

Description

[0001] The present invention refers to a method for the manufacture of a matrix roller for the printing of tiles or analogous flat and rigid supports, in accordance with the preamble of claim 1.

[0002] More specifically, the present invention refers to a method for manufacturing matrix-carrying rollers suitable for being used on rotary machines for so-called direct rotogravure printing or flexographic printing of ceramic tiles.

[0003] Hereafter, reference shall be made to rotogravure printing, without for this reason excluding flexographic printing.

[0004] As known, the rotogravure printing or decoration system foresees that the image is transferred onto the surface to be decorated through a roller on which the matrix is formed.

[0005] A film of ink is applied to the roller that enters into suitable alveoli created with laser incisions.

[0006] Thereafter, the ink is shaved by a doctor blade that has the function of loading the colour into the alveoli and of cleaning the roller in the areas where it is not engraved.

[0007] Finally, the ink is released onto tiles that run over a moving belt, transferring the image formed on the matrix.

[0008] So that the image formed can be transferred onto rigid surfaces through direct rotogravure printing or flexographic printing, it is necessary for the roller to be "soft" so as to ensure the perfect contact between roller and tile or other support to be printed.

[0009] The manufacture of said rollers for the direct printing of tiles is therefore of particular importance.

[0010] Therefore, there is a strong requirement to have a method for the manufacture of a matrix roller for the printing of tiles that is simple and efficient to use.

[0011] The purpose of the present invention is that of providing a method for the manufacture of a matrix roller for the printing of tiles having structural and functional characteristics such as to satisfy the aforementioned requirements.

[0012] Such a purpose is accomplished through a method for the manufacture of a matrix roller for the printing of tiles in accordance with claim 1.

[0013] The dependent claims outline preferred and particularly advantageous embodiments of the method for the manufacture of a matrix roller for the printing of tiles according to the invention.

[0014] Further characteristics and advantages of the invention shall become clear from reading the following description provided as an example and not for limiting purposes, with the help of the figures illustrated in the attached tables, in which:

- figure 1 shows a matrix roller for the printing of tiles made in accordance with the present invention;
- figures 2 to 11 show, in succession, the steps for

manufacturing the roller of figure 1;

[0015] With reference to the aforementioned figures, a matrix roller for the printing of tiles manufactured in accordance with the method of the present invention is globally indicated with 1.

[0016] Said method comprises the steps that shall be described hereafter.

[0017] First of all a cylinder 2 made from rigid material, preferably metal, is provided.

[0018] In the example, the cylinder is made from aluminium obtained from a sheet of variable thickness between 1 and 3 mm and, therefore, the cylinder 2 is hollow.

[0019] A ferrule 3 having a greater outer diameter than the cylinder 2 is fixed to each of the opposite ends of the cylinder 2.

[0020] As shown in figure 3, the ferrules 3 are annular bodies slotted onto the cylinder 2 and a through hole 4 arranged on the annular portion outside the cylinder 2 is formed on one of said ferrules 3.

[0021] The through hole 4 extends parallel to the axis of the cylinder 2 and its function shall become clear in the rest of the description.

[0022] The cylinder 2 with the ferrules 3 slotted onto it is inserted into a fixed mould 5 (fig. 4).

[0023] The mould 5 surrounds the cylinder forming a first annular chamber 6 arranged between the mould 5 and the surface of the cylinder 2.

[0024] Basically, the first annular chamber 6 is defined at the opposite ends of the cylinder 2 by the two ferrules 3 that form a seal with the mould 5.

[0025] Through the through hole 4, a first liquid substance is injected into the first annular chamber 6, which then expands and forms a yielding layer in the form of foam (fig. 5).

[0026] Said first yielding substance is an elastomer, in the example it is a flexible expanded polyurethane having high elastic deformability and resilience.

[0027] The injected polyurethane has the ability to permanently attach to the cylinder 2 so as to form a first inner layer 7 of yielding consistency.

[0028] Therefore, by removing the cylinder 2 from the mould 5, a layer 7 of polyurethane having a thickness equal to the radial overhang of the ferrule 3 with respect to the cylinder 2 (fig. 6) shall deposit onto the cylinder 2.

[0029] As shown in figure 7, the pair of ferrules 3 is replaced with a pair of crowns 8 having a smaller outer diameter than the diameter of the cylinder 2 of the first layer 7.

[0030] Each crown 8 is slotted onto the cylinder 2 and fixed to it through fastening screws 9, in the example three in number arranged 120° apart (fig. 7A).

[0031] Through openings 10 extending along the axis of the cylinder 2 are also formed on one of the two crowns 8.

[0032] In the example, said openings 10 are three in number and are arranged 120° apart close to the three

screws 9.

[0033] In the illustrated example, the crowns 8 are also provided with outer annular grooves 15 suitable, amongst other things, for containing the ink during printing.

[0034] The cylinder 2 thus obtained is subjected to turning through the use of a suitable tool 16, known in the field, in order to rectify the thickness of the polyurethane 7 taking the overall diameter to the predetermined size based upon the desired end characteristics (fig. 9).

[0035] However, in the example of the roller intended for rotogravure printing, the overall end diameter of the first layer 7 is less than the outer diameter of the crowns 8 (fig. 9).

[0036] At the end of turning, everything is inserted in a rotary mould 12.

[0037] Since the diameter of the cylinder with first layer 7 is less than the outer diameter of the crowns 8, a second annular chamber 13 will have been arranged between the rotary mould 12 and the first layer 7.

[0038] A second substance, having lower elastic deformability than that of the polyurethane of which the first layer 7 consists, is fed into the second annular chamber 13 through the through openings 10 present on one of the ferrules 8 (fig. 11).

[0039] For such a purpose, at the end of the cylinder 2 facing the openings 10 an apron 16 is arranged that creates an annular groove 17 open towards the centre into which a static nozzle, not illustrated, drips the second substance (fig. 11).

[0040] This second substance, by centrifugal force, is forced to enter into the openings 10 and to expand in the interspaces consisting of the second annular chamber 13.

[0041] In the example, said second substance is silicon rubber that, thanks to the rotation of the rotary mould 12 uniformly distributes on the entire surface of the first layer until it reticulates on it and forms a second layer 14.

[0042] This allows very low thicknesses of the second silicon rubber layer to be obtained.

[0043] The type of silicon and the thickness of the second layer can be varied according to the needs and characteristics of the end product.

[0044] Basically, at the end of the process, the diameter of the cylinder including the first layer 7 and the second layer 14 is at least equal to the outer diameter of the crown 8.

[0045] The aforementioned operations allow the roller 1 according to the present invention to be obtained.

[0046] Then one proceeds to the laser incision on the second silicon rubber layer according to the prior art.

