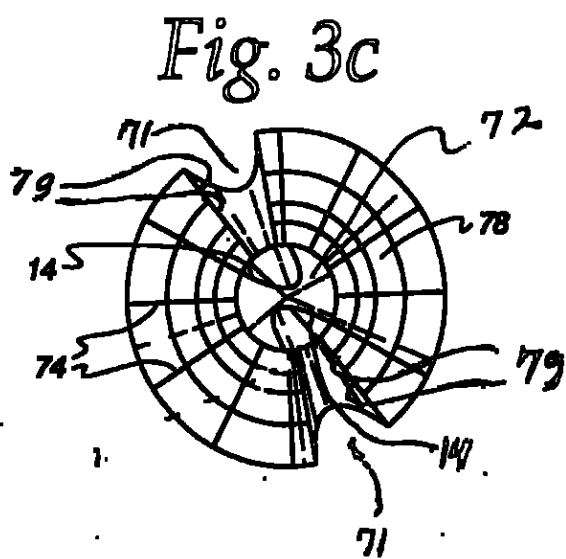
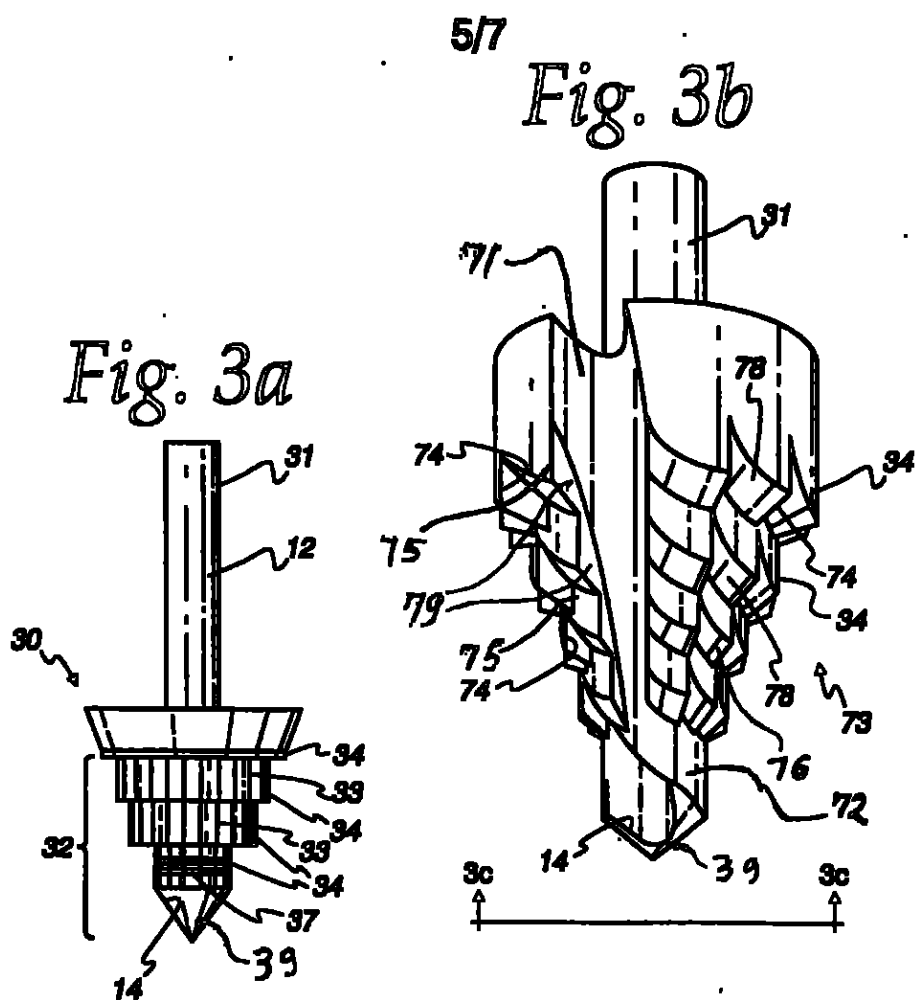


Fig. 2b



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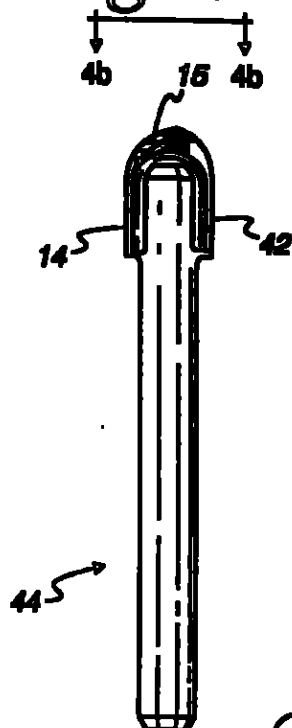
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Fig. 4a



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Fig. 4b

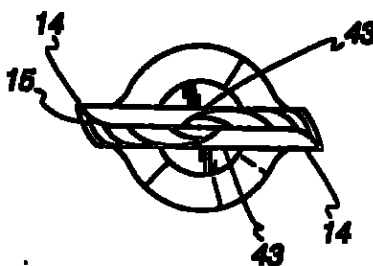
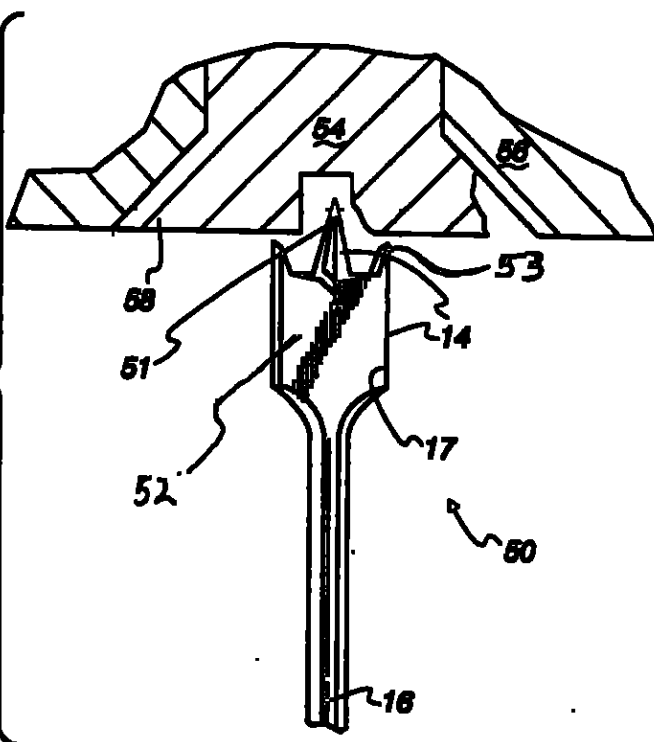


Fig. 5a



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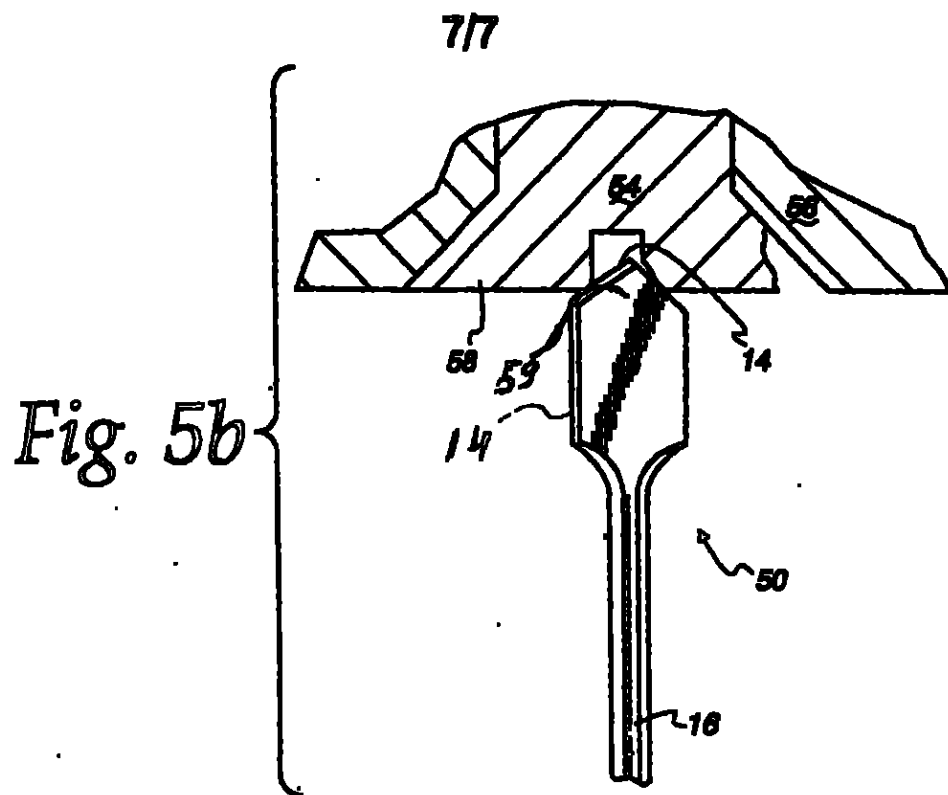


