

050541

SPRUSON & FERGUSON

AUSTRALIA

PATENTS ACT 1990

PATENT REQUEST: STANDARD PATENT

I/We, the Applicant(s)/Nominated Person(s) specified below, request I/We be granted a patent for the invention disclosed in the accompanying standard complete specification.

[70,71] Applicant(s)/Nominated Person(s):

Howmedica GmbH, of Professor-Kuntscher-Strasse 1-5, 2314 Schonkirchen,
GERMANY

[54] Invention Title:

Locking Nail for Treating Femoral Fractures in the Medium and
Trochanter Region

[72] Inventor(s):

Arsene Jerome Grosse and Hans Erich Harder

[74] Address for service in Australia:

Spruson & Ferguson, Patent Attorneys
Level 33 St Martins Tower
31 Market Street
Sydney New South Wales Australia (Code SF)

Details of Basic Application(s):		
[31] Appl'n No(s):	[33] Country:	[32] Application Date:
G 91 09 883.1	DE	9 August 1991

DATED this TWENTY FOURTH day of JUNE 1992

Howmedica GmbH

By:



Registered Patent Attorney

IRN: 213837

INSTR CODE: 61315

5030289 24/06/92

Australia

Patents Act 1990

NOTICE OF ENTITLEMENT

I, John David O'Connor, of 31 Market Street, Sydney, New South Wales, 2000, Australia, being the patent attorney for the Applicant/Nominated Person in respect of Application No 18565/92 state the following:-

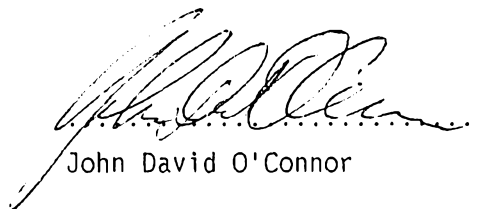
The Applicant/Nominated Person has entitlement from the actual inventors as follows:-

The Applicant/Nominated Person, by virtue of a Contract of Employment between the actual inventors as employees and the Applicant/Nominated Person as employer, is a person which would be entitled to have the patent assigned to it if a patent were granted on an application made by the actual inventors.

The Applicant/Nominated Person is the applicant of the basic application listed in the Patent Request.

The basic application listed on the Patent Request is the first application made in a Convention Country in respect of the invention.

DATED this *Twenty first* day of *April* 19 *94*


John David O'Connor



AU9218565

(12) PATENT ABRIDGMENT (11) Document No. AU-B-18565/92
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 650547

(54) Title
LOCKING NAIL FOR TREATING FEMURAL FRACTURES IN THE MEDIUM AND TROCHANTER
REGION

International Patent Classification(s)
(51)⁵ A61B 017/58

(21) Application No. : 18565/92

(22) Application Date : 24.06.92

(30) Priority Data

(31) Number	(32) Date	(33) Country
9109883	09.08.91	DE GERMANY

(43) Publication Date : 11.02.93

(44) Publication Date of Accepted Application : 23.06.94

(71) Applicant(s)
HOWMEDICA GMBH

(72) Inventor(s)
ARSENE JEROME GROSSE; HANS ERICH HARDER

(74) Attorney or Agent
SPRUSON & FERGUSON, GPO Box 3898, SYDNEY NSW 2001

(56) Prior Art Documents
US 5034013
US 4697585

(57) Claim

1. Locking nail for treating femural fractures in the medium and trochanter region, wherein a proximal portion of the nail to be positioned in the marrow space may be provided with an oblique bore for positioning and guiding a femur neck screw and the distal portion of the nail is provided with at least a cross bore for receiving a bone screw, characterized in that the distal nail portion (2) comprises an open clover-leaf profile including an axial longitudinal slot (7), a transition portion (4) joining a cylindrically closed proximal nail portion (3) with a distal nail portion (2) having a smaller diameter and that the axial longitudinal slot extends substantially from the transition portion to the free distal nail end.

AUSTRALIA
PATENTS ACT 1990

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

Name and Address
of Applicant:

Howmedica GmbH
Professor-Kuntscher-Strasse 1-5
2314 Schonkirchen
GERMANY

Actual Inventor(s):

Arsene Jerome Grosse and Hans Erich Harder

Address for Service:

Spruson & Ferguson, Patent Attorneys
Level 33 St Martins Tower, 31 Market Street
Sydney, New South Wales, 2000, Australia

Invention Title:

Locking Nail for Treating Femoral Fractures in the
Medium and Trochanter Region

The following statement is a full description of this invention, including the
best method of performing it known to me/us:-

Locking nail for treating femoral fractures in the medium
and trochanter region

The present invention relates to a locking nail for treating femoral fractures in the medium and trochanter region
5 according to the preamble of claim 1.