[0047] As can be appreciated from that which has been described, the method for the manufacture of a matrix roller for the printing of tiles according to the present invention allows the requirements mentioned in the introductory part of the present description with reference to the prior art to be satisfied.

[0048] Of course, a man skilled in the art can bring numerous modifications and variants to the method for the manufacture of a matrix roller for the printing of tiles described above in order to satisfy contingent and specific requirements, all of which are covered by the scope of protection of the invention, as defined by the following claims.

10 Claims

1. Method for the manufacture of a matrix roller (1) for the printing of tiles comprising the steps of:

- providing a cylinder (2) made from rigid material;
- fixing a pair of ferrules (3) having a larger outer diameter than that of the cylinder (2) at the two ends of the cylinder (2);
- inserting said cylinder (2) with ferrules (3) in a mould (5) forming a first annular chamber (6) between said mould (5) and the cylinder (2);
- injecting a first yielding substance inside said first annular chamber (6), said substance permanently attaching itself to the cylinder (2) to form a first layer (7);
- removing the cylinder (2) from the mould (5) and replacing the pair of ferrules (3) with a pair of crowns (8) having a smaller outer diameter than the diameter of said first layer (7);
- turning said first layer (7) to obtain a perfectly regular and calibrated surface;
- inserting the cylinder (2) including said turned first layer (7) and the pair of crowns (8) fixed at the two ends in a rotary mould (12) forming a second annular chamber (13) arranged between the rotary mould (12) and said first layer (7);
- feeding a second substance inside the second annular chamber (13), said second substance having less elastic deformability than the first yielding substance and reticulating around it to form a second layer (14);
- removing said matrix roller (1) thus obtained from said rotary mould (12).

2. Method according to claim 1, wherein at least one of said ferrules (3) is provided with a through hole (4) formed on the annular portion outside the cylinder (2) from which said first yielding substance is injected.

3. Method according to claim 1, wherein at least one of said crowns (8) is provided with openings (10) from which said second substance is fed.

4. Method according to claim 3, wherein said second substance is dripped inside an annular groove (17)

formed from an apron (16) associated with the end of the cylinder (2) facing the openings (10).

5. Method according to claim 1, wherein said crowns (8) are fixed to the cylinder (2) through screw means (9). 5
6. Method according to claim 1, wherein said cylinder (2) is made from metal material. 10
7. Method according to claim 6, wherein said metal material is aluminium.
8. Method according to claim 1, wherein said first yielding substance is an elastomer. 15
9. Method according to claim 8, wherein said elastomer is flexible expanded polyurethane.
10. Method according to claim 1, wherein said second substance is silicon rubber. 20
11. Method according to claim 1, wherein said crowns (8) are provided with outer annular grooves (15). 25
12. Matrix roller (1) for the direct printing of tiles manufactured according to any one of the previous claims.

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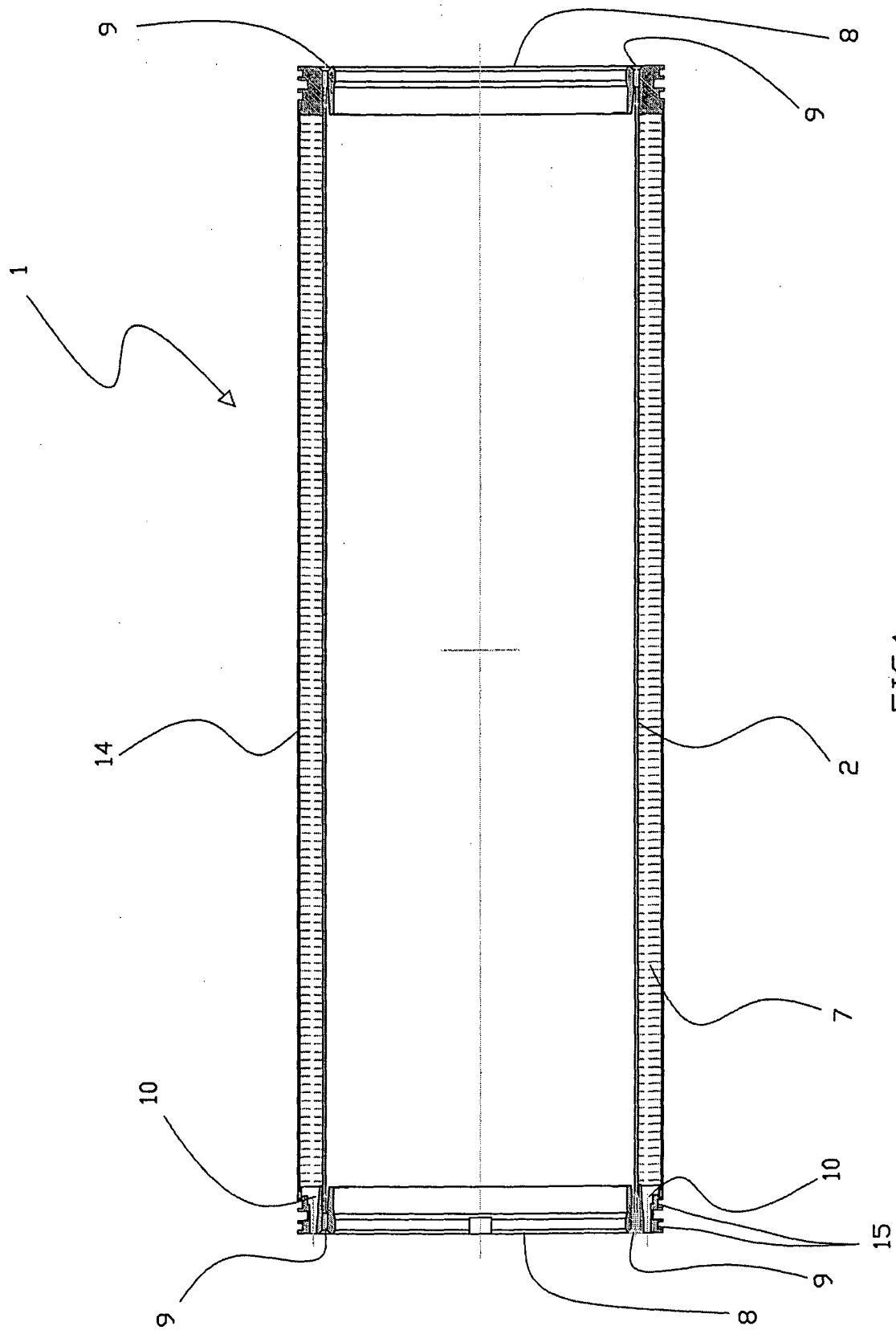