Fig. 6a

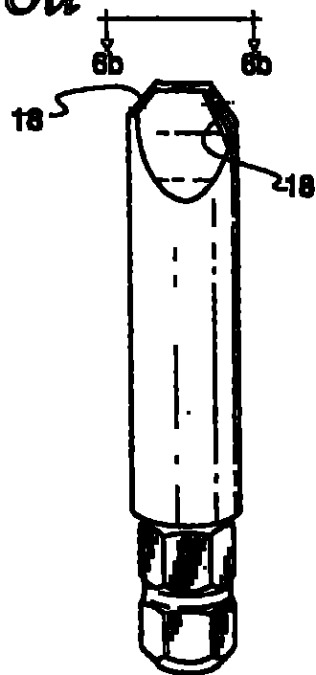


Fig. 6b



DISPOSITIVOS PARA EXTRACCIÓN DE PERNOS Y TORNILLOS AVERIADOS

RESUMEN

Una broca para extraer un sujetador averiado que comprende una punta desde la cual sobresalen dos o más ranuras separadas por superficies de raspado conformadas en dos regiones troncocónicas de dos caras. Las superficies de raspado están limitadas de un lado por un borde cortante y por el otro lado por un borde no cortante, estando configuradas para cortar el sujetador cuando se hace girar la broca en sentido opuesto al del roscado del sujetador. Realizaciones específicas incluyen configuraciones en las que los bordes cortantes se extienden con inclinaciones diferentes respecto del eje de la broca y en las que las superficies de raspado comprenden una pluralidad de estrías.

La presente solicitud reclama los beneficios de prioridad de la Solicitud de Patente Provisoria de los Estados Unidos N° 60/465.506, presentada el 25 de abril de 2003.

ANTECEDENTES DE LA INVENCION

1. Campo de la invención

La presente invención se refiere al campo de las herramientas de broca y, más en particular, la presente invención se refiere a un dispositivo para extraer sujetadores averiados que se mantienen incrustados o aprisionados de otro modo en una pieza de trabajo.

2. Descripción del arte previo

El uso de sujetadores, como tornillos, pernos y otros dispositivos roscados de sujeción, sigue en aumento. Sucede, que cuanto más se usa un sujetador, más probabilidades hay de que se redondeen sus aristas, de que se quiebren o queden inutilizables por algún otro motivo. Cuando esto ocurre, es necesario remover los sujetadores y/o descartar la pieza de trabajo.

Existen incontables brocas para extraer tornillos. Generalmente, las brocas tienen en común el poseer un primer extremo y un segundo extremo. El primer extremo está adaptado para recibir un portabroca rotatorio o el vástago de una herramienta rotatoria, como el vástago de un destornillador, accionado en forma manual o eléctrica. El segundo extremo de la broca está configurado para impartir torque rotatorio al sujetador mientras éste sigue aprisionado en la pieza de trabajo.

El segundo extremo de la broca es similar al extremo de una broca estándar. Varios extractores de pernos averiados poseen un borde cortante en sentido horario. Por ejemplo, en la Patente de los Estados Unidos N° 4.777.850 se describen dos bordes de este tipo. Sin embargo, estos dispositivos requieren considerable energía para impartir el torque rotatorio

necesario para "morder" el sujetador y comenzar la extracción en sentido horario.

La Patente de los Estados Unidos N° 6.595.730 B2, a favor de Bergamo, emitida el 22 de julio de 2003, describe una broca para extraer tornillos averiados. Este dispositivo está diseñado para enganchar la superficie externa de los sujetadores, y no sus superficies internas. Por lo tanto, el "agarre" del sujetador por parte del dispositivo queda limitado a dicha superficie externa.

Existe la necesidad en el arte de un dispositivo para la extracción de pernos averiados o tornillos averiados que permita facilitar la extracción de sujetadores aprisionados en una pieza de trabajo. El dispositivo tiene que poder ser utilizado con mangos para uso manual o herramientas eléctricas. El dispositivo debe enganchar el máximo de superficie interna de un sujetador rebelde para disminuir las posibilidades de que el dispositivo se suelte del sujetador y a la vez aumentar la probabilidad de extracción del sujetador con la mínima fuerza posible.

RESUMEN DE LA INVENCION

Un objeto de la presente invención es suministrar un extractor de pernos averiados o de tornillos averiados que supere muchas de las desventajas del arte previo.

Otro objeto de la presente invención es suministrar un extractor de pernos/tornillos averiados que requiera mínimos niveles de torque para extraer un sujetador. Una característica de la invención es que el sujetador posee un par de bordes cortantes que sobresalen en forma generalmente radial, donde cada uno de los bordes cortantes define un ángulo con respecto al eje del extractor. Una ventaja de la invención es que los diferentes ángulos del borde

de corte aumentan la mordida de la broca en las superficies internas del sujetador. Los bordes cortantes también pueden tener estrías que corren en dirección sustancialmente perpendicular al eje longitudinal del borde cortante para suministrar agarre adicional del sujetador.

Otro objeto más de la presente invención es suministrar un extractor de pernos/tornillos que también tiene una función de perforación. Una característica de la invención es que comprende una broca cónica en sentido horario que contiene estrías que se extienden de manera general paralelas al eje de la broca. Una ventaja de la invención es que el elemento de perforación del extractor pone más superficie interior del sujetador en contacto con los bordes cortantes de las estrías, y asegura poder retirar el extractor con el sujetador fijado a la broca dejando intacta la cavidad roscada en la pieza de trabajo.

Otro objeto más de la presente invención es suministrar un taladro en escalones con capacidad para extraer sujetadores. Una característica de la invención es una pluralidad de estrías en dirección generalmente longitudinal interpuestas entre escalones espaciados axialmente en la broca. Estas estrías se extienden cortando en sentido horario. Una ventaja de la invención es que esta realización se puede utilizar para extraer sujetadores que tengan espigas con diámetros de innumerables dimensiones diferentes.

BREVE DESCRIPCIÓN DEL DIBUJO

La invención precedente y sus ventajas se podrán apreciar fácilmente a partir de la siguiente descripción detallada, leída conjuntamente con el dibujo que la acompaña, donde:

la Fig. 1aa es una vista en elevación de la broca de la invención, de acuerdo con características de la presente invención;

la Fig. 1 ab es una vista superior de la Fig. 1 tomada por la línea 1 ab-1 ab;

la Fig. 1 ac es una vista en elevación de la Fig. 1 rotada 180 grados en su eje longitudinal, de acuerdo con características de la presente invención;

la Fig. 1 ba es una vista en elevación de la broca de la invención con regiones estriadas, de acuerdo con características de la presente invención;

la Fig. 1 bb es una vista superior de la Fig. 1 ba tomada por la línea 1 ba-1 ba;

la Fig. 1 be es una vista ampliada de la broca de la invención con las regiones estriadas mostradas en la Fig. 1 ba, de acuerdo con características de la presente invención;

la Fig. 1ca es una vista en elevación de una realización alternativa de la broca de la invención con regiones estriadas, de acuerdo con características de la presente invención;

la Fig. 1 cb es una vista superior de la Fig. 1 ca tomada a lo largo de la línea 1 cb-1 cb;

la Fig. 1 cc es una vista en elevación de una realización alternativa de la broca de la invención con regiones estriadas, de acuerdo con características de la presente invención;

la Fig. 1cd es una vista superior de la Fig. 1 ca tomada a lo largo de la línea 1cd-1cd;

la Fig. 1da es una vista detallada de las regiones estriadas mostradas en la Fig. 1ba, de acuerdo con características de la presente invención;

la Fig. 1db es una vista detallada de una configuración alternativa de las regiones estriadas mostradas en la Fig. 1 ba, de acuerdo con características de la presente invención;

la Fig. 2a es una vista en elevación de una broca de fácil extracción que define además una broca a izquierdas con porciones estriadas, de acuerdo con características de la presente invención;

la Fig. 2b es una vista ampliada del borde cortante de la Fig. 2a, de acuerdo con características de la presente invención;

la Fig. 3a es una vista lateral de una broca escalonada con filetes cortantes, de acuerdo con características de la presente invención;

la Fig. 3b es una vista lateral de una configuración alternativa de una broca escalonada con porciones estriadas, de acuerdo con características de la presente invención;

la Fig. 3c es una vista superior de la Fig. 3b tomada a lo largo de la línea 3c-3c;

la Fig. 4a es una vista en perspectiva de un dispositivo alternativo de extracción de sujetadores, de acuerdo con características de la presente invención;

la Fig. 4b es una vista superior de la Fig. 4a tomada a lo largo de la línea 4b-4b;

la Fig. 5a es una horquilla plana modificada, de acuerdo con características de la presente invención;

la Fig. 5b es una alternativa de una horquilla plana modificada, de acuerdo con características de la presente invención;

la Fig. 6a es una vista en elevación de una modificación de la broca de la invención, de acuerdo con características de la presente invención; y

la Fig. 6b es una vista superior de la Fig. 6a tomada a lo largo de la línea 6b-6b.

DESCRIPCIÓN DETALLADA DE LA INVENCION

La presente invención suministra una configuración de broca y diversas configuraciones de brocas/fileteados en un único dispositivo para facilitar la extracción de sujetadores.

