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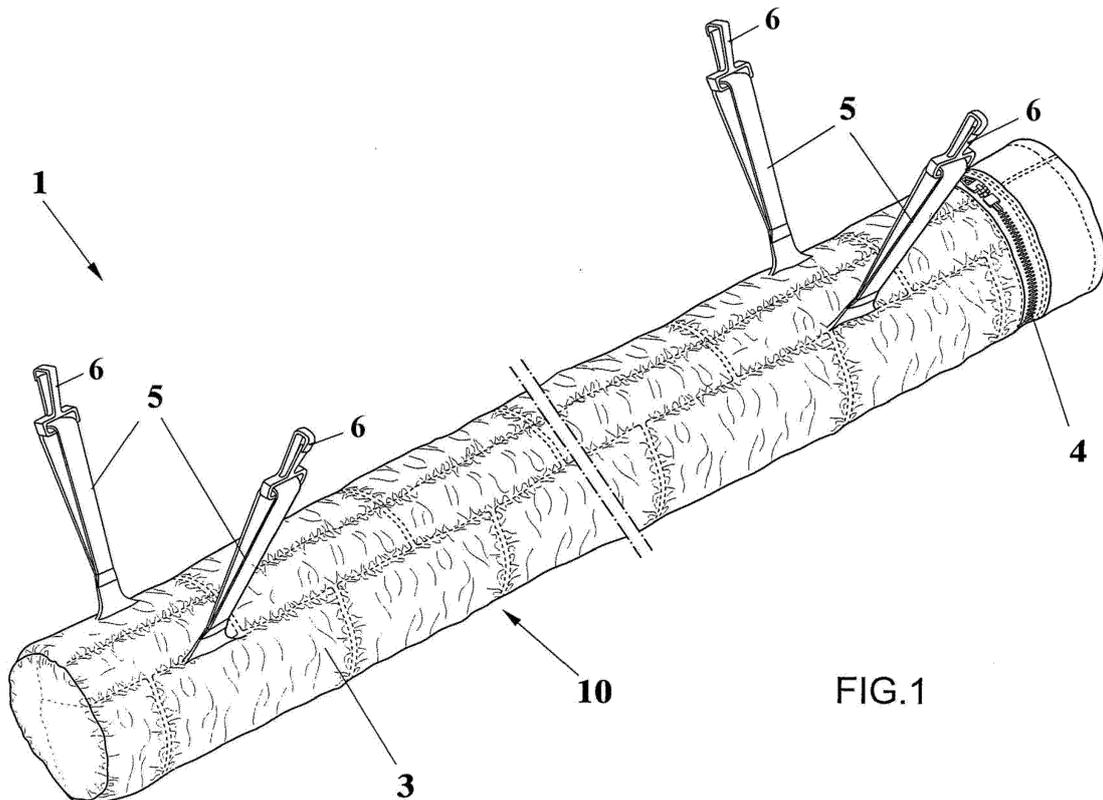
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(54) **MODULAR DUCT FOR AN AIR PROCESSING SYSTEM**

(57) A modular duct construction for air processing systems in environments for making food articles, said modular duct construction comprising a tubular body made of an insulated fabric, consisting of fabric materials

resisting against temperature from -30°C to +70°C and having a flame or fire resistance corresponding to the M1 class.



**FIG.1**

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## Description

### BACKGROUND OF THE INVENTION

[0001] The present invention relates to a modular duct construction, particularly for air processing systems.

[0002] The modular duct construction according to the present invention has been specifically designed for distributing air through all air conditioning systems, and especially through environments for processing food articles.

[0003] As is known, in food article air processing systems, conventional air distributing or conveying pipes generally comprise metal ducts which have a comparatively large weight and the inside of which may be accessed only with a great difficulty for cleaning purposes.

[0004] In addition to their large weight, conventional air ducts require a long assembling time, and moreover the assembling operation is very complex.

[0005] In fact, the above ducts must be properly insulated, for preventing condensing and dispersing phenomena, and then coated or encompassed by a further outer metal sheet coating.

[0006] The duct weight is so large that the structures supporting them have to be frequently reinforced.

[0007] Document US 2012/006442 A1 discloses an inflatable duct 10 for conveying air generated by a blower 22 to a comfort region 14 through large pores and/or openings formed through a side wall 16 of the duct.

[0008] Document US 2005/079309 A1 discloses a flexible duct consisting of a laminated structure with an inner layer 1, a sound absorbing layer 2, a middle layer 3, a thermally insulating layer 4 and an outer layer 5.

[0009] Document US 6 286 876 B1 discloses a flexible tube for delivering preconditioned air between ground installed heating-ventilating units and an inner ventilating system of an airplane, which flexible tube comprises at least two segments having an end portion including zip-fastener fixing elements which may be coupled by corresponding zip-fastener couplings to an end portion of any element of an adjoining flexible tube.

### SUMMARY OF THE INVENTION

[0010] The aim of the present invention is to provide a novel modular duct construction overcoming the above mentioned drawbacks of the prior art.

[0011] Within the scope of the above mentioned aim, a main object of the invention is to provide such a modular duct construction which has an overall weight smaller than that of conventional ducts.

[0012] Another object of the present invention is to provide such a modular duct construction which may be easily and quickly assembled and disassembled.

[0013] A further object of the present invention is to provide such a modular duct construction which has a cost much lower than that of conventional air distributing system including metal duct assemblies.

[0014] Another object of the present invention is to provide such a modular duct construction which allows the operation noise to be greatly reduced.

[0015] Yet another object of the present invention is to provide such a modular duct construction which has a very small weight so as not to stress its supporting structures.