FIG. 1

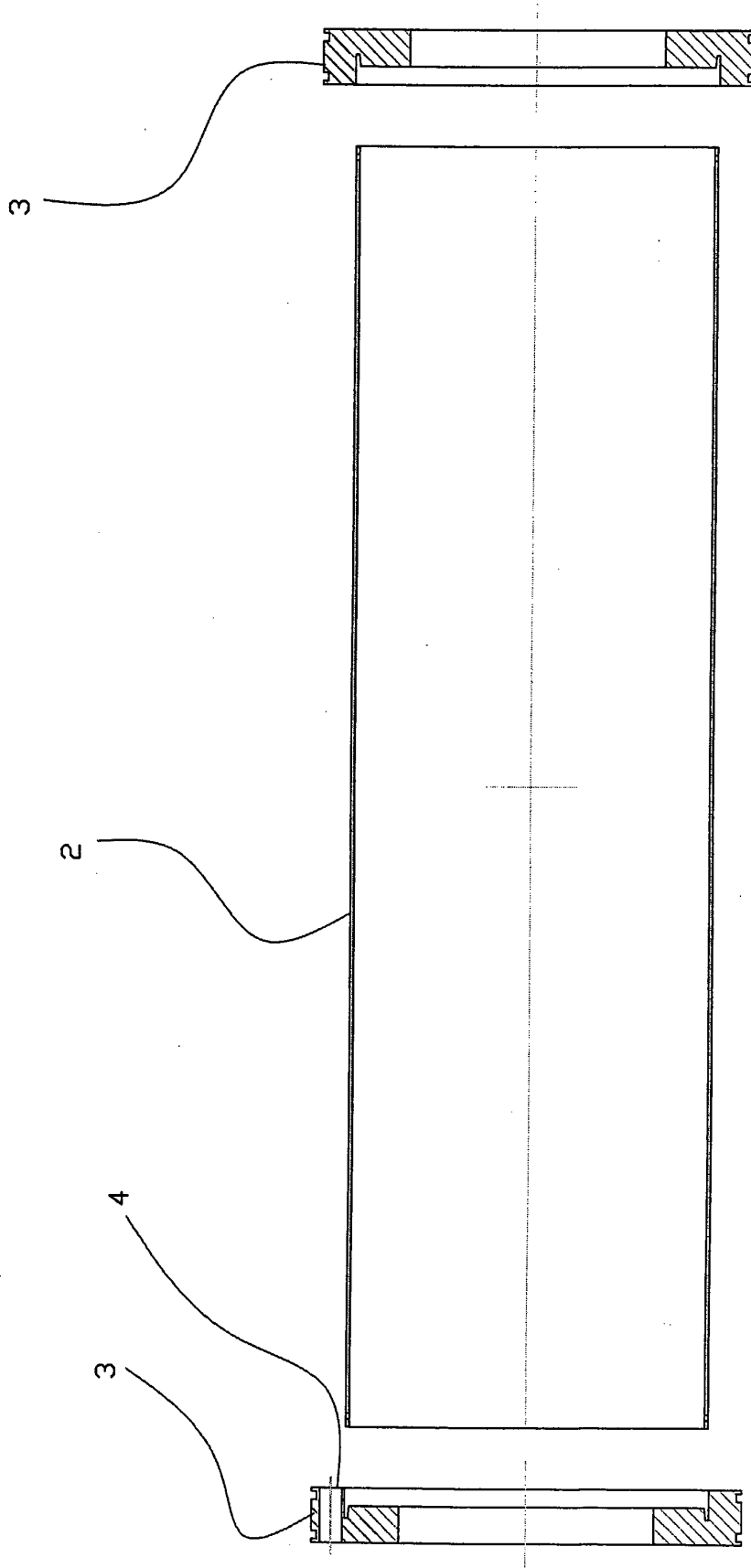


FIG.2

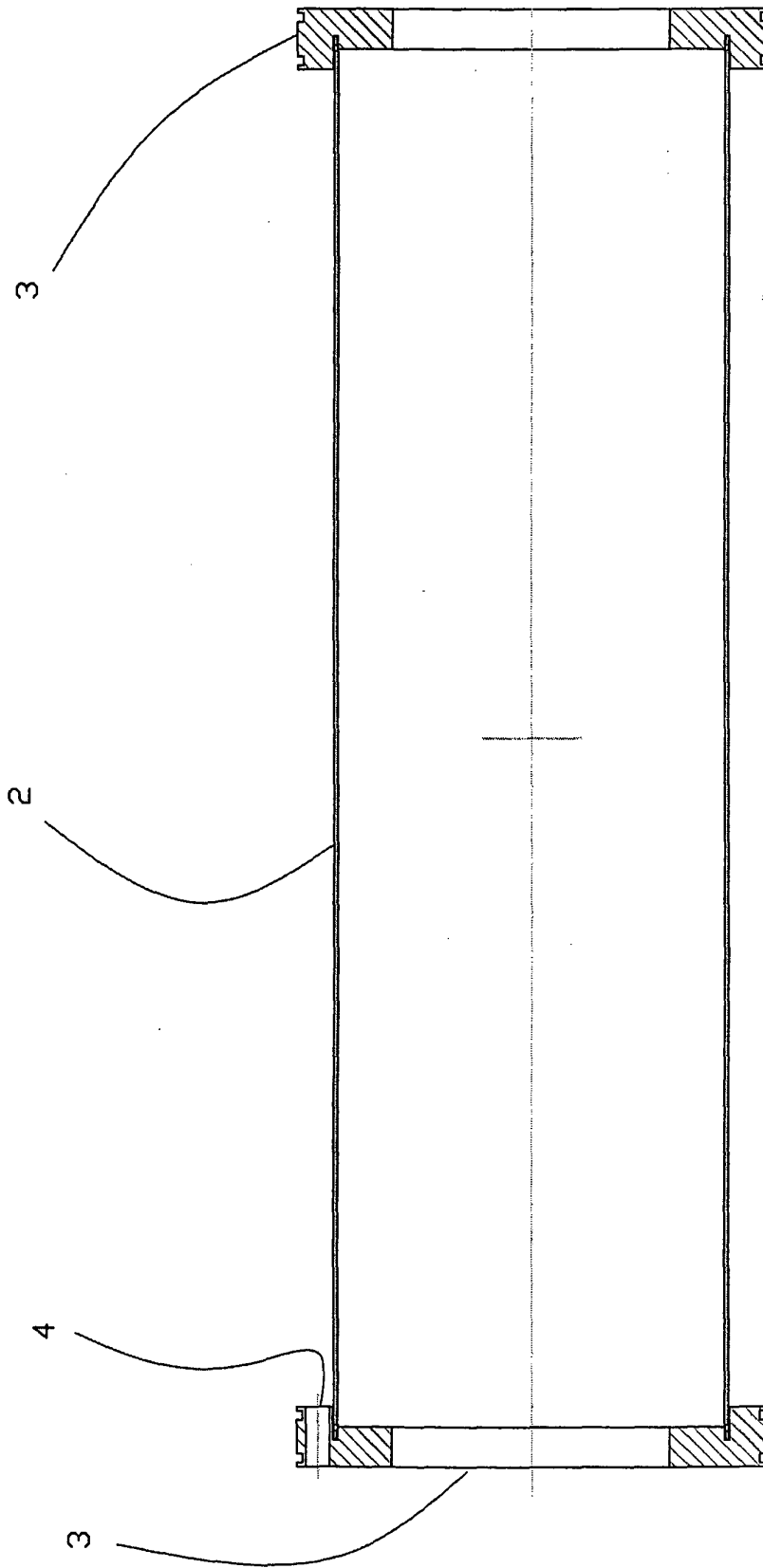


