US009763673B2

(12) **United States Patent**
Young

(10) **Patent No.: US 9,763,673 B2**
(45) **Date of Patent: Sep. 19, 2017**

(54) **OSTEOTOME**

(71) Applicant: **Orthosonics Limited**, Devon (GB)

(72) Inventor: **Michael John Radley Young**, Devon (GB)

(73) Assignee: **Orthosonics Limited**, Devon (GB)

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

(21) Appl. No.: **14/322,183**

(22) Filed: **Jul. 2, 2014**

(65) **Prior Publication Data**

US 2014/0316415 A1 Oct. 23, 2014

Related U.S. Application Data

(63) Continuation of application No. 11/792,198, filed as application No. PCT/GB2005/004618 on Dec. 2, 2005, now Pat. No. 8,888,783.

(30) **Foreign Application Priority Data**

Dec. 2, 2004 (GB) 0426503.9

(51) **Int. Cl.**
A61B 17/32 (2006.01)
A61B 17/16 (2006.01)
A61B 17/14 (2006.01)

(52) **U.S. Cl.**
CPC ***A61B 17/16*** (2013.01); ***A61B 17/142*** (2016.11); ***A61B 17/144*** (2016.11);
(Continued)

(58) **Field of Classification Search**
USPC 606/169
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,391,846 A 7/1968 Hawes
3,416,579 A 12/1968 Cowley
(Continued)

FOREIGN PATENT DOCUMENTS

DE 189394 C 10/1907
DE 1628903 A1 5/1971
(Continued)

OTHER PUBLICATIONS

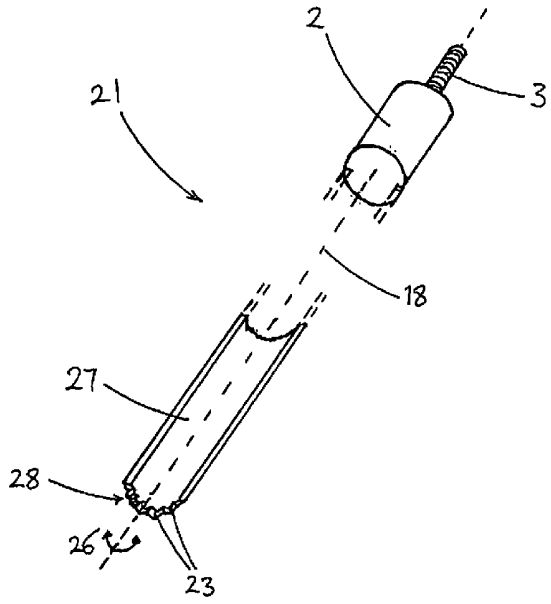
European examination Communication pursuant to Article 94(3) EPC dated Dec. 4, 2014.
(Continued)

Primary Examiner — Sameh Boles
(74) *Attorney, Agent, or Firm* — Carter, DeLuca, Farrell & Schmidt, LLP

(57) **ABSTRACT**

A tool (**1**, **31**) for cutting bone comprises an elongate blade (**7**, **37**) connectable to a generator of longitudinal-mode ultrasonic vibrations. The blade (**7**, **37**) has two lateral cutting edges (**9**, **10**) linked by a rounded distal tip (**8**). A series of triangular teeth (**13**) extends along each cutting edge (**9**, **10**) and the distal tip (**8**). The blade (**37**) may taper towards each cutting edge (**9**,**10**) and the distal tip (**8**). A variant of the tool (**21**) comprises an elongate part-cylindrical blade (**27**) connectable to a generator of torsional-mode ultrasonic vibrations. The blade (**27**) has a cutting edge at its distal tip (**28**) provided with a plurality of triangular teeth (**23**). All forms of the tool (**1**, **21**, **31**) are particularly suitable for cutting cancellous bone around an implant to be removed during revision of a joint arthroplasty.

8 Claims, 3 Drawing Sheets



(52) **U.S. Cl.**
CPC ***A61B 17/1628*** (2013.01); ***A61B 17/1637*** (2013.01); ***A61B 17/320068*** (2013.01); *A61B 17/1642* (2013.01); *A61B 17/1664* (2013.01); *A61B 2017/320072* (2013.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,680,610	A		8/1972	Lindgren
3,905,105	A		9/1975	Tuke
4,008,720	A		2/1977	Brinckmann et al.
4,069,824	A	*	1/1978	Weinstock 606/82
4,157,673	A		6/1979	Bruno
4,188,952	A		2/1980	Loschilov et al.
4,227,532	A		10/1980	Bluhm et al.
4,409,973	A	*	10/1983	Neufeld 606/82
5,261,922	A		11/1993	Hood
5,517,889	A		5/1996	Logan
5,676,680	A		10/1997	Lim et al.
5,897,570	A		4/1999	Palleva et al.
5,935,142	A		8/1999	Hood
5,935,143	A		8/1999	Hood et al.
5,957,943	A		9/1999	Vaitekunas
6,782,781	B2		8/2004	Rack
2002/0010477	A1		1/2002	Hirt et al.
2002/0099400	A1		7/2002	Wolf et al.
2006/0030797	A1		2/2006	Zhou et al.
2006/0100547	A1	*	5/2006	Rabiner et al. 601/2

