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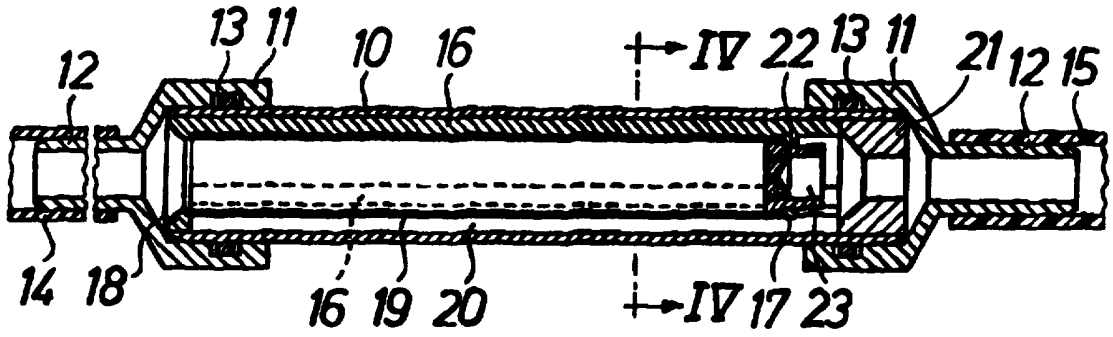
(71)(72) Applicant and Inventor: LUNDGREN, Dan [SE/SE]; Askims Kyrkväg 5, S-436 51 Hovås (SE).

(74) Agents: STRÖM, Tore et al.; Ström & Gulliksson AB, P.O. Box 4188, S-203 13 Malmö (SE).

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(54) Title: METHOD AND APPARATUS FOR COLLECTING FRAGMENTS OF BONE TISSUE



(57) Abstract

The invention relates to method and device for collecting bone tissue fragments at a surgical operation in bone tissue occurring liquid fluid being evacuated by suction from the operation site. In the method liquid is allowed to pass during evacuation by suction into a cylindrical sieve (19) through one open end thereof and through the sieve wall from the inside to the outside thereof. A displaceable end wall (22) disposed at the other end of the sieve is moved axially through the cylindrical sieve in order that bone tissue fragments collected on the inside surface of the sieve will be scraped off therefrom and deposited outside the sieve from said one, open end thereof. The device comprises a cylinder (10) having an inlet and an outlet at one end and the other, respectively, which can be connected into a suction conduit. The cylindrical sieve is located inside the cylinder, a space being provided between the outside curved surface of the sieve and the inside curved surface of the cylinder. One, open end of the sieve communicates with the inlet of the cylinder while the outlet of the cylinder communicates with said space. The end wall disposed at the other end of the sieve can be displaced as a piston axially through the sieve.

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Method and apparatus for collecting fragments of bone tissue

The invention relates to method and device for collecting bone tissue fragments at surgical operations in bone tissue occurring liquid fluid being evacuated by suction from the site of operation.

At surgical operations in bone tissue, for example such operations as are carried out in the oral cavity for fixing dental crowns, bridges, and prostheses in a toothless yaw region, drilling is effected in the yaw bone for securing titanium screws which are used as anchoring elements. Often it is in that case desired to recover the bone tissue fragments formed as bone chips at drilling because these can be used for filling the bone cavities formed in the yaw due to preceding pathological processes. By this procedure the yaw bone can be restored in defect regions. At drilling an aspirator is used for removing blood from the site of operation and then the bone tissue fragments will be entrained in the evacuated liquid and will be lost if they are not separated from the liquid flow in some way or other and are collected.

The purpose of the invention is to make this collection possible in a simple way which moreover facilitates the deposition of the bone tissue fragments where desired.

This is achieved by the invention which provides method and device according to claims 1 and 2, respectively.

In order to explain the invention in more detail reference is made to the accompanying drawings in which

FIG. 1 is an axial cross-sectional view of the device according to the invention applied for evacuation of liquid by suction and separation of bone tissue fragments from the liquid,

FIG. 2 is a corresponding axial cross-sectional view of the device applied for deposition of separated and collected bone tissue fragments,

FIG. 3 is an end view of the axially displaceable end wall in the sieve, and

FIG. 4 is a cross-sectional view along line IV-IV in FIG. 1.