FIG.3

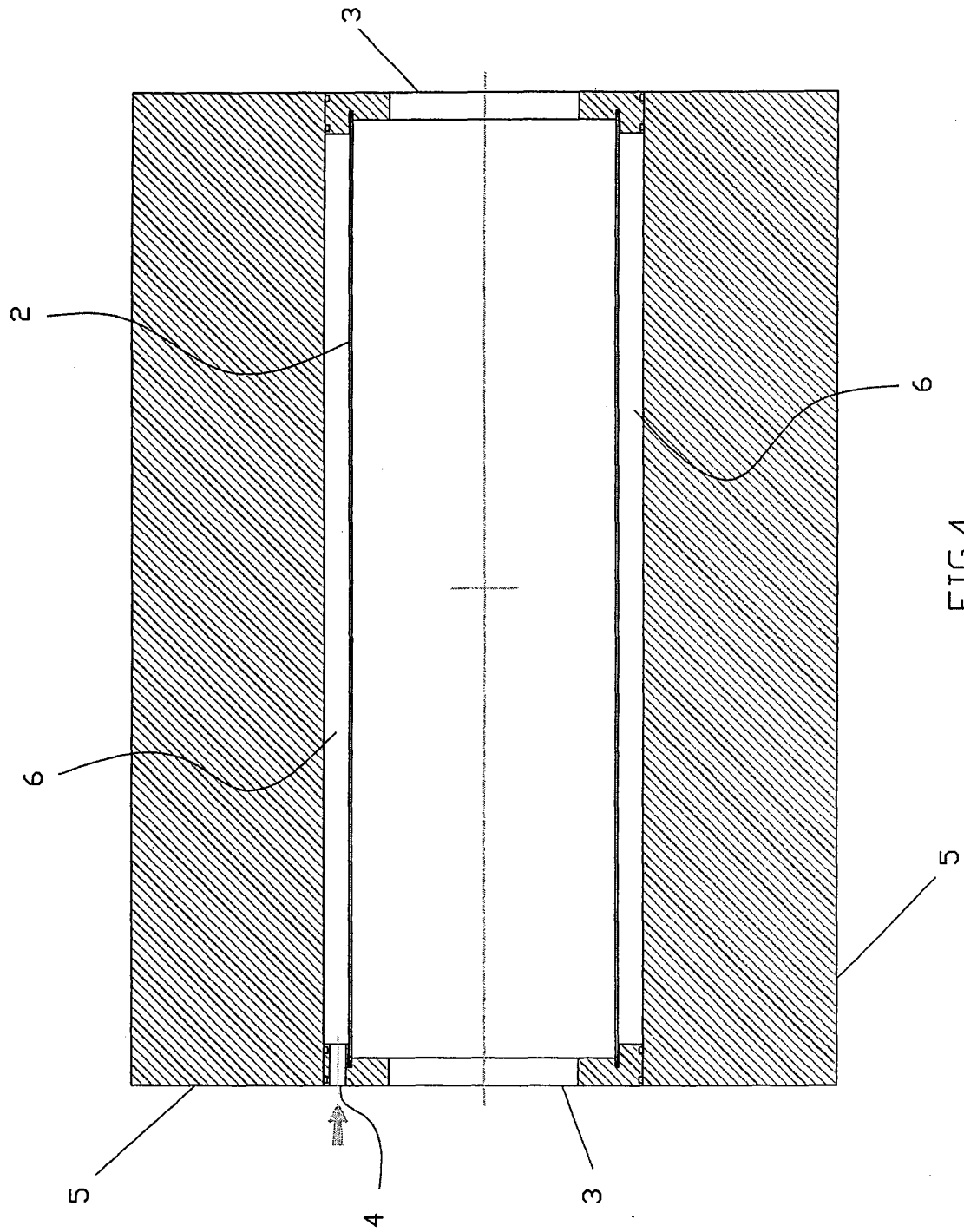


FIG. 4

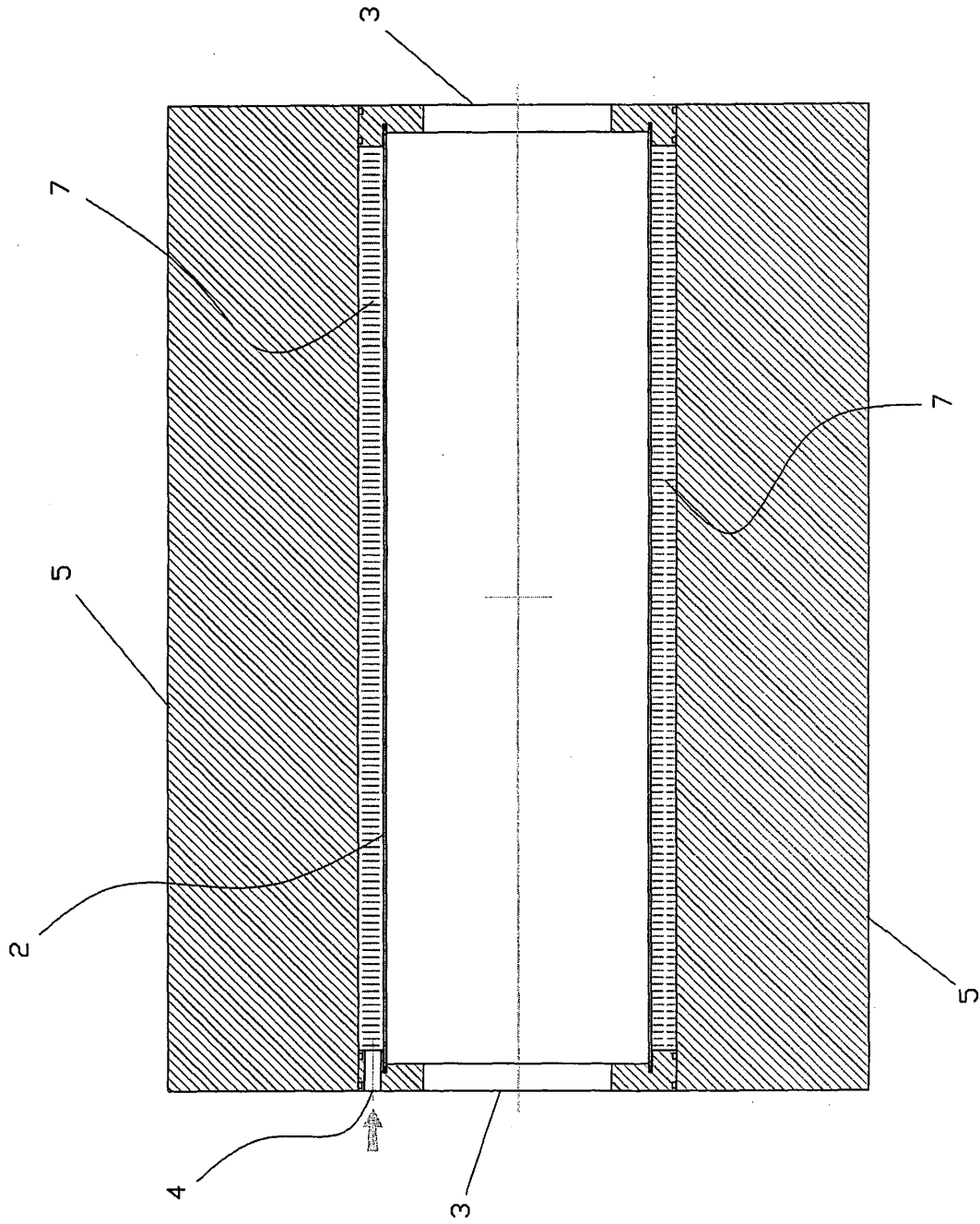
