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AUSTRALIA
Patents Act 1990

PATENT REQUEST AND NOTICE OF ENTITLEMENT

We Jean-Louis Vignaud; Gilles Missenard; Philippe Lapresele and Jean-Francois Sacriste

of 10 impasse Francois Audouin, F-33400 TALENCE, FRANCE; 94-96 quai Louis Blériot, F-75016 PARIS, FRANCE; 32 boulevard Victor Hugo, F-92200 NEUILLY SUR SEINE, FRANCE and 5 square Maurice Ravel, La Chapelle Forestière, F-33115 PYLA SUR MER, FRANCE, respectively

being the Applicant and Nominated Person, request the grant of a patent for an invention entitled INTERCONNECTING DEVICE ABLE TO LOCK SPINAL OSTEOSYNTHESIS FASTENER which is described in the accompanying standard complete specification.

Convention priority is claimed from the following basic application:

Basic Applicant	Application Number	Application Date	Country	Country Code
Jean-Louis Vignaud; Gilles Missenard; Philippe Lapresele and Jean-Francois Sacriste	91 06133	17 May 1991	France	FR

We are the actual inventors of the invention.

The basic application was the first application made in a Convention country in respect of the invention the subject of this request.

Drawing number recommended to accompany the abstract: 1

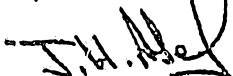
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By their Patent Attorney



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INTERCONNECTING DEVICE ABLE TO LOCK SPINAL OSTEOSYNTHESIS FASTENER
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- (56) Prior Art Documents
US 5005562
US 3865105
EP 350925
- (57) Claim

1. Interconnecting device able to lock two spinal osteosynthesis fasteners , said fasteners comprising an osseous fixation section formed by a screw, a bent-back plate or similar device and a body for fixing an integralization rod formed by a diapason head housing both said rod and a clamping screw , said interconnecting device being constituted by two annular elements able to be each externally attached onto one of the diapason heads , each annular element comprising an external locking rod able to slide into a clamping collar , the two clamping collars of the device being screwed down by a common screw traversing said collars.

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ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT

Invention Title: INTERCONNECTING DEVICE ABLE TO LOCK
SPINAL OSTEOSYNTHESIS FASTENER

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

GH&CO REF: P21703-B:CLC:RK

**INTERCONNECTING DEVICE ABLE TO LOCK SPINAL
OSTEOSYNTHESIS FASTENERS**

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This invention relates to a device able to interconnect and lock in a particular position two spinal osteosynthesis fasteners.

10 The invention concerns more particularly but not exclusively spinal osteosynthesis devices of the type comprising a rod housed and locked in a certain number of fasteners constituted by an osseous anchorage section formed by a screw or bent-shaped plate and a rod fixing body
15 constituted by a diapason-shaped head housing between its two branches said rod which is locked by means of an attachment screw housed in an internal screw thread fitted on the internal faces opposite said branches.

Usually, for example in the case where one vertebra of the
20 spine is fractured, two osteosynthesis rods are fixed in parallel on both sides of the spine with the aid of fasteners secured to certain vertebrae.

This device is completed by transversal rendered-integral and traction devices interconnecting the two rods, generally
25 constituted by transversal rods interconnecting hooks engaged on the two rods.

These devices are not practical to install and are of a type which may twist the rods owing to the traction they could exert on the latter.

30 The object of the invention is in particular to provide a device for rendering integral in transversal traction such osteosynthesis devices, said devices being of more simple design, easier to install and more effective.

With this aim in mind, the purpose of the invention is to
35 provide an interconnecting device able to lock two spinal osteosynthesis fasteners, said fasteners comprising an osseous fixation section formed by a screw, a bent-shaped plate or similar device and body for fixing an integralization rod formed by a diapason head housing both said rod and the
40 locking screw, wherein it comprises two annular elements each

able to be externally attached onto one of the diapason heads, each annular element comprising one external locking rod able to slide into a clamping collar, said two clamping collars of the device being screwed down by a common screw traversing
5 said collars.

Each annular element attached onto a diapason head is locked on the latter when screwing down the locking screw of the interconnecting rod of the fasteners, the purpose of this operation being to spread apart the branches of the diapason
10 and thus lock the annular element surrounding the diapason head.

Next, the external head of each annular element is adjusted via sliding inside its collar, the correct position being found for the two external rods and a simple screwing
15 down of a single screw locks the two clamping collars.