An osthesynthesis device to be used for sub-trochanter fractures is disclosed in European Patent 0 257 118, which device comprises a closed locking nail including an oblique bore for guiding and positioning a femoral neck screw in the
10 proximal portion thereof. Since the locking nail, known as well as "gamma-nail", is not used itself for treating fractures of the femur neck, the nail is shorter than usual, merely including cross bores in its distal portion to fix the nail in an axial and rotational direction. The femur
15 neck screw fits in the oblique bore and is thus effectively secured against pivoting in the plane clamped thereby and about an axis defined by the locking nail. To rotatably secure the femur neck screw a rotational lock, for example a locking pin is provided. This rotational lock allows the
20 femur neck screw to axially move so that the screw may yield when the bone shortens during healing.

While the known locking nail according to European patent 0 257 118 has a closed profile, the so-called Küntscher-nail has an open clover-leaf profile. The mechanical fixing in
25 the marrow space, in particular the security against rotation is deemed to be insufficient for the Küntscher-nail.

An advantage of this type of nail should be seen in its elasticity resulting from an axial longitudinal slot so that a certain spring effect is obtained and the nail beaten-in is laterally pressed against the bone material.

5 The nails referred to are used in the treatment of fractures in the central third or, respectively in the sub-trochanter region. However, in the treatment of complicated femoral fractures, the nails are less suited.

It is the object of the present invention to provide a
10 locking nail which is safely fixed in the femur and which is suited to be used in the treatment of complicated femoral fractures in the central and trochanter region.

The object is solved by the features in the characterizing portion of claim 1.

15 The locking nail according to the invention comprises an open clover-leaf profile including an axial longitudinal slot in the distal nail portion as well as at least a cross bore for receiving a bone screw. The longitudinal slot extends substantially from the free distal nail end to the
20 transition portion joining the distal nail portion and a cylindrically closed proximal portion. The proximal portion may be provided with an oblique bore to hold and guide a femoral neck screw. The clover-leaf shaped distal portion has a smaller diameter than the cylindrical closed proximal
25 portion, wherein the transition portion may be formed conical.

According to an embodiment of the invention the distal nail portion is disposed under an angle of 6° to 10° in the anterior-posterior plane with respect to the proximal nail
30 portion. In addition the distal nail portion may be disposed under an angle of 4° to 7° in the lateral-medial plane with respect to the proximal nail portion.

According to a further embodiment of the invention an internal thread is provided above the oblique bore to receive a locking pin. A second internal thread may be formed at the proximal nail end to receive a target device 5 or a beating tool.

The locking nail according to the invention, the length of which may be 240 to 480 mm, is particularly suited in the treatment of complicated femoral fractures, wherein it provides for a high mechanical holding force in the marrow 10 space and a high security against rotation. Due to the longitudinal slot, a certain elasticity of the nail is obtained. By means of the cross bores provided in the lower distal region the nail is fixed by bone screws in an axial and rotational direction. The locking nail according to the 15 invention may be bent to conform to the physiological ante-curvature of the femur. The femur neck screw may be positioned in the oblique bore and secured against rotation by a locking pin which is inserted in the proximal end of the nail and fixed in the internal thread, wherein an axial 20 motion of the nail is still allowed. A beating tool for operating the locking nail or a target device to determine the position of the oblique bore when the femur is drilled laterally to insert the femoral neck screw, may be fixed in a second internal thread provided at the distal nail end.

25 The nail according to the invention is formed from a cylindrical solid tube made of a non-corrosive, physically compatible material. The tube is internally drilled, wherein the internal bore preferably has a larger diameter in the distal nail portion than in the proximal nail portion, and in a 30 second step, the axial longitudinal slot is formed. Thereafter the outer periphery of the tube is worked to form the clover-leaf shaped distal portion having a smaller diameter than the proximal portion and the tapered transition portion

and the cylindrical proximal portion. The cross bores and internal threads are formed as known per se. The clover-leaf profile is formed by a press-forming step.