FOREIGN PATENT DOCUMENTS

DE	3830065	A1	3/1989
EP	0456470	A1	11/1991
EP	1380265	A	1/2004
FR	2656788	A1	7/1991
GB	174890	A	2/1922
GB	1457544	A	12/1976
GB	2107641	A	5/1983
SU	512761	A1	5/1976
SU	797675	A1	1/1981
WO	9222259		12/1992
WO	9301751	A	2/1993
WO	2005076951	A2	8/2005
WO	2006012797	A1	2/2006

OTHER PUBLICATIONS

Ipsum—Online Patent Information and Document Inspection Service for GB2420979, www.ipo.gov.uk/p-ipsum/Case/PublicationNumber/GB2420979, printed Jun. 30, 2014.

International Search Report for International Appln. No. PCT/GB2005/004618 (PCT/ISA/210).

Extended European Search Report for EP 14 17 6285 dated Dec. 5, 2014.

Canadian Office Action dated May 1, 2015 for Canadian Appln. No. CA 2,590,344.

* cited by examiner

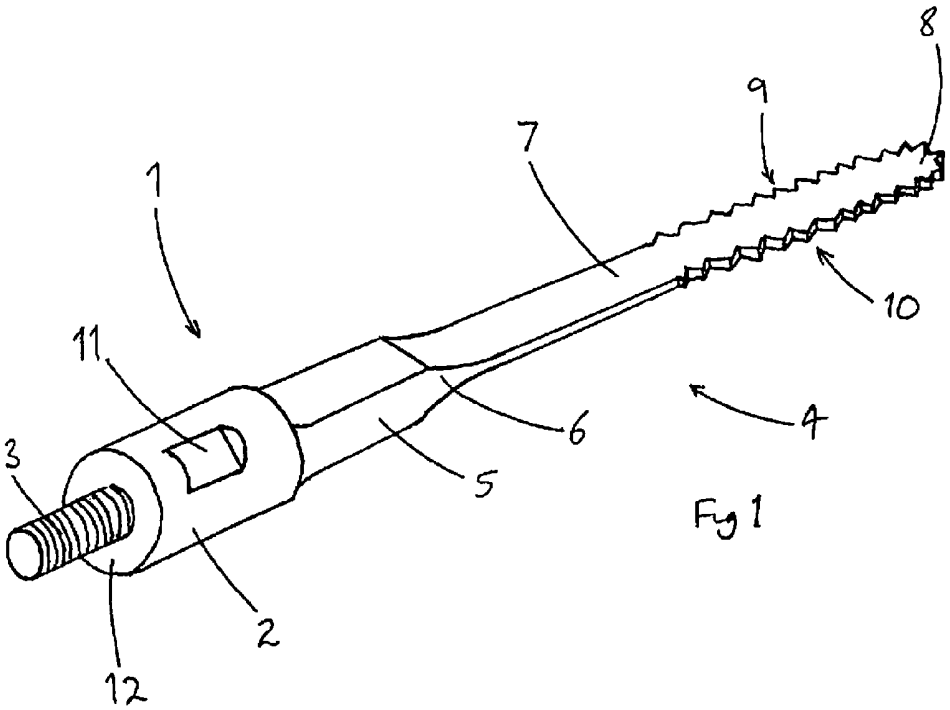


Fig 1

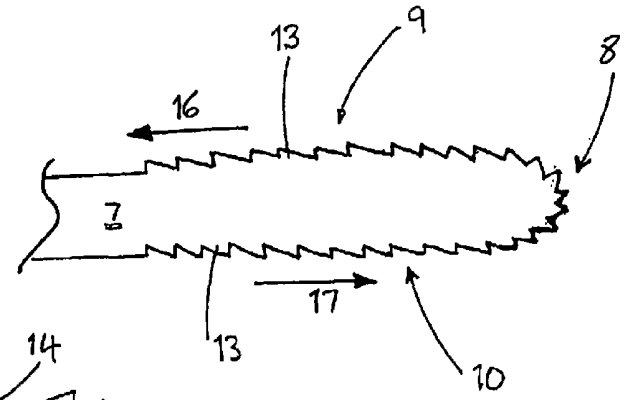


Fig 2A

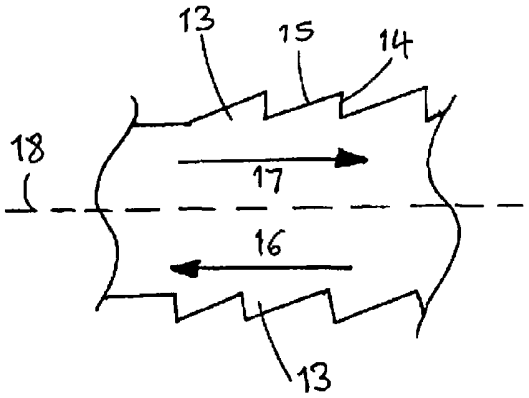


Fig 2B

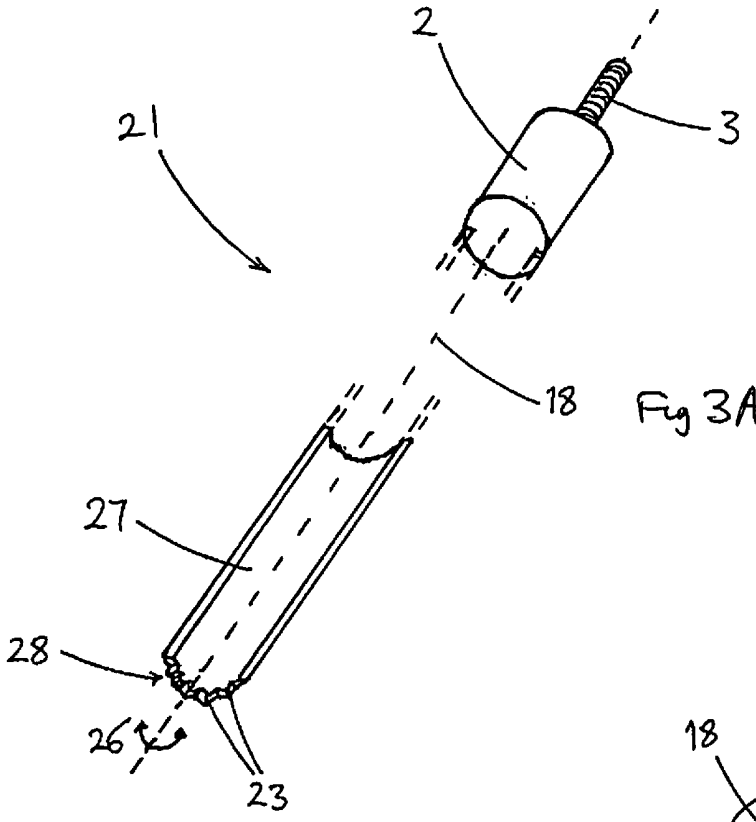


Fig 3A

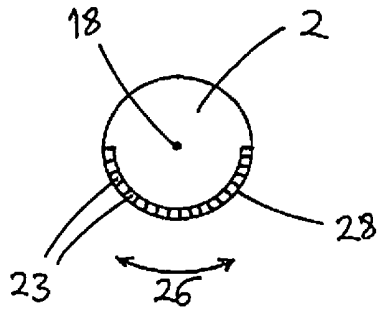


Fig 3B

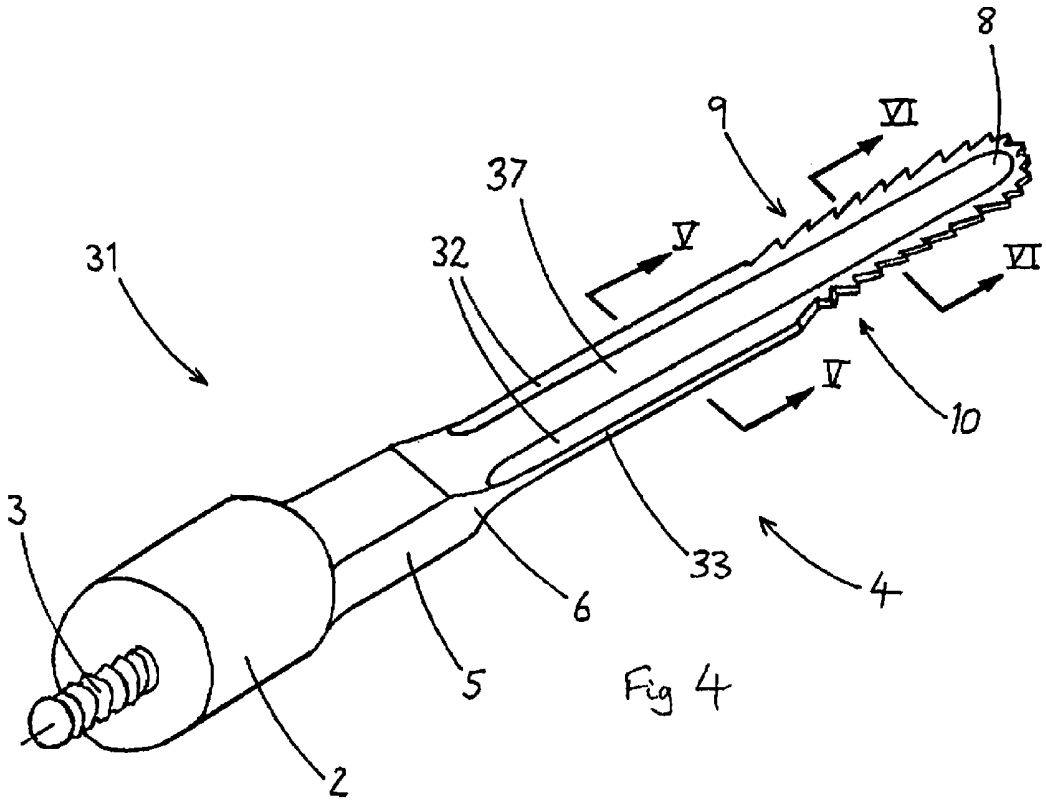


Fig 4

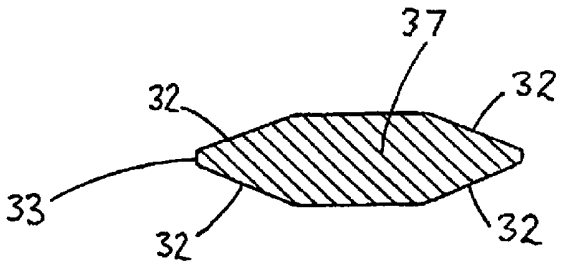


Fig 5

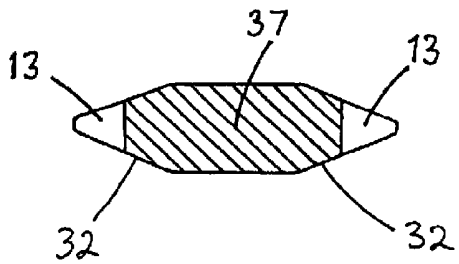


Fig 6

OSTEOTOME

BACKGROUND

1. Technical Field

The present disclosure relates to a tool for cutting into or through bone, for example during orthopaedic surgery. More particularly, but not exclusively, it relates to a tool for cutting through cortical or cancellous bone, for example to separate a joint prosthesis from surrounding bone as part of a revision procedure.

2. Prior Art