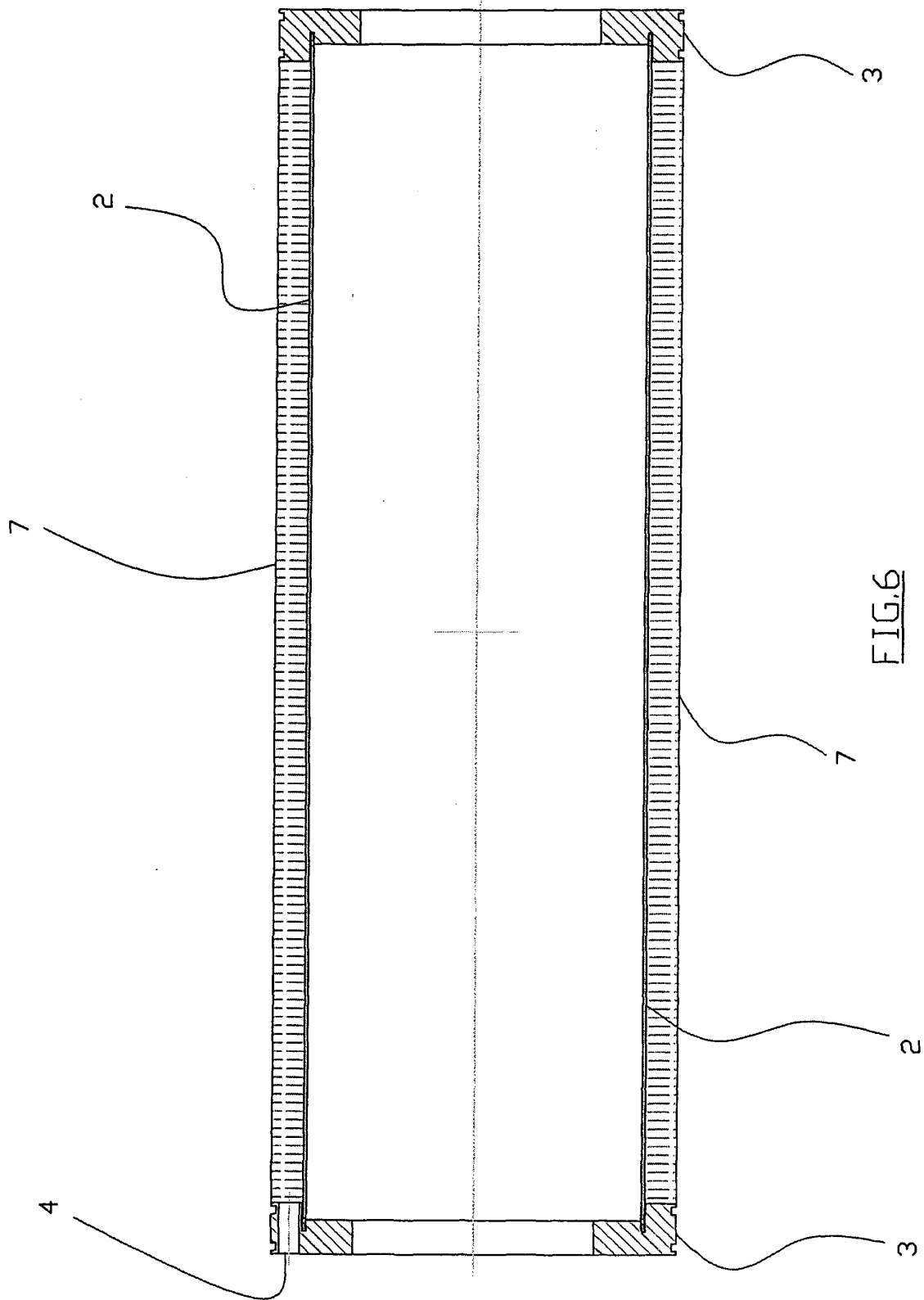
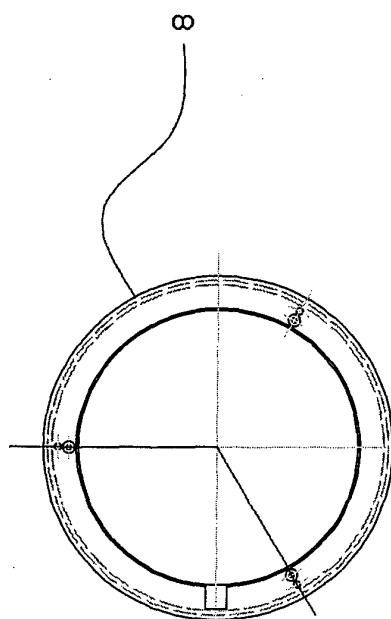