La Fig. 1aa muestra las características sobresaliente de la broca de la invención, donde la broca se indica en forma general con el número 10. Como en cualquier broca típica, la broca comprende de modo general un vástago 12 con un primer extremo 13 que termina en una punta 19. Si bien la punta 19 se muestra en forma generalmente puntiaguda, también se pueden usar puntas divididas estándar en las que las superficies cortantes 14 no están en el mismo plano ni en el plano de la punta. Esta configuración de punta dividida minimiza e incluso previene que la broca "salte" de la pieza de trabajo. Por lo tanto, la configuración sirve como medio para mantener la broca sobre el sujetador durante el movimiento rotatorio de la broca.

Un segundo extremo 15 de la broca está configurado para recibir un portabroca y, por lo tanto, la sección transversal del segundo extremo puede ser circular, hexagonal, poligonal o de cualquier otra forma conveniente para facilitar la aplicación de torque rotatorio sobre la punta.

Típicamente, la broca comprende dos ranuras longitudinales 16, cada una de las cuales termina de un lado en un borde delantero o cortante 14. El otro lado de la ranura está limitado por un borde no cortante 17. Tanto el borde cortante 14 como el borde no cortante se extienden desde un punto proximal al eje α hacia la periferia de la broca. Son aceptables solamente una o más de dos ranuras, pero, en aras de la especificidad, la siguiente descripción se centrará en configuraciones de dos ranuras. El borde cortante 14 mira en sentido antihorario para extraer un

sujetador atornillado en sentido horario, y a la inversa para un sujetador en sentido antihorario. Entre el borde cortante y el borde no cortante hay una superficie de raspado 18, que se puede describir como una sección de una región de forma troncocónica. La superficie de raspado está limitada por el borde cortante 14 y el borde no cortante 17.

El borde cortante 14 define un ángulo β en relación con el eje longitudinal α de la broca. El lado opuesto de la broca que se muestra en la Fig. 1ac define una configuración muy similar, excepto que su borde cortante 14b está dispuesto en un ángulo (γ) respecto del eje α de la broca, que es diferente del ángulo β . La Fig. 1ab es una vista superior de la Fig. 1aa tomada a lo largo de la línea 1ab-1ab.

En forma sorprendente e inesperada, el inventor verificó que la diferencia en los ángulos del borde cortante facilita una mayor mordida en el cuerpo del sujetador averiado. El primer ángulo β puede diferir del segundo ángulo γ en hasta un 50 por ciento. Por ejemplo, mientras que el primer ángulo tiene 45 grados, el segundo ángulo γ tiene 30 grados. Idealmente, la suma de los ángulos es tal que cualquier hendidura remanente de un sujetador averiado puede contactar simultáneamente con al menos partes de cada borde cortante 14 y 14b. Si bien los bordes cortantes mostrados en la Fig. 1aa son rectos, en una realización alternativa los bordes cortantes definen una configuración helicoidal orientada en sentido opuesto al sentido del roscado del sujetador.

Como alternativa a la broca con un borde cortante 14b recto, tal como se muestra en las Figs. 1aa y 1ac, uno de los bordes 14a o más bordes pueden ser estriados, como se muestra en la Fig. 1ba. (la Fig. 1bb es una vista superior de la Fig. 1ba tomada a lo largo de la línea 1bb-1bb). Las estrías 15 comienzan a lo largo de al menos una parte sustancial del borde cortante y se extienden

transversalmente desde el borde cortante hacia la derecha (es decir, en sentido opuesto al de la flecha pequeña marcada con la letra B, y paralelas circularmente a la periferia de la broca. Las estrías se pueden extender a través de toda la superficie troncocónica 18 y terminar en el borde no cortante 17 (ver Figs. 1 ba y 1 ca) o, de lo contrario, las estrías pueden llegar a la superficie 18 entre el borde cortante 14 y el borde no cortante 17 (ver Fig. 1 cc y Fig. 1cd, que es una vista superior de la Fig. 1 cc tomada a lo largo de la línea 1 cc-1 cc). Las estrías definen en la superficie 18 una serie de dientes con 15 con espacios 19 entre los dientes, como se muestra en detalle en la Fig. 1 bc. Un dispositivo con más de una superficie de raspado con estrías suministra mayor sinergia de agarre, tal como se trata más adelante.

La Fig. 1 ca es análoga a la Fig. 1 ac, excepto que es la superficie de raspado con un ángulo y con respecto al eje la que lleva las estrías. La Fig. 1 cb es una vista superior de la Fig. 1 ca tomada a lo largo de la línea 1 cb -1 cb.

Los inventores descubrieron que con un borde cortante estriado y el borde cortante que le sigue inmediatamente liso, aumenta la "mordida" de dicho borde cortante liso en el sujetador, facilitando su extracción de la pieza de trabajo. Esta configuración alternante de bordes cortantes estriados/lisos suministra una doble acción en virtud de la cual el borde estriado practica escariaciones en la topografía de la superficie del sujetador, sirviendo así como medio para aumentar el agarre de la superficie cortante lisa con el sujetador.

En la misma broca puede haber una pluralidad de bordes cortantes estriados (incluso en bordes adyacentes, por oposición a un borde liso interpuesto entre dos bordes estriados), donde una configuración tiene bordes que muerden el sujetador en posiciones axiales diferentes entre sí. La característica de la

invención de variar el ángulo de ataque de los bordes (p. ej., los ángulos β y γ , mencionados anteriormente) minimizará la posibilidad de que los bordes estriados adyacentes destruyan la carcasa del sujetador antes de que la broca pueda hacer anclaje en la carcasa para proceder a la extracción.

La configuración de las estrías admite muchas variaciones posibles. Por ejemplo, en una posible realización las estrías están en dos bordes cortantes que se encuentran con la misma inclinación respecto del eje de la broca, donde las estrías definen dos conjuntos de dientes 15 separados por espacios 11. Las Figs. 1da y 1db muestran dos posibles variaciones dentro de esta realización. En la Fig. 1da los dientes correspondientes 15a'-15b', 15a"-15b", 15a'''-15b'''..., etc., en las dos superficies están alineados acimutalmente a través de una ranura 16, en tanto que en la in Fig. 1db los dientes correspondientes están desplazados axialmente en relación con los del otro lado de la ranura para quedar alineados acimutalmente con los espacios 11 del otro lado. La configuración de estriado escalonado suministra un medio para que las estrías muerdan en diferentes regiones radiales y axiales del sujetador.

Además, corresponde señalar que las brocas de la invención no tienen que terminar en un extremo afilado. Por el contrario, las brocas que terminan en extremos redondeados o romos son adecuadas para sujetadores que tienen vástagos de diámetro especialmente grande o para sujetadores en los que se ha practicado una cavidad central en un intento previo de extraer el sujetador. La Fig. 6a muestra una realización a modo de ejemplo de dicha broca con extremo romo donde las superficies de raspado 18 están inclinadas a diferentes ángulos con respecto a los ejes (ver Fig. 1aa) y también pueden comprender estrías (ver Fig. 1

ba). La Fig. 6b es una vista superior de la Fig. 6a tomada a lo largo de la línea 6b-6b.

La Fig. 2a muestra una realización del extractor de sujetadores averiados de la invención, designada con el número 20, que comprende una configuración estándar de tipo "easy out" (extracción fácil) (donde la extracción fácil define una espiral conforme en sentido horario). Esta realización comprende una pluralidad de superficies cortantes a la izquierda 22 que terminan en una broca 28. La broca 28 puede tener la configuración descrita en las Figs. 1 aa y 1 ba.

Asimismo, la broca del extractor de sujetadores 20 con la configuración *easyout* puede incluir una pluralidad de estrías 24 a lo largo de la o de las superficies cortantes 22 de la broca 20, donde estas superficies cortantes definen regiones helicoidales que se extienden circunferencialmente a lo largo de la periferia de la broca 20. Las estrías pueden estar en uno o más de los bordes cortantes 14 de la broca. Una característica destacada de esta realización es una pluralidad de estrías a la izquierda 24 que se extienden preferiblemente (pero no necesariamente) paralelas al eje longitudinal α del vástago 12 de la broca. Estas estrías muerden la ranura de la cabeza del tornillo. En la Fig. 2b se muestra un detalle de un borde cortante 14 donde se ve que las estrías 24 definen dientes 25 en el borde cortante 14 de la superficie cortante helicoidal 22.

Las Figs. 3a y 3b muestran una broca para extracción de sujetadores designada con el número 30. Esta broca de extracción 30 tiene un primer extremo 31 adaptado para recibir un mango o portabroca rotatorios (no se muestran). Un segundo extremo 32 de la broca para extracción 30 termina en una configuración 39 de la broca similar a la que se muestra en las Figs. 1 aa-1 ba. De modo general, la región cortadora de la broca para extracción comprende una

configuración 32 de escalonada y bordes estriados 33 posicionados entre los escalones 35 de la configuración, de modo tal que las estrías se extienden radialmente desde las caras radiales de los escalones. Además, dichos bordes estriados 33 se extienden de modo general paralelos al eje longitudinal de la broca 30, definiendo una configuración de corte a la izquierda (en sentido antihorario).