A frequently required procedure in orthopaedic surgery is revision of a joint arthroplasty, for example revision of a hip joint replacement, should an implanted prosthesis break or wear unacceptably over its articulating surface. The present disclosure will be described in relation to its use in hip joint revision, but is equally applicable to other joints and the terms "hip", "pelvis" and "femur" may be replaced as necessary. In many cases, an implanted prosthesis is secured in a cavity within a bone, such as a femur, using polymeric organic cement such as polymethylmethacylate. Tools have been devised to soften and remove this cement and to allow convenient removal of a worn or damaged prosthesis, followed by implantation of a replacement.

However, there has been a recent increase in the use of press-fit prostheses. No cement is used to hold these in place within the femur, pelvis, etc. Instead, the implanted portions of the prostheses have porous surfaces or surfaces coated with hydroxy-apatite, which encourage ingrowth of bone, leading to stable, well-anchored implants. This formation of cancellous bone may also occasionally occur with cement-anchored implants. While not as strong as the structural bone of the wall of the femur, the pelvis or other bone, cancellous bone is not easily susceptible to cutting using the tools devised for revising cement-anchored implants, and it has become necessary to attack cancellous bone mechanically in order to revise such implants.

Furthermore, in order to remove a prosthesis, it may be necessary to remove portions of cortical bone, which cannot be achieved without using mechanical means.

A manual osteotome is effectively a specialised form of chisel, which is forced longitudinally through the bone between a prosthesis and surrounding structural bone. The force required can be so great as to compromise the directional accuracy of the technique, and may thereby damage surrounding structural bone, especially if it is weakened by osteoporosis or the like.

Another approach is to use powered burrs to drill out the bone. These may also be difficult to guide accurately, and flexure in their elongate rotating drive shafts may lead to unacceptable collateral damage in surrounding structural bone. This approach also produces inconveniently large quantities of bone swarf, which must be removed to allow clear visualisation of the point at which the burr is cutting. Furthermore, high-speed burrs lead to significant localised frictional heating, which may also harm adjacent bone, tissue or marrow.

Manual sawing through bone is a slow, tiring process, also leading to localised heating and copious bone swarf. In any case, conventional bone saws could not easily be inserted or operated between a hip or other joint prosthesis shaft and an inner wall of a femur, or between a part-spherical acetabular shell and a pelvic bone, for example.

SUMMARY

It is hence an object of the present disclosure to provide a tool for cutting bone, particularly bone adjacent an arthroplasty implant, that obviates the above disadvantages and allows accurate, rapid and convenient removal of such implants as part of a revision procedure.