The traction forces of the integralization device are thus exerted directly on the fasteners and no longer on the interconnecting rods between two fasteners and the various degrees of freedom of the locking rods of the annular elements
20 and of the clamping collars allows for considerable flexibility as regards the positioning of the annular elements on the diapason heads, irrespective of their possible position or orientation.

The invention is also applicable to the interconnecting
25 between two fasteners disposed on one given side of the spine and belonging to two osteosynthesis devices of the type mentioned above and disposed with one being an extension of the other, the device of the invention being mounted between the two extremity fasteners.

30 Other characteristics and advantages shall appear more readily from a reading of the following description of one embodiment of the device of the invention, this description being given solely by way of example and with reference to the accompanying drawings on which :

- 35
- Figure 1 shows an implantation on a spine of a known type of a spinal osteosynthesis device ;
 - Figure 2 shows a perspective and approximate front view of a known type of diapason head pedicular screw ;

- Figure 3 is a perspective and approximate front view of a device conforming to the invention ;
- Figure 4 is a top view of the device of figure 3, and
- Figure 5 is an axial partial cutaway view of a screw of the type of figure 2 to which an annular element of the device of figures 3 and 4 is attached.

Figure 1 shows at 1 vertebrae provided with a spinal instrument including on both sides of the spine one integralization rod 2 connecting a certain number of fasteners constituted by an osseous fixing portion formed by a screw or a bent back plate, and a head for receiving and locking said rod 2.

Figure 1 shows for each rod 2 only one of these fasteners, for example a known type of a pedicular screw 3 detailed on figure 2.

This screw 3 includes a threaded osseous anchorage rod 4, a diapason-shaped cylindrical head 5 between the two branches 5a and 5b from which the rod 2 is kept locked by a locking screw 6 engaged between the branches 5a and 5b and screwed into an internal screw thread 7 provided on the internal faces opposite said branches. The locking screw 6 is provided on its upper face with a polygonal hollow indentation for receiving a wrench for locking the rod 2.

Such a device is well-known and is generally completed by an integralization and transversal traction device connecting the two rods 2, approximately parallel.

In accordance with the invention, this integralization and transversal traction device, shown in more detail on the diagram of figure 1, is constituted according to a particular embodiment appearing on figures 3 and 4.

The device of the invention includes two annular elements 9 each externally provided with a locking rod 10 of a certain length. The axis of the rod 10 passes, for example, through the center of the auxiliary element 9 but could have any orientation inside the plane of the annular element and have any inclination with respect to this plane.

Each locking rod 10 is able to slide and can be locked in a clamping collar 11.

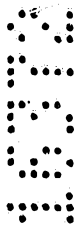
In the embodiment shown, the two clamping collars are superimposed and traversed by a common clamping screw 12

orthogonal to the two rods 10. The screw is for example an internal socket head screw similar to the screw 6.

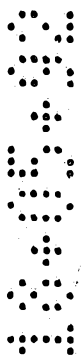
Each annular element 9 may comprise, as shown on figure 5, a convex external face, a cylindrical internal face 14 whose diameter corresponds to the external diameter of the heads 5 of the pedicular screws or other similar fasteners 3 and, at the side intended to be available on the heads of the fasteners (3), a chamfer 15 on the internal edge facilitating placing.

10 Each annular element 9 is attached to a head 5 prior to screwing down of the rod 2 by the screw 6, and is then locked in place by screwing down said screw 6, which tends to spread apart the branches 5a, 5b and thus lock said element 9.

The two elements 9 are placed between two fasteners 3 15 opposite, as shown on figure 1.



These two elements 9 may also be placed on two fasteners disposed on the same side of the spine. In this case, each fastener 3 is, for example, a pedicular screw for fixing the extremity of an interconnecting rod, the device of the invention thus embodying a coupling between the two 20 osteosynthesis devices which are substantially in a line.



It is easy to place the elements 9 on the heads 5, regardless of the possible positions or orientations of said heads 5 by virtue of the various degrees of freedom of the 25 connecting members between the two elements 9. In fact, each rod 10 may slide into a clamping collar 11 and rotates round its axis. Moreover, the two collars 11 are able to pivot with respect to each other by 360° around the common axis of the screw 12.

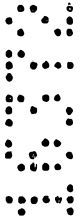
30 Once the rods 10 and collars 11 have been correctly placed, a simple rotation of the sole screw 12 locks the unit in position.

Finally, the invention is not merely limited to the embodiment shown and described above but, on the contrary, 35 covers all possible variants, especially as regards the fitting and possible disposition of the clamping collars 11.