The device according to the invention comprises a cylinder 10 open at each end thereof. At each end a cover 11 is pushed onto the cylinder externally thereof said cover forming a connection piece 12 and being sealed against the outside surface of the cylinder by means of an O-ring 13. An aspirator nozzle 14 is connected to one connection piece, the left one in FIG. 1, said nozzle being shown fragmentarily only. A suction hose 15 is connected to the other connection piece, the right one in FIG. 1, said hose extending to an aspirator not shown herein. The left connection piece with the nozzle thus forms an inlet of the cylinder while the right connection piece with the hose forms an outlet from the cylinder. A cage comprising three straight bars 16 extending in parallel and equally spaced circumferentially, and two rings 17 and 18 integral with and interconnecting said bars, fits detachably in the cylinder, and a cylindrical sieve 19 is received by the cage. By means of the cage the outside curved surface of the sieve is kept spaced from the inside curved surface of the cylinder such that axially extending spaces 20, FIG. 4, are maintained between the sieve and the cylinder between the bars. These spaces are separated from the inlet of the cylinder by means of ring 18 but communicate with the outlet of the cylinder through an annular plug 21 fixed in the cylinder.

At the end of the sieve adjacent the outlet of the cylinder an end wall 22 is provided which at a thicker portion fits against the inside surface of the sieve and at a

narrower portion forms a hollow stud 23 which fits displaceably in ring 17 when the wall is in the end position shown in FIG. 1. End wall 22 is axially displaceable along the inside surface of the sieve, and in the embodiment disclosed herein the end wall is perforated although this is not necessary. If it is perforated the apertures should be smaller than the apertures of sieve 19. The device according to FIG. 1 preferably is made in its entirety of plastics and is intended to be a disposable product.

If the device is connected in a suction conduit between the aspirator nozzle 14 and the suction hose 15 as shown herein and if it is assumed that an underpressure is maintained in the suction conduit and that the aspirator nozzle is used for drawing blood from a site in the oral cavity where drilling in the yaw bone is going on, rinsing liquid and blood will be sucked into the sieve via the inlet of the cylinder and will pass through the wall of the sieve to spaces 20 and will continue to the outlet but will also pass through the perforated end wall 22 directly to the outlet. By the underpressure the end wall will be kept in the end position shown; the thicker portion thereof cannot pass through ring 17. If the liquid contains coagulated blood or bone tissue fragments the perforation of end wall 22 will quickly be clogged and occurring solid particles in the liquid will collect on the inside surface of the sieve. However, the perforation of the end wall promotes a direct continuous flow through the device as long as there are no solid particles in the liquid flow.

In order to recover and deposit the material collected in the sieve, cylinder 10 is disconnected from hoods 11 and is placed in a cylinder 24 of an ordinary disposable syringe, FIG. 2, a piston rod 25 then being connected to end wall 22 by the piston rod being inserted into stud 23. The end wall is displaced by means of the piston rod axially through the cylindrical sieve 19 the collected

material being scraped off from the inside surface of the sieve wall to be deposited through connection piece 26 of the cylinder, which can be constructed as a Luer connection for connecting a suitable mouth piece to the syringe cylinder. However, it is not necessary to shift cylinder 10 to a syringe for deposition. It is also possible to connect the piston rod to the end wall through the right connection piece 12 in FIG. 1 and to deposit the material through the left connection piece 12 in FIG. 1. It may be comfortable, however, to operate a syringe at deposition.

CLAIMS

1. Method for collecting bone tissue fragments at a surgical operation in bone tissue occurring liquid fluid being evacuated by suction from the operation site, c h a r a c t e r i z e d in that liquid when being evacuated by suction is passed into a cylindrical sieve (19) through one, open end thereof and through the sieve wall from the inside surface to the outside surface thereof, and that an end wall (22) displaceably disposed at the other end of the sieve is moved axially through the cylindrical sieve in order that bone tissue fragments collected on the inside surface of the sieve shall be scraped off therefrom and deposited outside the sieve from said one, open end.