According to a first aspect of the present disclosure, there is provided a tool for cutting bone comprising a means of generating ultrasonic vibrations, elongate blade means operatively connectable thereto and having at least one cutting edge provided with a plurality of serrations each having a first cutting facet substantially transverse to the direction of said ultrasonic vibrations.

In a first embodiment, the tool is adapted to be vibrated by longitudinal mode ultrasonic vibrations, for example directed substantially parallelly to a longitudinal axis of the blade means.

Preferably, the blade means then comprises an elongate substantially planar member having two substantially oppositely-facing lateral edges.

Advantageously, said lateral edges each extend substantially parallelly to the longitudinal axis of the blade means.

The elongate member may further comprise a rounded distal tip.

Said distal tip may extend between a distal end of a first said lateral edge and a distal end of a second said lateral edge.

Preferably, the cutting edge extends along at least part of a respective one of said lateral edges.

Advantageously, the cutting edge extends along at least part of each said lateral edge.

The cutting edge may extend around all or part of the rounded distal tip.

A continuous cutting edge may extend around at least a distal portion of each lateral edge and the distal tip extending therebetween.

Preferably, at least part of the blade means has a cross-sectional profile tapering towards one or each lateral edge.

Advantageously, the blade means has a cross-sectional profile adjacent its distal tip tapering towards said tip.

Said tapering profile may comprise at least one angled surface located on each opposite face of the blade means.

A single angled surface may extend adjacent each lateral edge and the distal tip on each said face.

Said angled surfaces may be connected at their respective outer peripheries by an edge surface extending transversely to the general plane of the blade member.

Said edge surface may be substantially narrower than an overall thickness of the blade means.

Preferably, said tapering profile is at least coextensive with the cutting edge of the blade means.

Preferably, each serration of the or each cutting edge is generally triangular.

Each serration may have the first, cutting facet extending generally orthogonally to a local alignment of the cutting edge.

Each serration may then have a second, angled facet extending obliquely to said local alignment.

Each pair of neighbouring serrations may be so relatively aligned that a first facet of one serration of said pair is adjacent a second facet of the next serration of said pair.

Each first facet of a first lateral cutting edge may face towards a distal tip of the blade means and each first facet of a second opposite lateral cutting edge may then face towards a proximal root of the blade means.

Preferably, each serration extends outwardly from the cutting edge, substantially in the plane of the elongate member.

In a second embodiment, the tool is adapted to be vibrated by torsional mode ultrasonic vibrations.

The blade means then preferably comprises an elongate member having a curved cross-section, optionally substantially comprising an arc of a circle.

Advantageously, said cross-section is substantially constant along a whole of the elongate member.

The tool may be so adapted as to be torsionally vibratable about an longitudinal axis extending through the centre of said circle.

Preferably, a distal tip of the elongate member comprises the cutting edge of the tool.

The serrations of the cutting edge may be generally triangular.

The serrations may extend distally from the tip of the member.

A portion of the elongate member adjacent its tip may taper longitudinally towards said tip.

The tapered portion may comprise an angled surface located on a concave face of a curved elongate member.

In each embodiment, the generator means is advantageously adapted to generate ultrasonic vibrations at a frequency within the range of twenty to seventy-five kilohertz.

According to a second aspect of the present disclosure, there is provided a method of cutting bony material comprising the steps of providing a tool as described in the first aspect above, applying a cutting edge of the tool to a surface of bony material to be cut, causing the tool to vibrate at an ultrasonic frequency and drawing the cutting edge of the tool across said surface.

Preferably, the cutting edge is drawn reciprocally across said surface.

Advantageously, the bony material comprises cancellous and/or cortical bone holding an orthopaedic implant to a bone of a living body, and the method comprises the step of cutting the bone as described above until the implant is separable therefrom.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present disclosure will now be more particularly described by way of example and with reference to the accompanying drawings in which:

FIG. **1** is a perspective view of a first tool embodying the present disclosure;

FIG. **2**A is a plan view of a distal portion of the tool shown in FIG. **1**;

FIG. **2**B is a schematic plan view of an intermediate part of the distal portion shown in FIG. **2**A;

FIG. **3**A is a partial perspective view of a second tool embodying the present disclosure;

FIG. **3**B is an elevation of a distal end of the tool shown in FIG. **3**A;

FIG. **4** is a perspective view of a third tool embodying the present disclosure;

FIG. **5** is a cross-sectional elevation of a blade of the tool shown in FIG. **4**, taken along the line V-V; and

FIG. **6** is a cross-sectional elevation of a blade of the tool shown in FIG. **4**, taken along the line VI-VI.

DETAILED DESCRIPTION

Referring now to the Figures and to FIG. **1** in particular, a first osteotomy tool **1** comprises a cylindrical connecting body **2** provided at a proximal end with a threaded spigot **3**, by which the tool **1** may detachably be connected to a generator of ultrasonic vibrations (not shown). An elongate blade portion **4** of the tool **1** extends from a distal end of the connecting body **2**, and is aligned generally coaxially therewith.