As shown on figures 2 and 3, instead of having a contact plane between the two clamping collars 11 perpendicular to the axis of the screw 11, it is possible to provide a contact 40 plane forming with the axis of the screw 12 an angle different

from the right angle, which would create additional positioning possibilities for the annular elements 9.

The elements of the device of the invention are, of course, contained in a biocompatible material approved for surgical implantation.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Interconnecting device able to lock two spinal osteosynthesis fasteners , said fasteners comprising an osseous fixation section formed by a screw, a bent-back plate or similar device and a body for fixing an integralization rod formed by a diapason head housing both said rod and a clamping screw , said interconnecting device being constituted by two annular elements able to be each externally attached onto one of the diapason heads , each annular element comprising an external locking rod able to slide into a clamping collar , the two clamping collars of the device being screwed down by a common screw traversing said collars.

2. Device according to claim 1, wherein the two clamping collars are at least partially superimposed and free to rotate round the axis of said clamping common screw so as to enable said locking rods to move inside two parallel planes perpendicular to the axis of said screw .

3. Device according to claim 1, wherein the two clamping collars are at least partially superimposed and can rotate onto each other and with respect to the other according to a contact plane forming with the axis of the clamping common screw an angle not equal to 90°.

4. Device according to anyone of claims 1 to 3, wherein each annular element comprises a cylindrical internal face and a chamfered edge .

5. Device according to anyone of claims 1 to 4, wherein at least one of the annular elements comprises an external rod whose axis passes through the centre of said annular element.

6. An interconnecting device able to lock spinal osteosynthesis fasteners, substantially as hereinbefore described with reference to figures 1, 3, 4 and 5 of the accompanying drawings.

Dated this 18th day of May 1992

Jean-Louis Vignaud; Gilles Missenard; Philippe
Lapresele and Jean-Francois Sacriste
By their Patent Attorney
GRIFFITH HACK & CO.

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- The invention concerns an interconnecting device able to lock two spinal osteosynthesis fasteners (3) comprising an osseous fixation section (4) formed by a screw, a bent-back plate or similar device and a body for fixing an integralization rod formed by a diapason head (5) receiving both said rod and a locking screw (6), said interconnecting device being constituted by two annular elements (9) able to be each externally attached onto one of the diapason heads (5), each annular element (9) comprising an external locking rod (10) able to slide into the clamping collar (11), the two clamping collars (11) of the device being screwed down by a common screw (12) traversing said collars.

- Particular application for spinal osteosynthesis.

FIGURE 3

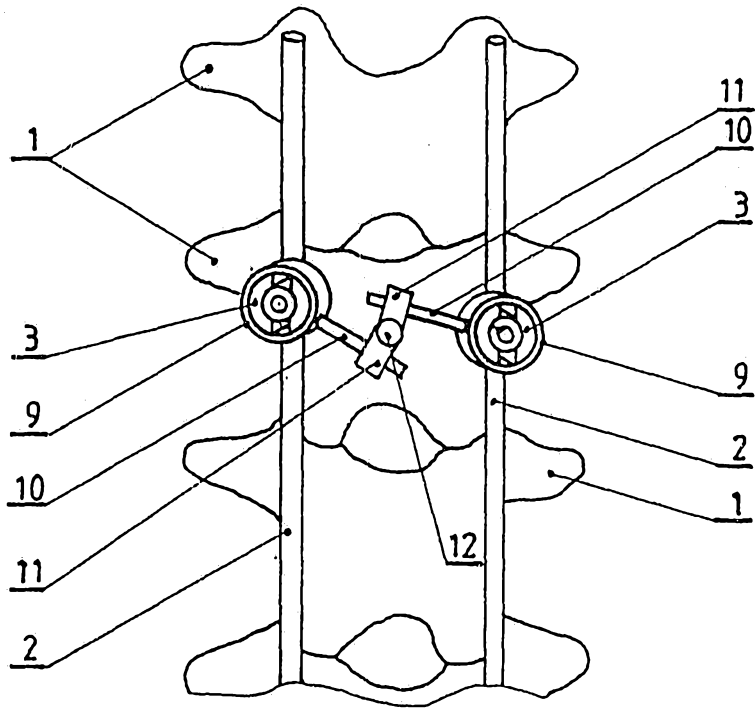


FIG. 1.