En la Fig. 3a, los escalones 34 están espaciados en dirección axial y configurados para que la broca para extracción 30 pueda recibir espigas de sujetador de diversos diámetros. Por lo tanto, los escalones tienen filetes autorroscables 37 que están espaciados para brindar el anclaje necesario para extraer el sujetador en dirección axial una vez que la broca está introducida en la espiga del sujetador, mientras que la cavidad roscada en la pieza de trabajo queda intacta.

La Fig. 3b muestra una broca escalonada alternativa 73, donde los escalones 34 están configurados para comprender bordes cortantes en sentido antihorario 74 y superficies de raspado 74. Más específicamente, la broca 73 tiene un primer extremo que termina en una punta 72 con dos o más ranuras 71 que se extienden longitudinalmente por el vástago 31 desde la punta, donde dichas ranuras están separadas por una pluralidad de bordes cortantes 79, y donde dichos bordes 74 están configurados en superficies de raspado 75 que están posicionadas a lo largo del eje y desplazadas del eje radialmente en forma sucesiva en una dirección desde el primer extremo hacia el segundo extremo. Los bordes cortantes 79 están configurados para cortar el sujetador en escalones radialmente progresivos cuando se hace rotar la broca en sentido opuesto al sentido del roscado del sujetador al mismo tiempo que los bordes cortantes cortan acimutalmente el sujetador. Regiones dependientes de dichas superficies 75

comprenden una pluralidad de dientes 76, donde cada uno de dichos dientes define un borde cortante 74 adaptado para morder el sujetador en dirección paralela al eje longitudinal del sujetador. Por lo tanto, cada escalón 34 constituye una broca hueca que muerde el sujetador a medida que la broca avanza dentro del sujetador. La Fig. 3c es una vista de la Fig. 3b tomada a lo largo de la línea 3c-3c. La realización descrita en la Fig. 3b puede comprender también características descritas en conjunción con las realizaciones señaladas en las Figs. 1aa y 3a. Por lo tanto, la broca 73 puede comprender bordes estriados que sobresalen de dichas superficies 75 y filetes autorroscables en una o más de dichas superficies. Asimismo, dos o más bordes cortantes 79 pueden tener inclinaciones diferentes respecto del eje.

La Fig. 4a muestra otra broca, designada de forma general con el número 40 y la Fig. 4b es una vista superior de la Fig. 4a tomada a lo largo de la línea 4b-4b. Esta broca comprende un "taladro para vidrio" 44 en la forma de una varilla maciza que termina en un suplemento de carburo 42. El suplemento 42 consiste en una broca de 2 ranuras, como se muestra en las Figs. 1aa y 1ba en el límite, donde cada una de las ranuras 43 tiene entre 150 y 180 grados. Por lo tanto, esta realización se asemeja a una broca en "horquilla" plana posicionada transversalmente respecto del eje longitudinal de la varilla. El extremo distal del suplemento define una pluralidad de bordes cortantes 14 a la izquierda, cada uno de los cuales puede o no tener la misma inclinación respecto del eje longitudinal de la varilla. Optativamente, uno o ambos de los bordes mencionados definen superficies de raspado que contienen estrías 15 que se extienden transversalmente desde el borde cortante. Cada uno de estos bordes está configurado a la izquierda, de modo que permiten la extracción de sujetadores a la

derecha. De todos modos, y al igual que con todas las brocas descritas en la presente, los bordes cortantes se pueden configurar a la derecha para facilitar la extracción de sujetadores a la izquierda. La Fig. 4b es una vista de la Fig. 4a tomada a lo largo de la línea 4b-4b.

La configuración del extractor de tornillos/pernos de la invención se puede moldear integralmente con otras herramientas fresadoras típicas. Por ejemplo, como se muestra en la Fig. 5a, elementos de la configuración de la invención que se ven en las Figs. 1 aa y 1 ba se pueden moldear integralmente con una broca de horquilla plana típica (la Fig. 5a es una vista de una horquilla plana en la ranura de un sujetador averiado) para optimizar una herramienta ya conocida. Una broca de horquilla típica comprende un vástago adaptado para insertarse en el portabroca de una herramienta de torque, donde el vástago termina en un elemento cortante plano, a menudo denominado "horquilla plana". La horquilla plana comprende típicamente bordes cortantes paralelos al vástago y una punta cortante alineada con el vástago y/o puntas cortantes laterales paralelas al vástago pero desplazadas lateralmente respecto del eje del vástago.

En las Figs. 5a y 5b el híbrido con horquilla plana 50 se muestra posicionado en la ranura de un tornillo averiado 54, donde el tornillo está embutido en una pieza de trabajo 56. En operación, los bordes cortantes 14 del híbrido de horquilla plana 50 se entierran en la cabeza 58 del tornillo. El centro de la ranura del tornillo se muestra como agujero guía para el usuario de la broca híbrida 50. En la Fig. 5a, la herramienta híbrida de la invención, designada con el número 50, define bordes cortantes 14 en sentido antihorario en la horquilla plana 52 y en una punta 51, similares a cualquiera de las configuraciones mostradas en las Figs. 1 aa y 1 ba. La broca 50 comprende también puntas cortantes laterales 53.

En la Fig. 5b la horquilla plana termina en un elemento cortante triangular 59.

Al igual que en las realizaciones mostradas en la Fig. 1, la horquilla plana puede incluir como alternativa un borde no cortante y una superficie de raspado, con topología lisa o estriada.

La dimensión de la horquilla plana es de 1/4". No obstante, esta medida es meramente ejemplificativa. Por el contrario, resultan adecuadas innumerables dimensiones de la horquilla plana, de acuerdo con el diámetro remanente de la cabeza del sujetador 53 o del vástago.

En la Fig. 5b se muestra otra realización de una horquilla plana, donde los bordes cortantes 14 presentan una forma triangular.

Corresponde subrayar que las realizaciones antes descriptas muestran siempre configuraciones de corte en sentido horario. No obstante, si es necesario extraer sujetadores a la izquierda, se utilizarán las realizaciones descriptas en la presente con configuraciones a la derecha.

Corresponde señalar además que los bordes cortantes opuestos en cada una de las realizaciones antes descriptas están configurados de modo general con inclinaciones respecto del eje longitudinal de la respectiva broca en ángulos que son idénticos entre sí o diferentes entre sí en la misma broca.

Asimismo, las brocas de la invención se pueden configurar para incluir un medio que impida que las brocas se suelten de los sujetadores averiados una vez producido el enganche con dichos sujetadores. A tal efecto, se pueden instalar "buscadores". Son accesorios asociados y coaxiales con los vástagos de las brocas a las que están unidos en forma deslizante. Configurados generalmente como cilindros o tubos, los buscadores están adaptados para deslizarse sobre la periferia de un sujetador encajado en una pieza de trabajo. A tal fin, los

buscadores mantienen la broca en una posición coaxial con el eje longitudinal del sujetador para asegurar la incrustación adecuada de la broca en el sujetador. El buscador también previene que la broca salte o se deslice del sujetador a las superficies adyacentes de la pieza de trabajo, previniendo así la avería o el desgaste de dicha pieza de trabajo.

Otro agregado al dispositivo de la invención es la colocación de un collarete o proyección radial alrededor de la circunferencia del dispositivo. El collarete o proyección estará posicionado entre el primero y el segundo extremo del dispositivo y sirve como medio para prevenir la penetración del dispositivo más allá de la distancia definida por la punta 19 del dispositivo y la posición del collarete.

Si bien la descripción precedente de la invención se relaciona con detalles de la realización ilustrada, dichos detalles no limitan el alcance de la invención, el cual queda definido en las reivindicaciones adjuntas.

REIVINDICACIONES

La realización de la invención respecto de la cual se reivindica el beneficio de propiedad exclusiva o privilegio se define de la siguiente manera:

1. Una broca para extraer un sujetador averiado que tiene un sentido de roscado, donde dicha broca comprende:

a) un vástago alargado con un eje longitudinal, donde dicho vástago tiene un primer extremo y un segundo extremo y donde dicho primer extremo termina en una punta;

b) una pluralidad de bordes cortantes que se extienden radialmente desde dicha punta, donde dichos bordes cortantes están configurados para cortar en el sujetador cuando se hace girar la broca en sentido opuesto al sentido del roscado, y donde dicho borde cortante define un ángulo respecto del eje longitudinal de la broca y donde los ángulos de al menos dos bordes cortantes son diferentes; y

c) dicho segundo extremo del vástago está configurado para ser recibido por un portabroca de una herramienta que imparte torque rotatorio.

2. La broca descrita en la reivindicación 1, donde uno o más de dichos bordes cortantes definen superficies de raspado y donde dichas superficies comprenden estrías.

3. La broca descrita en la reivindicación 1, que comprende además una pluralidad de superficies cortantes conformes en espiral que se extienden desde una región proximal a dicho segundo extremo hasta dichos bordes cortantes.

4. La broca descrita en la reivindicación 3, que comprende además estrías que sobresalen de dicha superficie cortante conforme helicoidal en sentido opuesto al del roscado del sujetador.