2. Device for collecting bone tissue fragments at surgical operations in bone tissue c h a r a c t e r i z e d by a cylinder (10) having an inlet and an outlet (12) at one end and the other, respectively, to be connected into a suction conduit, a cylindrical sieve (19) in the cylinder, a space (20) being provided between the outside curved surface of the sieve and the inside curved surface of the cylinder, one, open end of the sieve communicating with the inlet of the cylinder, and said space communicating with the outlet of the cylinder, and an end wall (22) disposed at the other end of the sieve, which can be displaced as a piston axially through the sieve.

3. Device as in claim 2 characterized in that the end wall (22) has a hollow stud (23) for connection of a piston rod (25) for the axial displacement of the end wall.

4. Device as in claim 2 or 3 characterized in that the cylinder (10) at the ends thereof is provided with end covers (11) forming the inlet and the outlet, respectively, said end covers having couplings (12) for the connection of an aspirator nozzle (14) and a suction hose (15), respectively.

5. Device as in any of claims 2 to 4 characterized in that the sieve (19) is mounted in a cage fitting in the cylinder (10) and having axially extending bars (16) which form spacers between the sieve and the cylinder.

6. Device as in claim 5 characterized in that the cylinder (10) with the sieve (19) mounted therein can be inserted into a syringe (24) to be used for the deposition.

7. Device as in any of claims 2 to 6 characterized in that the end wall (22) is perforated the apertures thereof being narrower than the apertures of the sieve.

AMENDED CLAIMS

[received by the International Bureau on 12 February 1996 (12 .02.96) original claims 1-7 replaced by amended claims 1-7 (2 pages)]

1. Method for collecting bone tissue fragments at a surgical operation in bone tissue wherein occurring liquid fluid is evacuated by suction from the operation site and is passed through a tube (10) open at both ends, which is detachably connected into a suction conduit (14, 15), and wherein the liquid fluid supplied to one end of said tube is passed into a tubular sieve (19) in said tube through one, open end of the sieve and through the sieve wall from the inside surface to the outside surface thereof to be withdrawn from the other end of the tube, c h a r a c t e r i z e d in that the tube after the evacuation of liquid fluid having been terminated is disconnected from the suction conduit, and that a piston (22) is displaced manually axially through the sieve from the other end thereof bone tissue fragments collected on the inside surface of the sieve being scraped off therefrom and deposited outside the sieve through said one, open end of the sieve.

2. Device for collecting bone tissue fragments at surgical operations in bone tissue, comprising a tube (10) having an inlet and an outlet (12) at one end and the other, respectively, to be connected into a suction conduit, and a tubular sieve (19) in the tube, a space (20) being provided between the outside curved surface of the sieve and the inside curved surface of the cylinder, one, open end of the sieve communicating with the inlet of the tube, and said space communicating with the outlet of the tube, c h a r a c t e r i z e d by an end wall (22) disposed at the other end of the sieve, which can be displaced manually as a piston axially through the sieve sealingly engaging the inside curved surface of the sieve, and a piston rod (25) which can be introduced through said

other end of the tube to engage said end wall for the manual displacement thereof through the sieve.

3. Device as in claim 2 c h a r a c t e r i z e d by a syringe cylinder (24) having an outlet (26) at one end thereof and dimensioned to receive the tube (10) as an inside lining in the cylinder said one end of the sieve connecting to the outlet of the syringe cylinder.

4. Device as in claim 2 or 3 characterized in that the end wall (22) has a hollow stud (23) for the connection of the piston rod (25).

5. Device as in any of claims 2 to 4 c h a r a c t e r i z e d in that the tube (10) at the ends thereof is provided with end covers (11) forming the inlet and the outlet, respectively, said end covers having couplings (12) for the connection of an aspirator nozzle (14) and a suction hose (15), respectively.

6. Device as in any of claims 2 to 5 c h a r a c t e r i z e d in that the sieve (19) is mounted in a cage fitting in the tube (10) and having axially extending bars (16) which form spacers between the sieve and the tube.