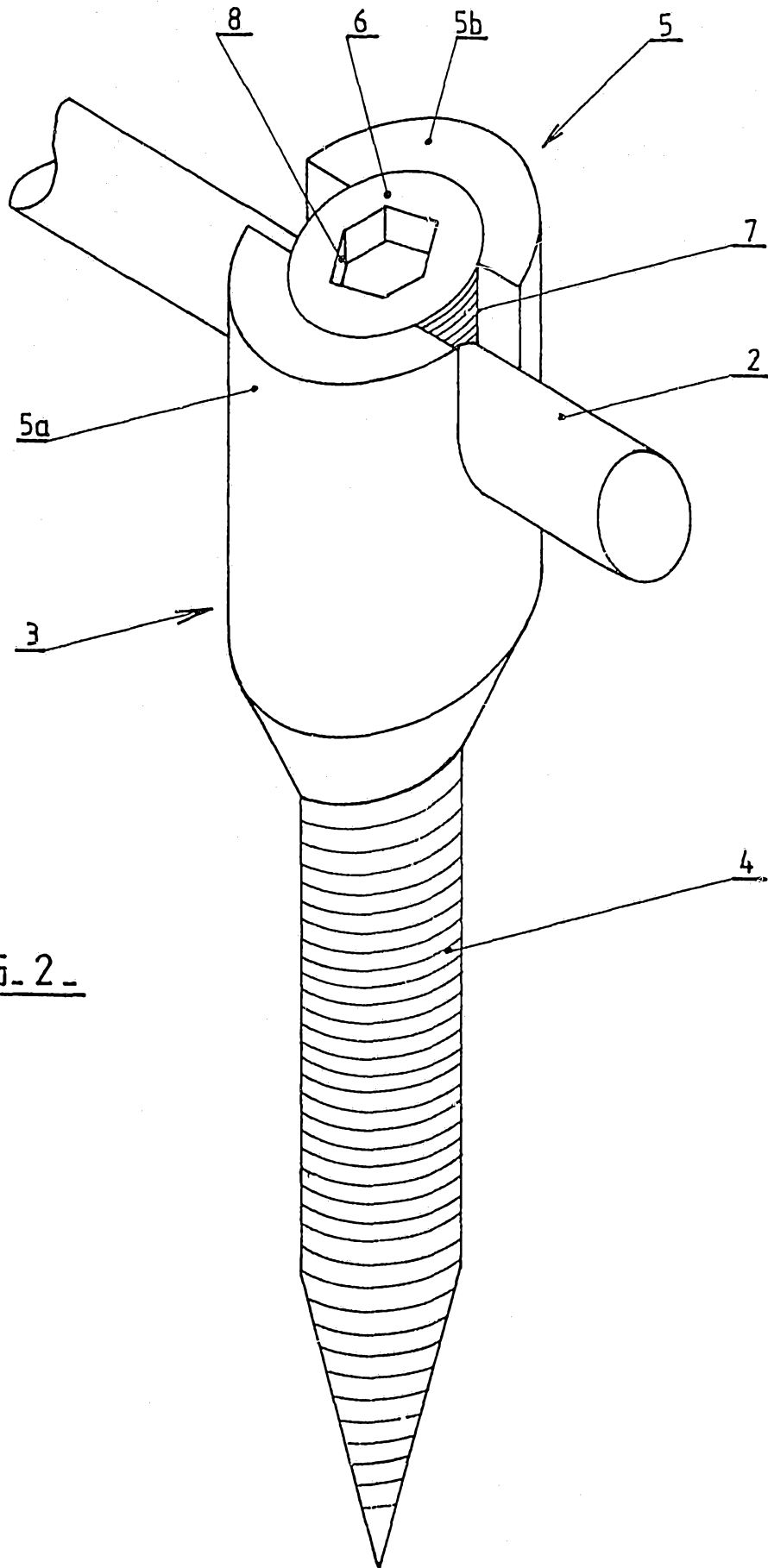


FIG. 2.

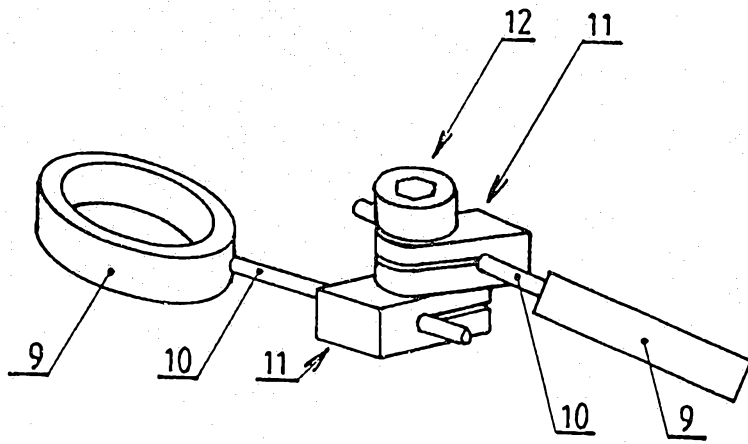


FIG. 3.