5. La broca descrita en la reivindicación 3, donde dichas estrías están paralelas a dicho eje longitudinal.

6. La broca descrita en la reivindicación 2, donde dichas estrías definen una pluralidad de dientes en los bordes cortantes.

7. La broca descrita en la reivindicación 2, donde una primera y una segunda superficie de raspado tienen inclinaciones idénticas respecto del eje longitudinal;

la primera y la segunda superficie de raspado comprenden estrías; y
donde las estrías en la primera superficie están alineadas acimutalmente con estrías correspondientes en la segunda superficie.

8. La broca descrita en la reivindicación 2, donde una primera y una segunda superficie de raspado tienen inclinaciones idénticas respecto del eje longitudinal;

la primera y la segunda superficie de raspado comprenden estrías, donde cada estría define una cresta y un espacio; y

donde las crestas de las estrías de la primera superficie están alineadas acimutalmente con los espacios de las estrías correspondientes de la segunda superficie.

9. La broca descrita en la reivindicación 1, que comprende además:
dos o más ranuras que se extienden longitudinalmente a lo largo del vástago en una posición intermedia entre dichos bordes cortantes y dicho segundo extremo, donde dichas ranuras están separadas por una pluralidad de bordes

cortantes, donde dichos bordes están dispuestos en superficies posicionados a lo largo del eje y se desplazan sucesivamente del eje en sentido radial en una dirección que va del primer extremo al segundo extremo, donde dichos bordes cortantes están configurados para cortar en el sujetador cuando se hace rotar la broca en sentido opuesto al sentido del roscado del sujetador.

10. La broca descrita en la reivindicación 9, donde dichas superficies son paralelas a dicho eje.

11. La broca descrita en la reivindicación 1, que comprende dos bordes cortantes paralelos entre sí.

12. La broca descrita en la reivindicación 12, donde uno o más de dichos bordes cortantes comprenden una pluralidad de estrías.

13. La broca descrita en la reivindicación 1, que comprende además una horquilla plana entre dicha punta y dicha espiga.

14. Una broca para extraer un sujetador averiado que tiene un sentido de roscado, donde dicha broca comprende:

a) un vástago con un eje longitudinal, un primer extremo y un segundo extremo,

b) donde dicho primer extremo termina en una punta con dos o más ranuras que se extienden longitudinalmente desde la punta a lo largo del vástago, donde dichas ranuras están separadas por una pluralidad de bordes cortantes, donde dichos bordes cortantes terminan en superficies que están posicionadas a lo largo del eje y están desplazadas radialmente en forma sucesiva del eje en la dirección desde el primer extremo hacia el segundo extremo;

donde dichas superficies comprenden estrías que sobresalen de las mismas;

donde dichos bordes cortantes y dichas estrías están adaptados para cortar en el sujetador cuando se hace rotar la broca en sentido opuesto al sentido del roscado del sujetador

y donde una pluralidad de dichas superficies comprenden filetes autorroscantes que sobresalen de dichas superficies; y

c) donde dicho segundo extremo del vástago está configurado para ser recibido en un portabroca de una herramienta que imparte torque rotatorio.

15. Una broca para extraer un sujetador averiado que tiene un sentido de roscado, donde dicha broca comprende:

a) un vástago con un eje longitudinal, un primer extremo y un segundo extremo;

b) donde dicho primer extremo termina en una punta con dos o más ranuras que se extienden longitudinalmente desde la punta a lo largo del vástago, donde dichas ranuras están separadas por una pluralidad de bordes cortantes, donde dichos bordes cortantes están dispuestos en superficies de raspado que están posicionadas a lo largo del eje y desplazadas radialmente en forma sucesiva del eje en la dirección desde el primer extremo hacia el segundo extremo;

c) donde dichos bordes cortantes están configurados para cortar acimutalmente en el sujetador cuando se hace girar la broca en sentido opuesto al del roscado del sujetador y donde dichas superficies sucesivas en dirección axial están configuradas para cortar radialmente en el sujetador;

d) donde una región dependiente de dichas superficies comprende una pluralidad de dientes, donde cada uno de dichos dientes define un borde cortante adaptado para morder el sujetador en dirección paralela al eje longitudinal del sujetador; y

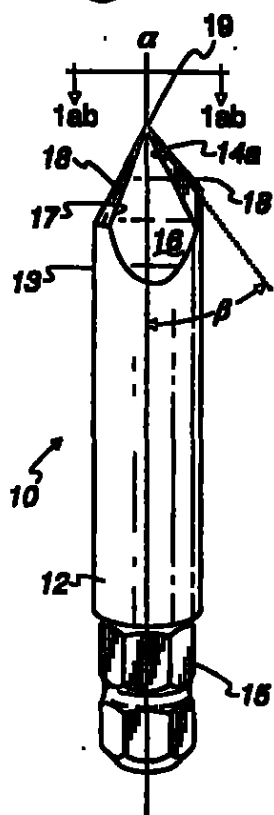
e) donde dicho segundo extremo del vástago está configurado para ser recibido en un portabroca de una herramienta que imparte torque rotatorio.

16. La broca descrita en la reivindicación 15, que comprende además bordes estriados que sobresalen de dichas superficies y filetes autorroscantes en uno o más de dichos escalones.

17. La broca descrita en la reivindicación 15, donde dos o más bordes cortantes tienen inclinaciones diferentes respecto del eje.

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Fig. 1aa



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Fig. 1ac

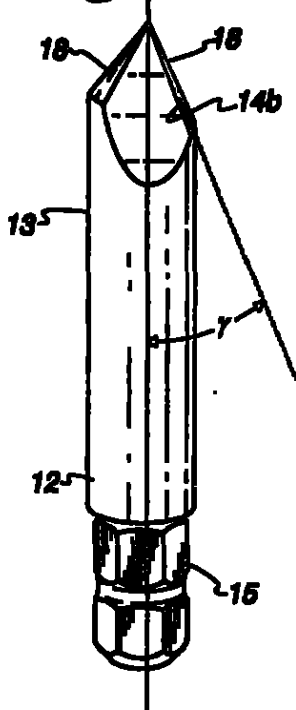


Fig. 1ba

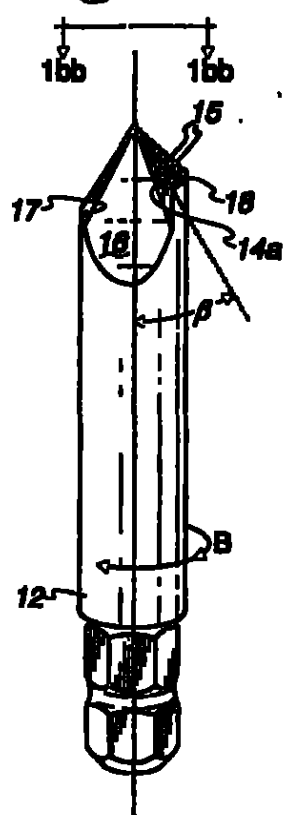


Fig. 1ab

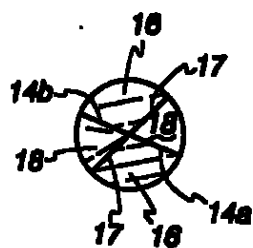
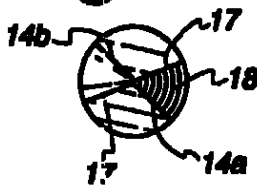