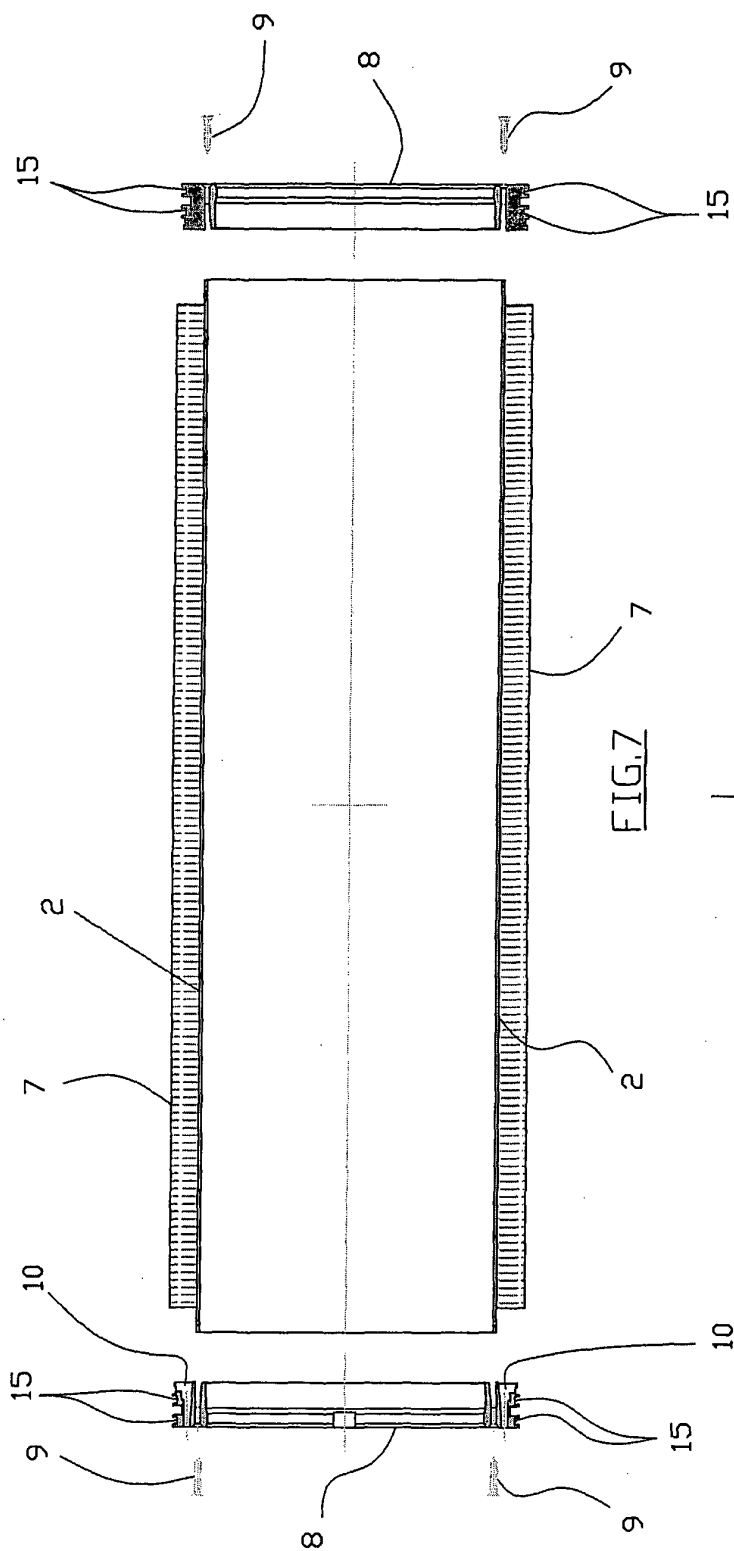
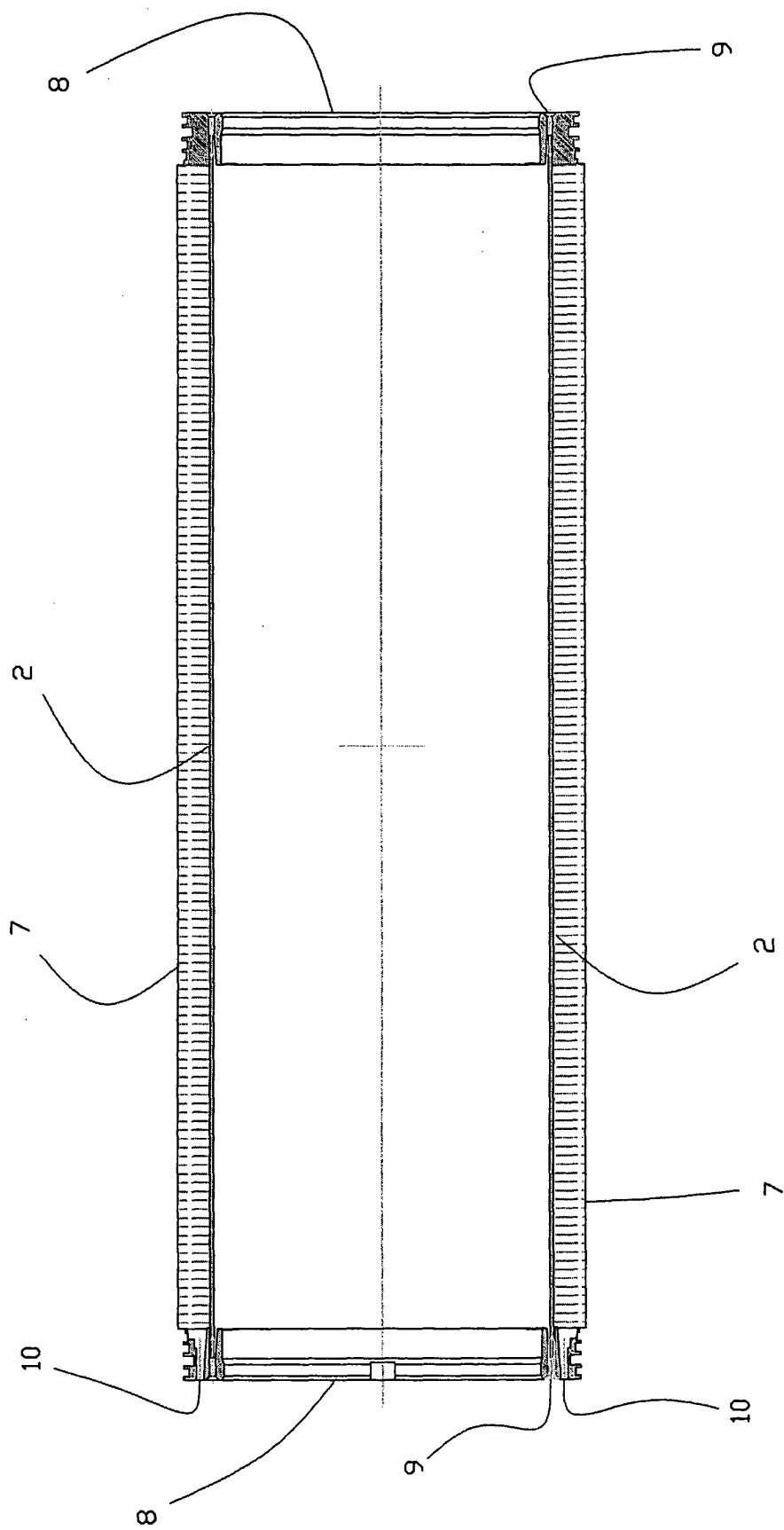