An embodiment of the invention is described as follows with reference to the figures, which show

- Fig. 1 a side view of a locking nail according to the invention for treating fractures in the right femur,
- Fig. 2 a section through the nail of Fig. 1 taken along the line A-A,
- Fig. 3 an end view of the nail of Fig. 1 in the direction of the arrow B,
- Fig. 4 a front view, partially in section of the nail of Fig. 1 and
- Fig. 5 a turning and drilling illustration of the locking nail.

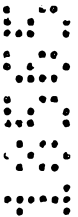
A locking nail 1 includes a distal portion 2, a proximal portion 3 and a tapered transition portion 4. The cross section (figs. 2 and 3) of the distal portion 2 is formed like a trifoliate open clover-leaf including elevations 5 and depressions 6. An axial longitudinal slot 7 extends from the free distal nail end 8 across the total length of the distal portion 2 to define the open clover-leaf profile. The lower range of the distal portion 2 is provided with a pair of cross bores 9 and 10.

The cross section of the proximal portion 3 is circular having a larger diameter than that of the distal portion 2. The wall thickness 12 in the proximal portion 3 of the locking nail 1 is relatively large with respect to its inner bore 11, whereas the distal wall thickness 13 is rather

small when compared with the inner bore 14 of the distal portion. The inner bore 11 extends from the end to the distal portion up to the free proximal nail end 15.

An oblique bore 16 for guiding and positioning a screw for the neck of the femur (not shown) is defined beyond the transition portion 4 in the proximal portion 3 (fig. 4), which is provided with an internal thread 17 as shown in figure 5 to receive a locking pin not shown. Adjacent the internal thread 17 the inner bore 11 is cylindrically enlarged up to the proximal nail end 15. The cylindrical enlarging portion 18 and a second internal thread 19 adjacent the proximal end 15 are used for receiving and positioning a target device or a beating tool.

By bending the transition portion 4 the straight distal portion 2 in the lateral medial plane is positioned under an angle of approximately 6° (fig. 4) and in the anterior-posterior plane under an angle of approximately 4° (fig. 1) with respect to the proximal portion 3.



~~Claims~~

The claims defining the invention are as follows:

1. Locking nail for treating femoral fractures in the medium and trochanter region, wherein a proximal portion of the nail to be positioned in the marrow space may be provided with an oblique bore for positioning and guiding a femur neck screw and the distal portion of the nail is provided with at least a cross bore for receiving a bone screw, characterized in that the distal nail portion (2) comprises an open clover-leaf profile including an axial longitudinal slot (7), a transition portion (4) joining a cylindrically closed proximal nail portion (3) with a distal nail portion (2) having a smaller diameter and that the axial longitudinal slot extends substantially from the transition portion to the free distal nail end.

2. The locking nail of claim 1 characterized in that the distal nail portion (2) is disposed in the lateral-medial plane of the locking nail (1) under an angle of between 6° and 10° with respect to the proximal nail portion (3).

3. The locking nail of claim 1 or 2, characterized in that the distal nail portion (2) is disposed in the anterior-posterior plane of the locking nail (1) under an angle of between 4° and 7° with respect to the proximal nail portion (3).

4. The locking nail of one of claims 1 to 3, characterized in that the transition portion (4) extends conically from the proximal to the distal portion.

5. The locking nail of one of claims 1 to 4, characterized in that the proximal nail portion (3) comprises an internal thread (17) for receiving a locking pin.

6. The locking nail of one of claims 1 to 5, characterized in that a second internal thread (19) for receiving a target device or a beating tool is formed adjacent the proximal nail end (15).

DATED this NINETEENTH day of JUNE 1992
Howmedica GmbH
Patent Attorneys for the Applicant
SPRUSON & FERGUSON



Locking Nail for Treating Femoral Fractures in
the Medium and Trochanter Region

Abstract of the Disclosure

Locking nail (1) for treating femoral fractures in the medium and
5 trochanter region, wherein a proximal portion (3) of the nail to be
positioned in the marrow space may be provided with an oblique bore (16)
for positioning and guiding a femur neck screw and the distal portion (2)
of the nail (1) is provided with at least a cross bore (9, 10) for
receiving a bone screw, wherein the distal nail portion (2) comprises an
10 open clover-leaf profile including an axial longitudinal slot (7), a
transition portion (4) joining a cylindrically closed proximal nail
portion (3) with the distal nail portion (2) having a smaller diameter
and the axial longitudinal slot (7) extends substantially from the
transition portion (4) to the free distal nail end (8).

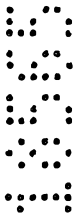


Figure 4.



18565/92

FIG.1

FIG.4

FIG.5