Fig. 1bc



Fig. 1bb



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Fig. 1ca

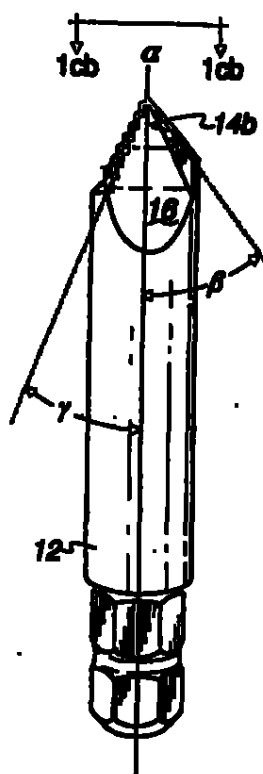


Fig. 1cc

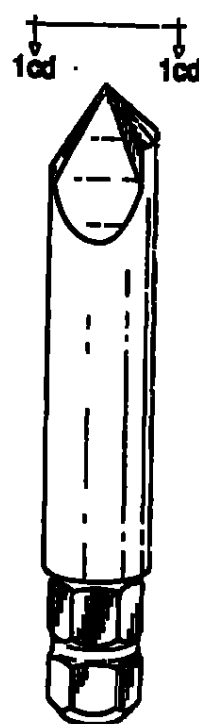


Fig. 1cb

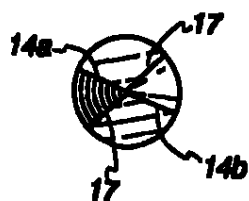


Fig. 1cd



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Fig. 1da

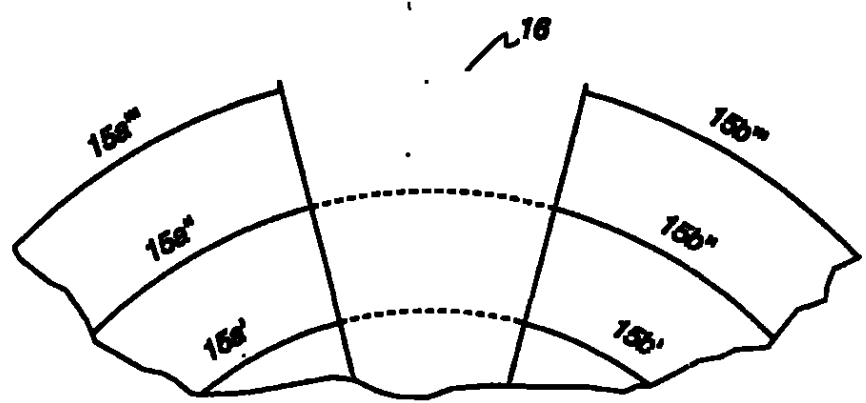
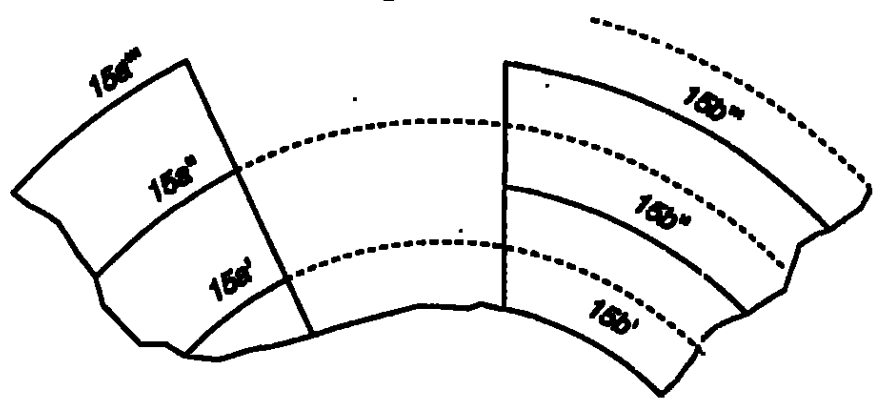


Fig. 1db



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Fig. 2a

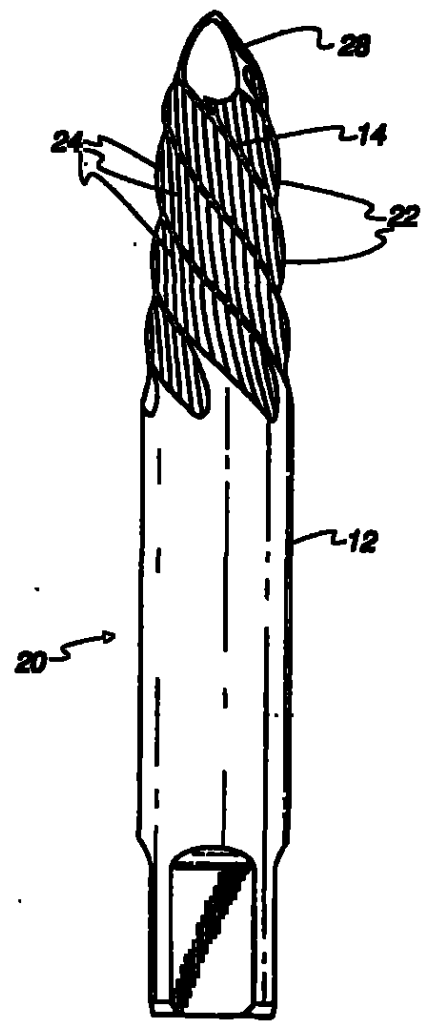


Fig. 2b



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Fig. 3b

Fig. 3a

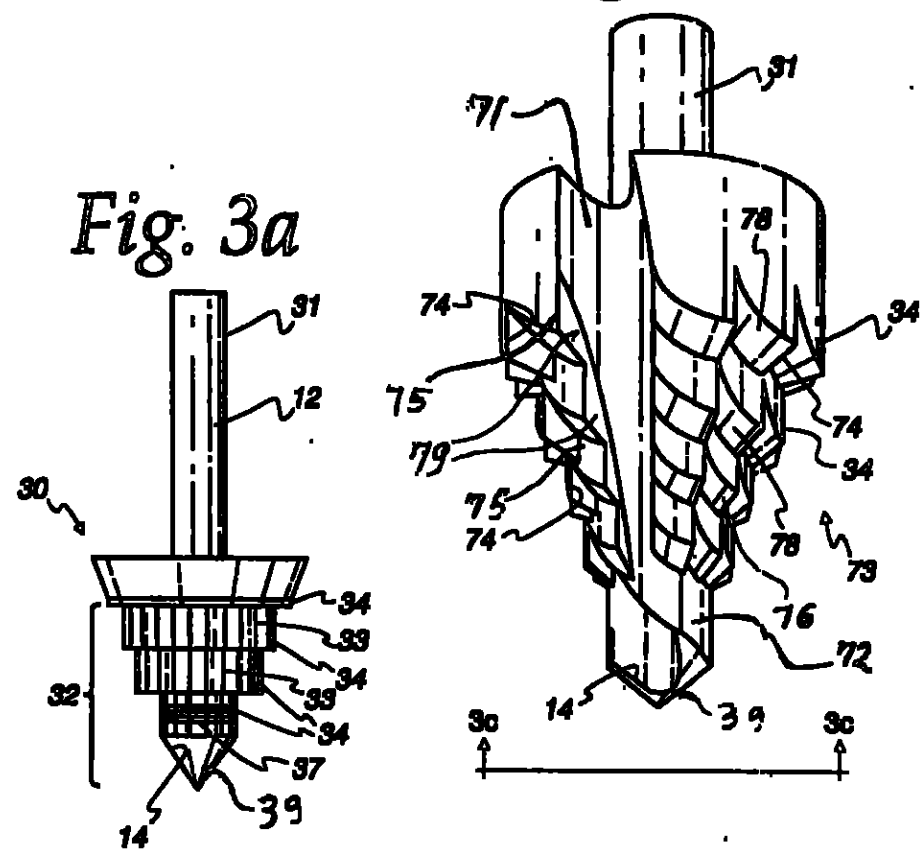
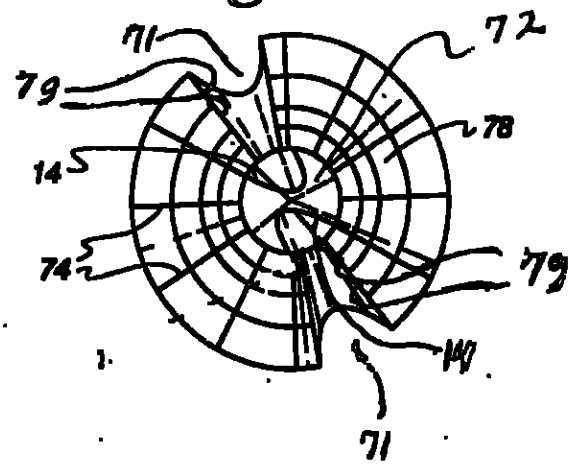


Fig. 3c



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Fig. 4a

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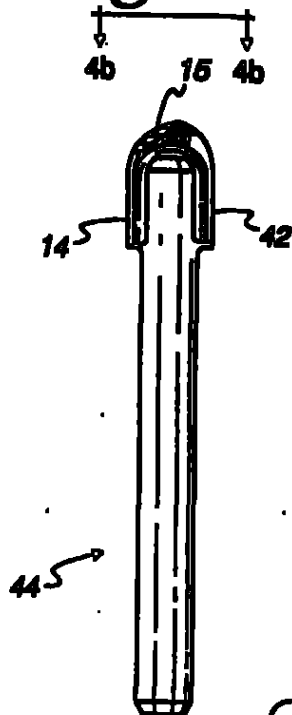


Fig. 4b

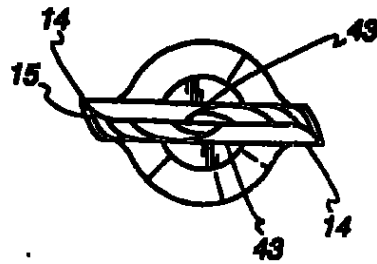
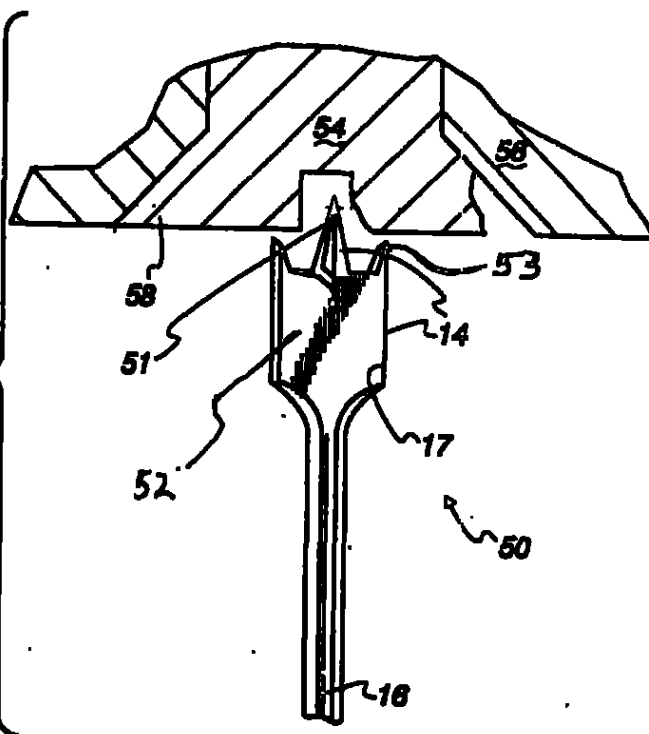