FIG. 5







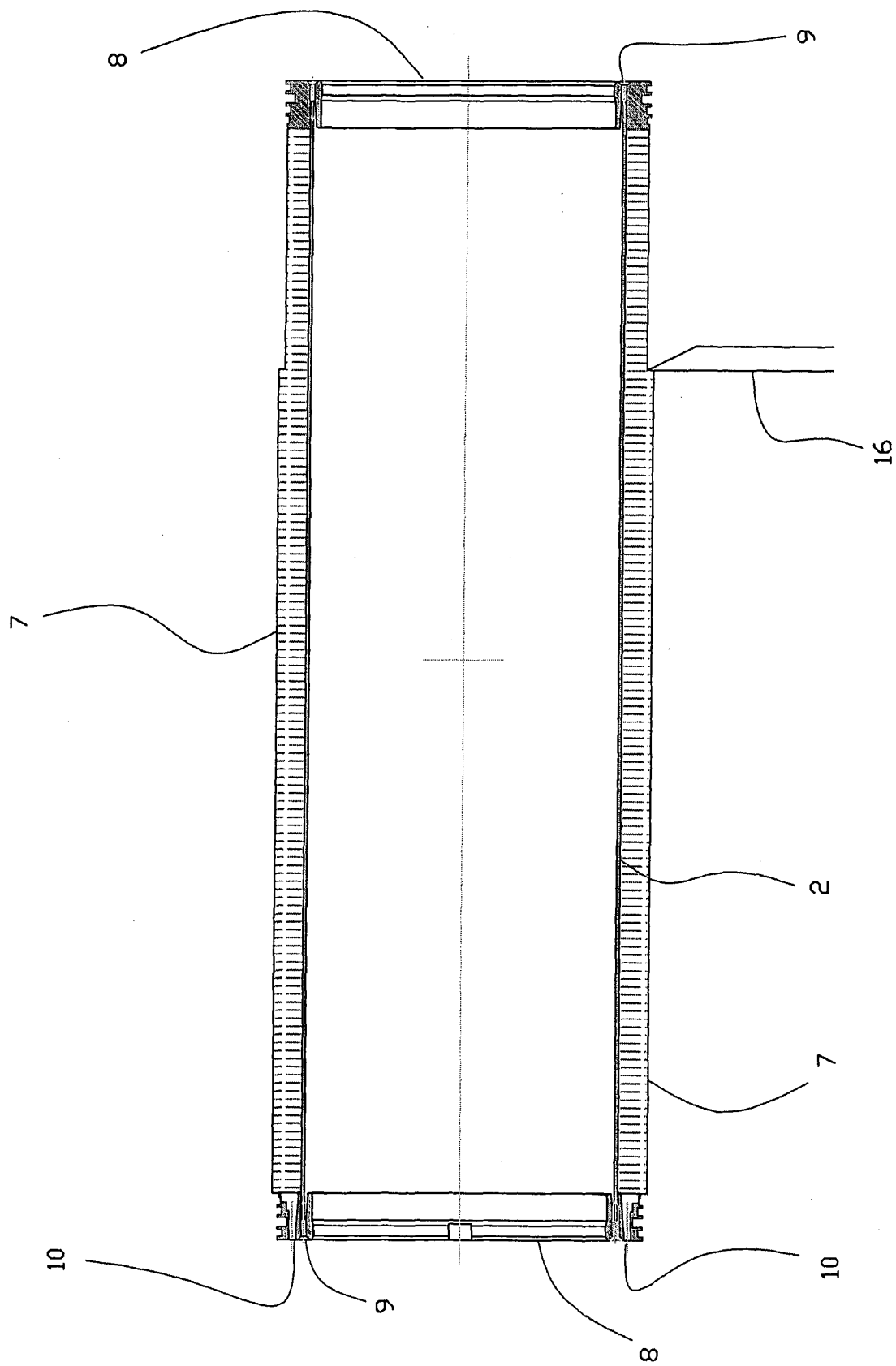


FIG. 9

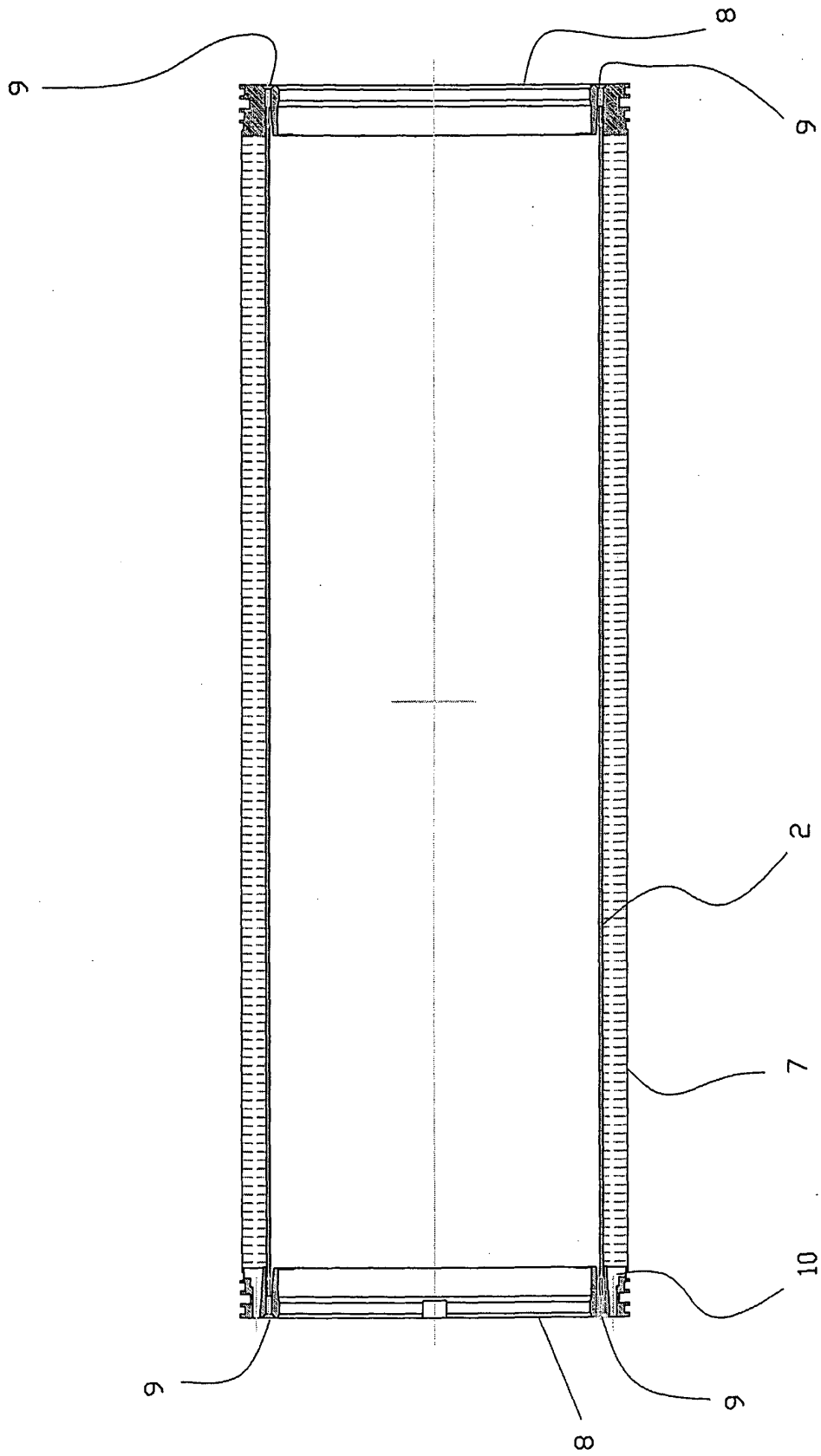
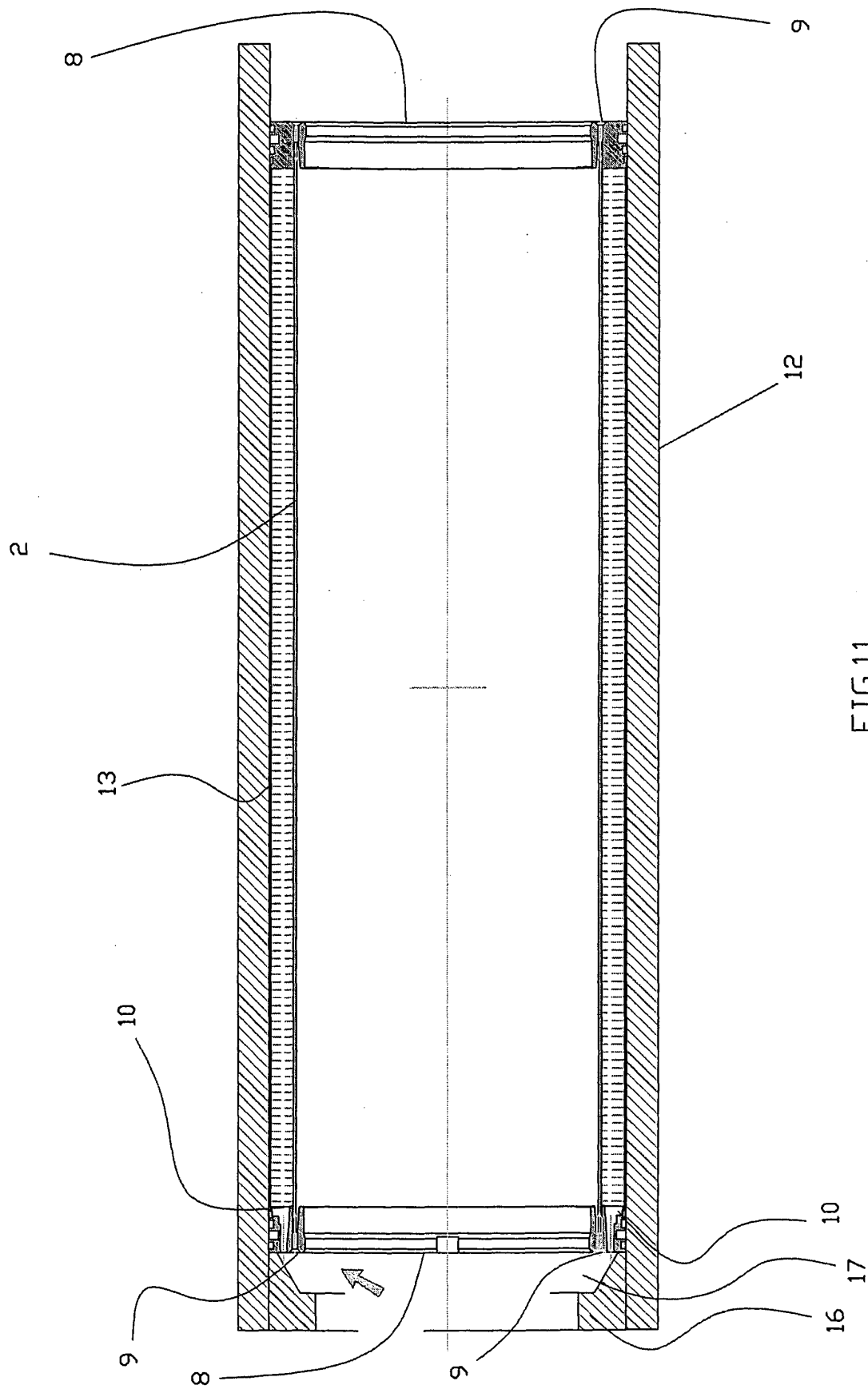


FIG.10





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 07 6043

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 1 190 867 A (ASSOPRINT S.P.A) 27 March 2002 (2002-03-27) * paragraphs [0045] - [0068]; claims 1,2,5,8; figures 2,5,6,9 *	1-12	B41C1/18 B41N1/16 B41N7/00
A	US 5 983 799 A (LANE, III ET AL) 16 November 1999 (1999-11-16) * column 2, line 12 - column 3, line 32; claims; figures 3,3A *	1-12	
A	DE 40 02 773 A1 (CLOUTH GUMMIWERKE AG, 5000 KOELN, DE) 8 August 1991 (1991-08-08) * column 1, line 35 - column 2, line 57; claims 1-11; figures *	1-12	
A	GB 863 872 A (PAUL DORNBUSCH) 29 March 1961 (1961-03-29) * claims 1-10; figure 1 *	1-12	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B41C B41N
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 September 2005	Examiner Giannitsopoulos, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 07 6043

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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12-09-2005

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