The blade portion **4** comprises a proximal blade root **5** having a substantially rectangular cross-section and linked by a tapered portion **6** to a thin, flat elongate blade **7** with a generally rounded distal tip **8**. A distal portion of the blade **7** has two oppositely-facing lateral cutting edges **9**, **10**. Each of the lateral cutting edges **9**, **10** and the tip **8** is provided with a plurality of teeth **13**, as shown in more detail in FIGS. **2**A and **2**B. A proximal portion of the blade **7** is toothless, although the relative lengths of the toothed and toothless portions may vary from that shown.

The cylindrical connecting body **2** is provided with spanner flats **11** to allow application of tightening torque sufficient to bring the tool **1** into secure contact with the ultrasound generator, allowing effective vibrational coupling through a contact surface **12** of the body **2**. The tool **1** is preferably made of titanium or stainless steel.

As FIGS. **2**A and **2**B illustrate, the teeth **13** of the blade **7** are preferably shaped generally as conventional saw teeth, having a first edge **14** substantially orthogonal to a longitudinal axis of the blade **7** and a second edge **15** at a relatively shallow angle thereto. In a conventional saw, the first edge **14** would be sharpened, and the saw would cut when pulled (or sometimes pushed) in a longitudinal direction in which the first edge **14** is a leading edge of the tooth **13**. In the present disclosure, it is believed to be unnecessary to sharpen the teeth **13**.

In the tool **1** shown, the teeth **13** extend in a continuous array along a first cutting edge **9**, around the tip **8** and along a second cutting edge **10**, without the relative dispositions of the first and second edges **14**, **15** of the teeth **13** changing. Thus, the first cutting edge **9** is adapted to cut on a longitudinal pull stroke as indicated by arrow **16** and the second cutting edge **10** is adapted to cut on a longitudinal push stroke as indicated by arrow **17**.

Were the tool **1** a conventional mechanical saw, this arrangement would not be particularly effective, a push cut being particularly difficult to control in direction or force. Manual sawing at bone, even cancellous bone, produces significant frictional heating and requires considerable effort on the part of the user.

However, when the blade **7** is subjected to longitudinal mode ultrasonic vibrations, directed parallelly to the longitudinal axis **18** of the tool **1**, the effectiveness of both the pull stroke **16** and the push stroke **17** is greatly improved. The velocity amplitude of the first edge **14** of each tooth **13** as it contacts the bone is much greater than the speed of the stroke **16**, **17** alone. This leads to much more rapid cutting through the bone, with much less friction, and hence much less heating. The user does not need to force the tool **1** through the bone, allowing much greater accuracy and control in the cut, for both the push and pull strokes **16**, **17**. The tip **8** may be sunk longitudinally into the bone with only small lateral movements of the tool **1**.

The tool **1** is connected to an ultrasound generator operating in the frequency range 20-75 kHz.

Thus, for a replacement hip joint prosthesis held in a cavity within a femur by friction or by interaction with cancellous bone, and requiring revision, it is relatively straightforward to sink the tool **1** between the stem of the prosthesis and the femur itself, tip first and extending generally parallelly to the stem. The tool **1** can then be moved laterally around the stem, with a gentle sawing motion, cutting through the bone and freeing the prosthesis.

Compared to the alternative approach of using powered burrs, the ultrasonically-vibrated tool **1** is significantly more accurate, and does not flex when it meets increased resistance, which might cause unacceptable collateral bone damage. Frictional heating is lower with the tool **1** shown than with powered burrs, and the amount of bone swarf produced is significantly lower.

Manual (chisel-like) osteotomes require considerable force to drive between the prosthesis and the femur, which could damage a weakened femur wall and frequently compromises the directional accuracy of the technique.

The tool **1** may also be of use in other surgical procedures where rapid and accurate bone cutting is required, such as bone grafting or amputations.

A second osteotomy tool **21** is shown in FIG. **3**A. As for the first **1**, it comprises a cylindrical body **2** with a proximally-mounted threaded spigot **3** by which it is connectable to a generator of ultrasonic vibrations. However, in this case, the generator produces torsional mode ultrasonic vibrations. As for the longitudinally-vibrated first tool **1**, vibrations in the frequency range 20-75 kHz are preferred.

The second tool **21** is provided with a generally hemicylindrical blade **27**, aligned coaxially with the connecting body **2** along a longitudinal axis **18** of the tool **21**. A distal tip **28** of the hemicylindrical blade **27** is provided with a plurality of teeth **23**. The teeth **23** are shown as symmetrical, although they may be asymmetrical as for the teeth **13** of the first tool **1**, set in either sense or even set in alternating senses. The tip **28** thus comprises a generally semicircular cutting edge, as shown in FIG. **3**B.