Fig. 5a



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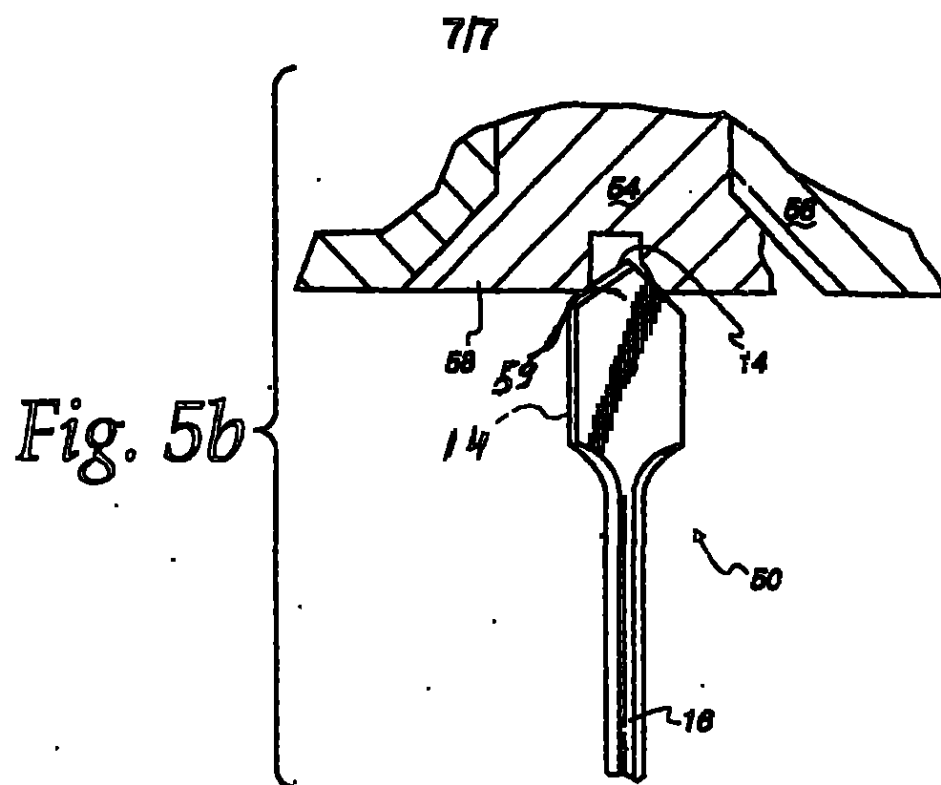


Fig. 6a

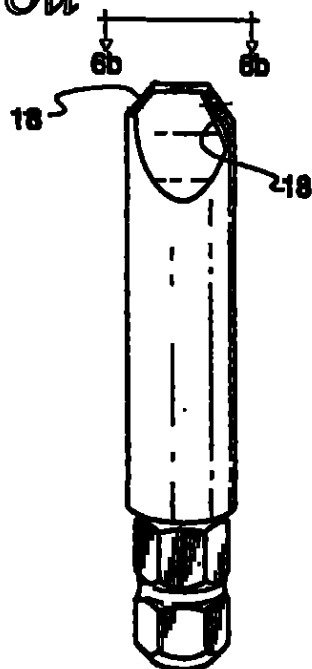


Fig. 6b



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0052/01327 PCT	FOR FURTHER ACTION see Form PCT/ISA/210 as well as, where applicable, item 5 below	
International application No. PCT/US04/12647	International filing date (day/month/year) 23 April 2004 (23.04.2004)	(Earliest) Priority Date (day/month/year) 25 April 2003 (25.04.2003)
Applicant KOZAK, BURTON		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the Report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☒ Certain claims were found unsearchable (See Box No. II)

3. ☒ Unity of invention is lacking (See Box No. III)

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1b



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.

- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/12647

Box No. II Observations where certain claims were found unsearchable (Continuation of item 3 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.: 12
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims: it is covered by claim Nos.:

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/12647

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : B25B 13/50

US CL : B1/53.2

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : B1/53.2, 441, 459; 408/210, 216-217, 223-225, 227, 229-230

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base used, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,189,266 A (KOSLOW) 19 February 1980, figure 7, column 4, lines 30-32.	1
Y		11, 13
Y	US 4,682,917 A (WILLIAMS, III ET AL) 28 July 1987, figures 1-2, column 3, lines 9-55.	11, 13

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "B" earlier application or patent published on or after the international filing date
- "L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to underpin the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "E" document member of the same patent family

Date of the actual completion of the international search

22 March 2005 (22.03.2005)

Date of mailing of the international search report

15 APR 2005

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 Facsimile No. (703) 305-3230

Authorized Officer

Debra S. Melvin

Telephone No. 571 272-4050

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/12647

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

- I. species of figures 1aa-1db.
- II. species of figures 2a-2b.
- III. species of figure 3a.
- IV. species of figure 3b.
- V. species of figure 4a or 5a.

The claims are deemed to correspond to the species listed above in the following manner:

- I. species of figures 1aa-1db, claims 1-2, 7, 8.
- II. species of figures 2a-2b, claims 1 and 3-6.
- III. species of figure 3a, claims 1, 9-11, 14 and 16-17.
- IV. species of figure 3b, claims 1, 9-11 and 15.
- V. species of figure 4a or 5a, claims 1 and 13.

The following claim(s) are generic: claim 1.

The inventions listed as Groups I. and II. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group I. does not require the special technical feature of tapering spiral cutting surfaces.

The inventions listed as Groups I. and III. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group I. does not require the special technical feature of successively radially displaced surfaces.

The inventions listed as Groups I. and IV. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group I. does not require the special technical feature of depending region of the surfaces comprise a plurality of teeth.

The inventions listed as Groups I. and V. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group I. does not require the special technical feature of a spade flat.

The inventions listed as Groups II. and III. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group II. does not

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/12647

require the special technical feature of successively radially displaced surfaces and the species of group III. does not require the special technical feature of tapering spiral cutting surfaces.

The inventions listed as Groups II. and IV. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group II. does not require the special technical feature of depending region of the surfaces comprise a plurality of teeth and the species of group IV. does not require the special technical feature of tapering spiral cutting surfaces.

The inventions listed as Groups II. and V. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group II. does not require the special technical feature of a spade flat and the species of group V. does not require the special technical feature of tapering spiral cutting surfaces.

The inventions listed as Groups III. and IV. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group III. does not require the special technical feature of depending region of the surfaces comprise a plurality of teeth and the species of group IV does not require the special technical feature of successively radially displaced surfaces.

The inventions listed as Groups III. and V. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group III. does not require the special technical feature of a spade flat and the species of group V. does not require the special technical feature of successively radially displaced surfaces.

The inventions listed as Groups IV. and V. do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the species of group IV. does not require the special technical feature of a spade flat and the species of group V. does not require the special technical feature of depending region of the surfaces comprise a plurality of teeth.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITYTo:
MICHAEL J. CHERSKOV
CHERSKOV & FLAYNIK
20 N. WACKER DRIVE
CHICAGO, IL 60606

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year) 13 APR 2005	
Applicant's or agent's file reference 0052/01327 PCT	
FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/US04/12647	International filing date (day/month/year) 23 April 2004 (23.04.2004)
Priority date (day/month/year) 25 April 2003 (25.04.2003)	
International Patent Classification (IPC) or both national classification and IPC IPC(7): B25B 13/50 and US Cl.: 81/53.2	
Applicant KOZAK, BURTON	

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Detra S. Melbrun Telephone No. 571 272-1050
---	--

Form PCT/ISA/237 (cover sheet) (January 2004)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US04/12647

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
- a. type of material
- ☐ a sequence listing
- ☐ table(s) related to the sequence listing
- b. format of material
- ☐ in written format
- ☐ in computer readable form
- c. time of filing/furnishing
- ☐ contained in international application as filed.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating therein has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US04/12647

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application☒ claims Nos. 12

because:

☐ the said international application, or the said claim Nos. _____ relate to the following subject matter which does not require an international preliminary examination (specify):☒ the description, claims or drawings (indicate particular elements below) or said claims Nos. 12 are so unclear that no meaningful opinion could be formed (specify):

Claim 12 is dependent upon itself.