7. Device as in any of claims 2 to 6 c h a r a c t e r i z e d in that the end wall (22) is perforated the apertures thereof being narrower than the apertures of the sieve.

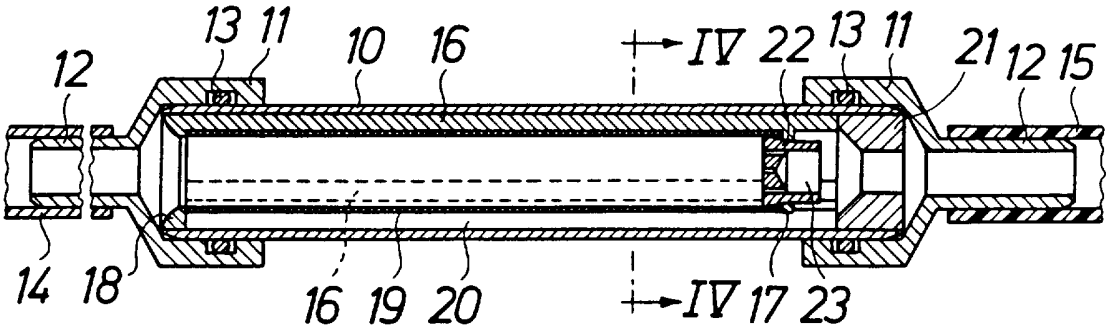


FIG. 1

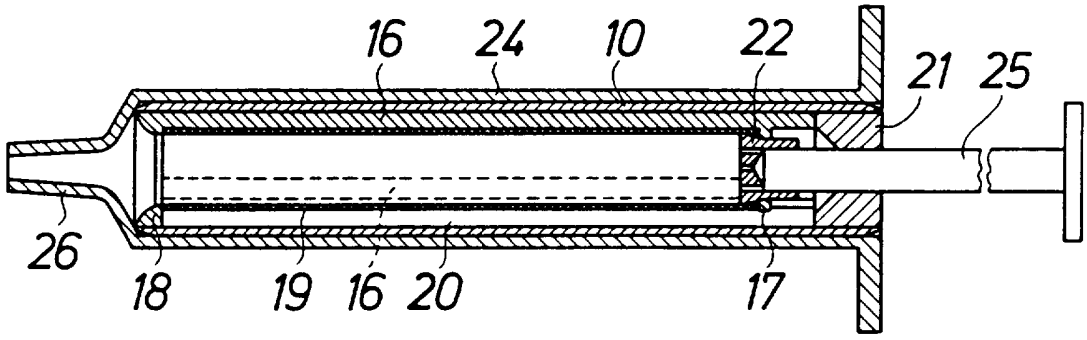


FIG. 2

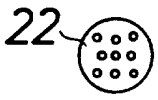


FIG. 3

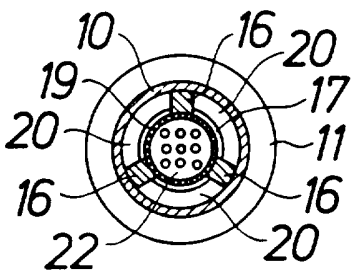


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 95/01065

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61M 1/00, B01D 29/64 // B 01 D 29/37
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)

IPC6: A61C, A61M, B01D

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

SE,DK,FI,NO classes as above

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

WPI, CLAIMS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3623607 A (JOHN F. LOOS), 30 November 1971 (30.11.71), column 2, line 7 - line 73, figure 1	1-7
Y	EP 0284322 A2 (BROOKE, GERARD MICHAEL), 28 Sept 1988 (28.09.88), column 1, line 46 - column 2, line 30, the figure	1-7
A	US 3863624 A (HANS GRAM), 4 February 1975 (04.02.75), column 1, line 51 - column 2, line 11, figure 2	1-7

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

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Date of the actual completion of the international search	Date of mailing of the international search report
30 January 1996	01.02.1996
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		SE-A- 7407715	16/12/74