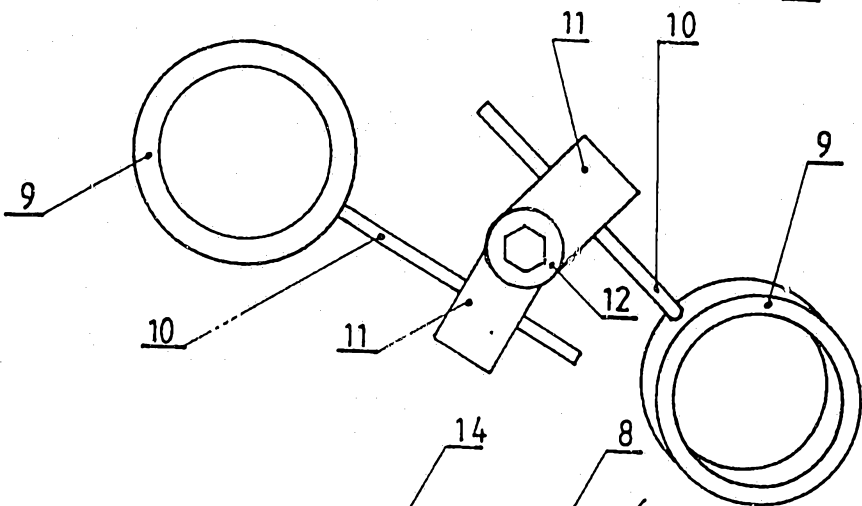


FIG. 4.

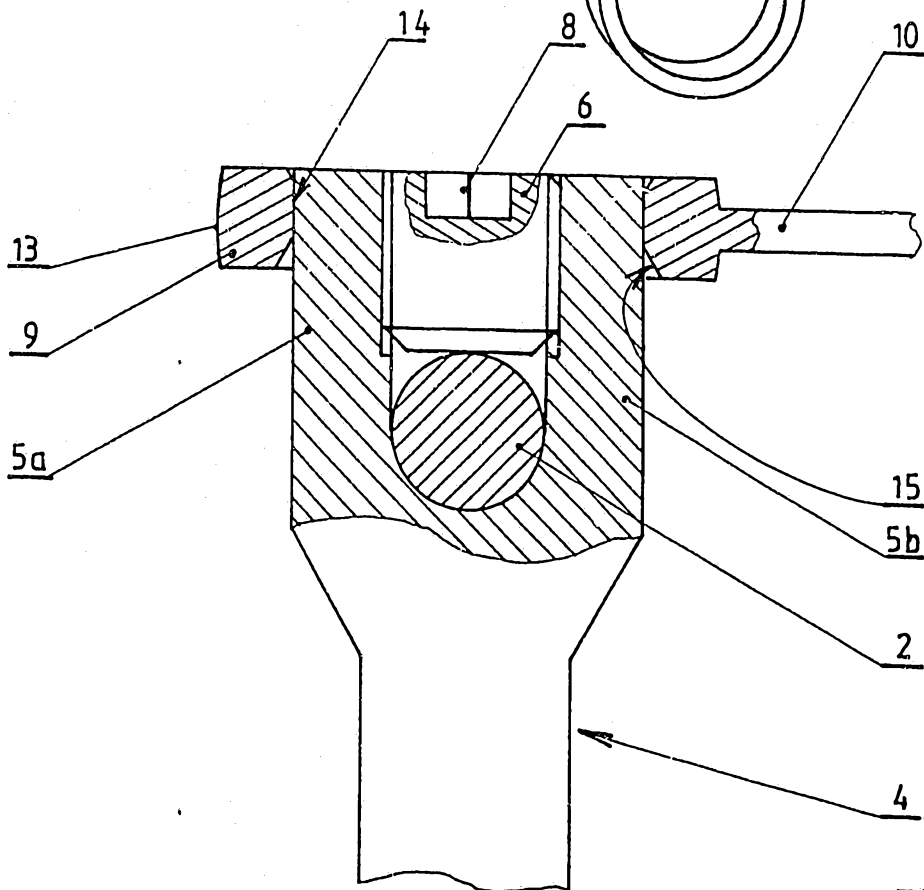


FIG. 5.