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed.☐ no international search report has been established for said claims Nos. _____☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form

☐

has not been furnished

☐

does not comply with the standard

the computer readable form

☐

has not been furnished

☐

does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.☐ See Supplemental Box for further details.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US04/12647

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:
- ☒ paid additional fees
 - ☐ paid additional fees under protest
 - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
See the lack of unity section of the International Search Report (Form PCT/ISA/210)

4. Consequently, this opinion has been established in respect of the following parts of the international application:

- ☐ all parts.
- ☒ the parts relating to claims Nos. 1-11 and 13-17

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US04/12647

Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 2-11, 13-17	YES
	Claims 1	NO
Inventive step (IS)	Claims 2-10, 14-17	YES
	Claims 1, 11, 13	NO
Industrial applicability (IA)	Claims 1-11, 13-17	YES
	Claims NONE	NO

2. Citations and explanations:

Claim 1 lacks novelty under PCT Article 33(2) as being anticipated by Koslow. Note figure 7 and column 4, lines 30-52. The device of Koslow is capable of performing the claimed function.

Claims 11 and 13 lack an inventive step under PCT Article 33(3) as being obvious over Williams, III et al in view of Koslow. Williams, III et al discloses all of the claimed subject matter except for having dissimilar cutting edge angles. Koslow discloses dissimilar cutting edge angles "18a" and "18b". It would have been obvious to one having ordinary skill in the art to form the tip end of Williams, III et al dissimilar cutting edge angles to enable all diameters to be cut within a hole as taught by Koslow.

Claims 2 and 6-8 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the dissimilar angled cutting edges in combination with serrated scraping surfaces.

Claims 3-5 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the dissimilar angled cutting edges in combination with a plurality of tapering spiral cutting surfaces.

Claims 9-10 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the dissimilar angled cutting edges in combination with two or more notches with cutting edges arranged along the axis successively radially displaced.

Claim 14 meets the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the cutting edges in combination with two or more notches with cutting edges arranged along the axis successively radially displaced and including serrations and self-tapping screw threads.

Claims 15-17 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the cutting edges in combination with two or more notches with cutting edges arranged along the axis successively radially displaced and including self-tapping screw threads depending regions comprising a plurality of teeth.

Claims 1-11 and 13-17 meet the criteria set out in PCT Article 33(4), and thus meet industrial applicability because the subject matter claimed can be made or used in industry.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendment consists in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any important such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)".

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. References to citations relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/ISA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1bis(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43bis.1(c)).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the PCT Applicant's Guide, Volume II.

(11) Patent Number: 4,682,917
(45) Date of Patent: Jul. 28, 1987

[56]

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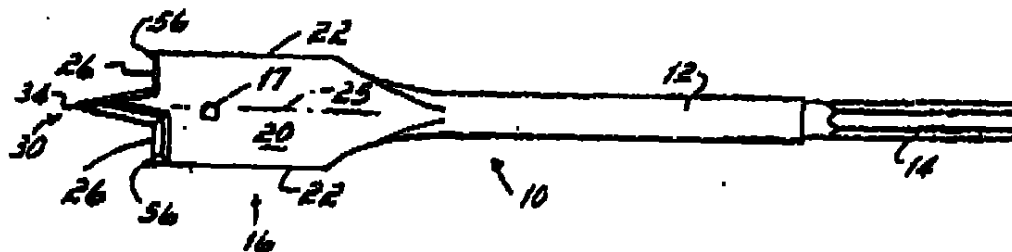
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Primary Examiner—Z. R. Bilinsky
Attorney, Agent, or Firm—Wood, Herron & Evans

[57] ABSTRACT

The cutting rate of a spade bit is greatly improved by the provision of radial flutes on the lateral shoulders of the bit, extending transversely to the bit axis. Further improvements are obtained if the shoulder flutes are stopped by spurs positioned at the outer ends of the shoulders.

10 Claims, 4 Drawing Figures



United States Patent (19)

(11) 4,189,266

Koslow

(43) Feb. 19, 1980

(54) ROTARY DRILL BIT FOR HAND-HELD POWER DRILLS

(76) Inventor: George Koslow, 28 Warren St., New York, N.Y. 10007

(21) Appl. No.: 822,826

(22) Filed: Aug. 8, 1977.

Related U.S. Application Data

(63) Continuation-in-part of Ser. No. 601,387, Aug. 1, 1975, abandoned.

(51) Int. Cl.² B23B 51/00; B23B 51/02; B23G 15/00

(52) U.S. Cl. 408/224; 408/228; 408/229; 408/230

(58) Field of Search 408/223, 224, 225, 227, 408/228, 229, 230, 199

(36) References Cited

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519475	3/1940	United Kingdom	408/223
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Primary Examiner—Horace M. Culver

Attorney, Agent, or Firm—Robert E. Burns, Emanuel I. Lobato, Bruce L. Adams

(57) ABSTRACT

A rotary drill bit for hand-held power drills comprises successively, a cutting section of progressively increasing diameter, a section of decreasing diameter and a shank portion for mounting the bit in a hand-held electric drill. The cutting section of the bit comprises a plurality of cutting edges disposed symmetrically about the axis of rotation of the bit and extending rearwardly from the apex at an angle to the axis. The cutting edges have cutting portions and noncutting portions which are so arranged that the cutting portions of one cutting edge cut selected diameters of a hole to be bored and cutting portions of another cutting edge cut other diameters of the hole whereby all cutting edges together cut all diameters of the hole. The sum of the lengths of the cutting portions of all of the cutting edges is approximately equal to the total length of one cutting edge so that the torque required to turn the bit is reduced. The cutting portions are disposed approximately to balance lateral forces on the bit during boring.

11 Claims, 6 Drawing Figures

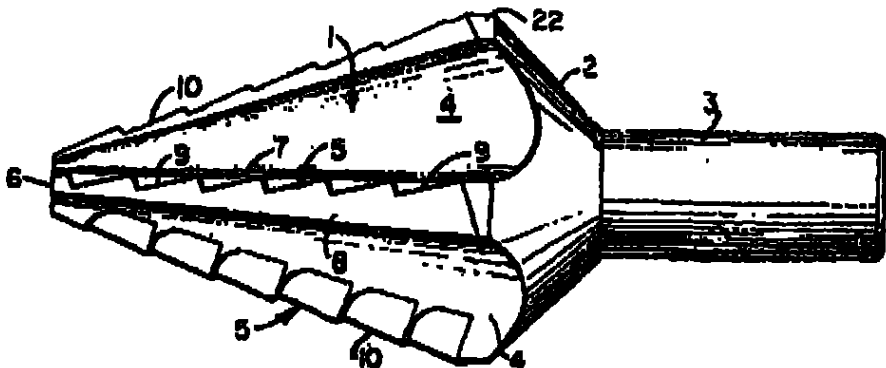


Fig. 6-7

REQUISITOS NECESARIOS PARA PRESENTACION Y AGILIZACION DEL TRAMITE

	USUARIO	RADICADOR
PATENTE DE INVENCION <i>PCT</i>	()	()
MODELO DE UTILIDAD	()	()
- Indicación de que se solicita la concesión de una patente	()	(X)
- Datos de identificación del solicitante o de la persona que se presenta la solicitud.	()	(X)
- Descripción de la invención	()	(X)
- Dibujos de ser estos pertinentes.	()	(X)
- Comprobante de Pago de las tasas establecidas	()	(X)
COMPLETA <i>(X)</i>	INCOMPLETA ()	()
DISEÑO INDUSTRIAL ()		
- Indicación de que se solicita el registro de Diseño Industrial	()	()
- Datos de identificación del solicitante o de la persona que presenta la solicitud	(X)	()
- Representación gráfica o fotográfica del Diseño Industrial o muestra del Material que incorpora el diseño	()	()
- Comprobante de pago de las tasas establecidas	()	()
COMPLETA ()	INCOMPLETA ()	()
ESQUEMA DE TRAZADO ()		
- Indicación de que solicita el registro de un Esquema de trazado	()	()
- Datos de identificación del solicitante o de la persona que presenta La solicitud	()	()
- Representación gráfica del esquema de trazado	()	()
- Comprobante de pago de las tasas establecidas	()	()
COMPLETA ()	INCOMPLETA ()	()

Firma Responsable

Fecha

27/11/05

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Bogotá,
2020

Doctor(a)
RODRIGUEZ D'ALEMAN DILIA MARIA

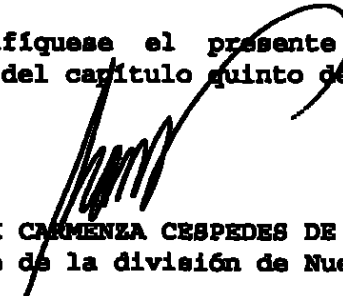
REFERENCIA	Radicación No.	5 108122
	Solicitud internacional	US2004/012647
	Fecha inicio fase nacional	25/11/2005
	Trámite	11
	Evento	379
	Actuación	430
	Oficio No.	10690

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

1. Si fuere el caso, el solicitante debe adjuntar la traducción de los anexos del reporte de examen preliminar internacional (Art. 36.2.b) del tratado PCT.
2. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante. (Art. 26-k) Decisión 486.
3. La solicitud no contiene el poder debidamente otorgado, con el lleno de los requisitos exigidos por los artículos 63 y subsiguientes del Código de Procedimiento Civil. Adicionalmente, deberá presentar el documento que acredita la existencia y representación legal de la sociedad solicitante, cuando ésta fuere persona jurídica.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

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.


ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de
fecha 11 NOV. 2005
adpa11