The torsional mode ultrasonic vibrations transmitted through the connecting body **2** to the blade **27** thus vibrate the tip **28** as shown by arrows **26**. The user rotates the second tool **21** manually about the axis **18**, without needing to exert significant longitudinal force, and the ultrasonic vibrations cause the tool **21** to cut rapidly and accurately into the bone to which it is applied.

As well as being useful for cutting between a prosthesis and a concave inner wall of a long bone, the second tool **21** may also be usable to cut circular bone samples, or in cranial surgery. Although a generally hemicylindrical blade **27** is probably optimal for arthroplasty revision work, blades comprising greater or lesser proportions of a hollow cylinder may be appropriate in other applications.

A third osteotomy tool **31**, shown in FIG. **4**, is a preferred variant of the first tool **1**, shown in FIG. **1**. As for the first tool **1**, the third tool **31** comprises a connecting body **2** having a threaded spigot **3**, by which the tool **31** may detachably be connected to a generator of ultrasonic vibrations. An elongate blade portion **4** extends from a distal end of the connecting body **2**, generally coaxially aligned therewith.

The blade portion **4** comprises a proximal blade root **5** of generally rectangular cross-section, linked by a tapered portion **6** to a thin, elongate blade **37** with a generally rounded distal tip **8**. As for the blade **7** of the first tool **1**, this comprises a distal portion having two oppositely-facing lateral cutting edges **9**, **10**. A plurality of teeth **13** extend along each cutting edge **9**, **10** and the rounded tip **8** that joins them.

The blade **37** of the third tool **31** differs in cross-sectional profile from that of the first tool **1**. Whereas the blade **7** has a rectangular cross-section, the blade **37** has a substantial bevelled region **32** extending longitudinally of the blade **37** adjacent each edge **33** thereof and around its distal tip **8**. (A corresponding bevelled region **32** is provided on a reverse face of the blade **37** to that visible in FIG. **4**).

Thus, as shown more clearly in FIG. **5**, the blade **37** has an octagonal cross-section. Respective bevelled regions **32** on each face of the blade **37** define a narrow edge **33** extending between them. It is preferable that the edge **33** is not actually sharpened, to reduce the likelihood of it cutting anything accidentally while the tool **31** is not ultrasonically activated.

As shown in FIG. **6**, the indentations between the teeth **13** of the blade **37** extend only partially across the bevelled regions **32**. They are thus both triangular in plan view (see FIGS. **2** and **3**) and generally triangular in profile.

The teeth **13** of the blade **7** of the first tool **1** have a substantially rectangular cross-section, and it is believed that the outer corners thereof may be prone to damage. It is probable that an activated tool **1** would at some point come into contact with a prosthesis being removed and the corners of the teeth **13** would tend to impact thereon. There would be a significant chance of these corners being knocked off, notched or chipped as a result. It is important to balance an ultrasonically-vibratable blade, and significant loss of material from the teeth **13** might require the whole blade **7** to be rebalanced or even disposed of. Also, if damage occurs at a region of the blade **7** that is under raised stress, fatigue fractures of the blade **7** might quickly follow, originating from the damage.

The blade **37** with bevelled regions **32** avoids such problems to a great extent. While a face of the blade **37** might contact the prosthesis in use, its teeth **13** (and particularly the narrow edge **33** forming the tips of the teeth **13**) are set back from the face and less likely contact the prosthesis. Even if they did, the profile created means that such contacts would be more glancing and less liable to cause damage. Nevertheless, the tooth **13** profile of the blade **37** of the third tool **31** is just as effective as that of the first tool in cutting through cancellous bone.

While the present disclosure has been illustrated with respect to several specific embodiments thereof, these embodiments should be considered as illustrative rather than limiting. Various modifications and additions may be made and will be apparent to those skilled in the art.

A similar tapered profile may also be created around the cutting distal tip **28** of the second tool **21**.

The invention claimed is:

1. A tool adapted to cut bone using torsional mode ultrasonic vibrations, the tool comprising:

an ultrasonic generator which produces torsional mode ultrasonic vibrations, and an elongate blade operatively connectable thereto by a connector body having no central channel, the blade having at least one cutting edge provided with a plurality of serrations each having a first cutting facet substantially traverse to a direction of said torsional mode ultrasonic vibrations, wherein the blade comprises an elongate member having a curved cross-section substantially comprising an arc of a circle, wherein said tool is adapted to be torsionally vibratable about a longitudinal axis extending through a centre of said circle, wherein the plurality of serrations is arranged along the curved cross-section and is located at the distalmost end of the elongate member, wherein said tool is further adapted to translate a cutting force generated by manual movement of the elongate member to the bone, wherein said plurality of serrations at said at least one cutting edge are positioned for cutting bone during manual movement of the elongate member, wherein a distal tip of the elongate member comprises the at least one cutting edge, wherein a portion of the elongate member adjacent its

tip tapers longitudinally towards said tip, and wherein the tapered portion comprises an angled surface located on a concave face of a curved elongate member.

2. A tool as claimed in claim **1**, wherein the serrations are generally triangular.

3. A tool as claimed in claim **1**, wherein the serrations extend distally from the tip of the elongate member.

4. A tool as claimed in claim **1**, wherein the ultrasonic generator is adapted to generate ultrasonic vibrations at a frequency within a range of 20-75 kHz.

5. A tool adapted to cut bone using torsional mode ultrasonic vibrations, the tool comprising:

means for generating ultrasonic vibrations, and

an elongate blade operatively connectable thereto by a connector body having no central channel, the blade having at least one cutting edge provided with a plurality of serrations each having a first cutting facet substantially traverse to a direction of said ultrasonic vibrations, wherein the means for generating ultrasonic vibrations produces torsional mode ultrasonic vibrations, wherein the blade comprises an elongate member having a curved cross-section substantially comprising an arc of a circle, wherein said tool is adapted to be torsionally vibratable about a longitudinal axis extending through a centre of said circle, wherein the plurality of serrations is arranged along the curved cross-section and is located at the distalmost end of the elongate member, wherein said tool is further adapted to translate a cutting force generated by manual movement of the elongate member to the bone, wherein said plurality of serrations at said at least one cutting edge are positioned for cutting bone during distal manual movement of the elongate member, wherein a distal tip of the elongate member comprises the at least one cutting edge, wherein a portion of the elongate member adjacent its tip tapers longitudinally towards said tip, and wherein the tapered portion comprises an angled surface located on a concave face of a curved elongate member.

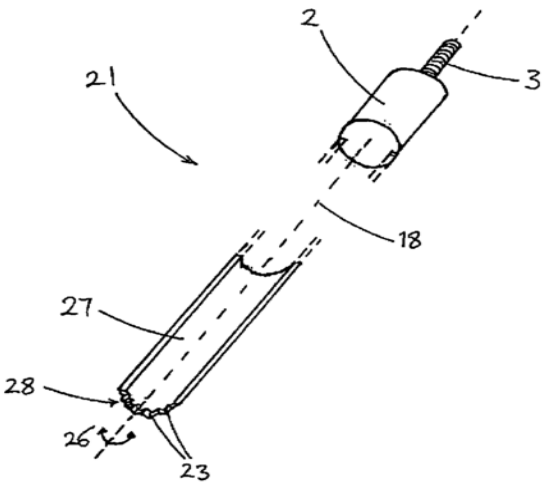
6. A tool as claimed in claim **5**, wherein the serrations are generally triangular.

7. A tool as claimed in claim **5**, wherein the serrations extend distally from the tip of the elongate member.

8. A tool as claimed in claim **5**, wherein the ultrasonic generator is adapted to generate ultrasonic vibrations at a frequency within a range of 20-75 kHz.

* * * * *

专利名称(译)	骨刀		
公开(公告)号	US9763673	公开(公告)日	2017-09-19
申请号	US14/322183	申请日	2014-07-02
[标]申请(专利权)人(译)	ORTHOSONICS		
申请(专利权)人(译)	ORTHOSONICS有限公司		
当前申请(专利权)人(译)	ORTHOSONICS有限公司		
[标]发明人	YOUNG MICHAEL JOHN RADLEY		
发明人	YOUNG, MICHAEL JOHN RADLEY		
IPC分类号	A61B17/32 A61B17/16 A61B17/14		
CPC分类号	A61B17/16 A61B17/142 A61B17/144 A61B17/1628 A61B17/1637 A61B17/320068 A61B17/1642 A61B17/1664 A61B2017/320072 A61B2017/320077		
优先权	2004026503 2004-12-02 GB PCT/GB2005/004618 2005-12-02 WO		
其他公开文献	US20140316415A1		
外部链接	Espacenet USPTO		

摘要(译)

用于切割骨骼的工具（ 1,31 ）包括可连接到纵向模式超声波振动的发生器的细长刀片（ 37,3 ）。刀片（ 7,37 ）具有两个横向切割边缘（ 9,10 ），其通过圆形远端尖端（ 8 ）连接。一系列三角形齿（ 13 ）沿着每个切削刃（ 9,10 ）和远侧尖端（ 8 ）延伸。刀片（ 37 ）可以朝向每个切削刃（ 9,10 ）和远端尖端（ 8 ）逐渐变细。工具的变体（ 21 ）包括可连接到扭转模式超声波振动发生器的细长部分圆柱形刀片（ 27 ）。刀片（ 27 ）在其远端尖端（ 28 ）处具有切削刃，该切削刃设有多个三角形齿（ 23 ）。所有形式的工具（ 1,21,31 ）特别适合于切割植入物周围的松质骨，以在关节成形术的修订期间移除。