[0016] Another object of the present invention is to provide a modular duct construction having very good hygienic properties and which may be easily washed even by conventional cleansing agents for textile materials.

[0017] Yet a further main object of the present invention is to provide such a modular duct construction which has very flexible operating characteristics such as a high thermal efficiency, a low dispersion and no condensing phenomena.

[0018] Yet another object of the present invention is to provide such a modular duct construction which has a long lifetime.

[0019] Yet another object of the present invention is to provide such a modular duct construction which is very reliable and safe in operation.

[0020] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a modular duct construction for air processing systems characterized in that said modular duct construction comprises a tubular body made of a thermally insulated fabric material.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Further characteristics and advantages of the present invention will become more apparent hereinafter from the following disclosure of a preferred, though not exclusive, embodiment of the invention, which is illustrated, by way of an indicative but not limitative example, in the accompanying drawings, where:

Figure 1 is a perspective view of a length of a modular duct construction according to the present invention; Figure 2 is a partially exploded perspective view of the duct length of the preceding Figure; Figure 3 is a perspective view of an exemplary air distributing system, made by using the modular duct construction according to the present invention; Figure 3A is a detail view of Figure 3; Figure 4 is a longitudinally cross-sectioned view of the duct construction length; Figures 5 and 6 are a longitudinally cross-sectioned and a side view of the duct construction length, respectively; and Figure 7 is a detail perspective view of the subject duct construction including a plurality of branching ducts.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] With reference to the number references of the above mentioned figures, the air processing system duct construction according to the present invention, which has been generally indicated by the reference number 1, comprises a tubular body made of a thermally insulated fabric material.

[0023] According to a preferred embodiment, the tubular body comprises two elements, that is an inner core 2 constituting an air distributing channel, made of an impermeable fabric material, and an outer element 3, defining a covering assembly encompassing the core 2.

[0024] The core 2 and the outer element 3 are joined by temporary joining means 4, preferably consisting of zipper fasteners.

[0025] Said tubular body may be suspended by a plurality of simple strip elements 5, each including a respective hook element 6, said strip elements being associated with said tubular body.

[0026] The hook elements 6 are clamped to metal cables 6' or are suspended to existing ceilings or structures.

[0027] The tubular bodies have a modular construction, thereby it is possible to connect any desired number of tubular bodies to provide different size and configuration air distributing nets.

[0028] For example, said tubular bodies may comprise straight lengths 10, of a standard size, T-joints 11, bent or curved length members 12, and so on.

[0029] The same connecting means 4 used for coupling said core 2 and outer element 3 also allow to connect a plurality of modules.

[0030] Preferably, the inner core 2 is made of a fabric material consisting of 100% polyester.

[0031] The outer element 3 is constituted by a plurality of layers of different materials and thicknesses.

[0032] For example, said outer element 3 is made of an outer fabric 31, of 100% polyester, and an inner fabric 32, also of 100% polyester, which encompass an insulating mattress 33, also of a polyester material and having a standard minimum thickness of 25 mm.

[0033] The thickness of the mattress 33 may be changed depending on the designing requirements.

[0034] The duct construction thus made may be used at temperatures from -30°C to +70°C and has a flame of fire resistance corresponding to the M1 class.

[0035] Advantageously, it is also possible to use an antistatic material and, if required, an anti-bacterial material.

[0036] It has been found that the invention fully achieves the intended aim and objects.

[0037] In fact, an insulated fabric material modular duct construction has been provided, characterized by an optimal combination of properties and a lifetime making it an optimal air conveying system, and with a fabric material specifically designed for air conveying applications.

[0038] The subject duct construction may be advanta-

geously used in technical environments where a plurality of air processing units are installed and where a difference between the channel and environment air temperatures is susceptible to cause condensing phenomena.

[0039] The modular duct construction according to the invention provides several important advantages, such as a great reduction of the operating noise, very good hygienic properties and washing capabilities, even by using conventional cleansing substances for textile materials.

[0040] The subject construction may be quickly assembled and disassembled and has a cost much smaller than that of conventional metal duct air distributing systems.

[0041] The insulated fabric material tubular elements have a very small weight and do not stress their supporting structures, which, moreover, makes them easily transportable.

[0042] Said tubular elements have moreover a high thermal efficiency and a low thermal dispersion, and prevent any condensing phenomenon from occurring.

[0043] Moreover, said textile tubular elements have a long lifetime.

[0044] In addition to its very functional and flexible operation properties, the subject modular construction has an improved aesthetical aspect compared to that of prior metal channel assemblies.

[0045] In practicing the invention, the materials used, as well as the contingent size and shapes can be any, depending on requirements.

## Claims

1. A modular duct construction (1) for air processing systems in environments for making food articles, said modular duct construction (1) comprising a tubular body made of an insulated fabric, consisting of fabric materials resisting against temperatures from -30°C to +70°C and having a flame or fire resistance corresponding to the M1 class.
2. A modular duct construction (1), according to claim 1, wherein said tubular body comprises two elements, an inner core (2) defining an air distributing channel, made of an impermeable fabric material, and an outer element (3) forming a covering assembly encompassing the outside of said inner core (2), **characterized in that** said inner core (2) is made of a 100% polyester fabric, and **that** said outer element (3) is made of a 100% polyester outer fabric (31) and an inner fabric (32) also made of a 100% polyester, between the inner fabric and the outer fabric being arranged a polyester insulating mattress (33) having a standard minimum thickness of 25 mm.
3. A modular duct construction, according to claim 2, **characterized in that** said inner core (2) and outer

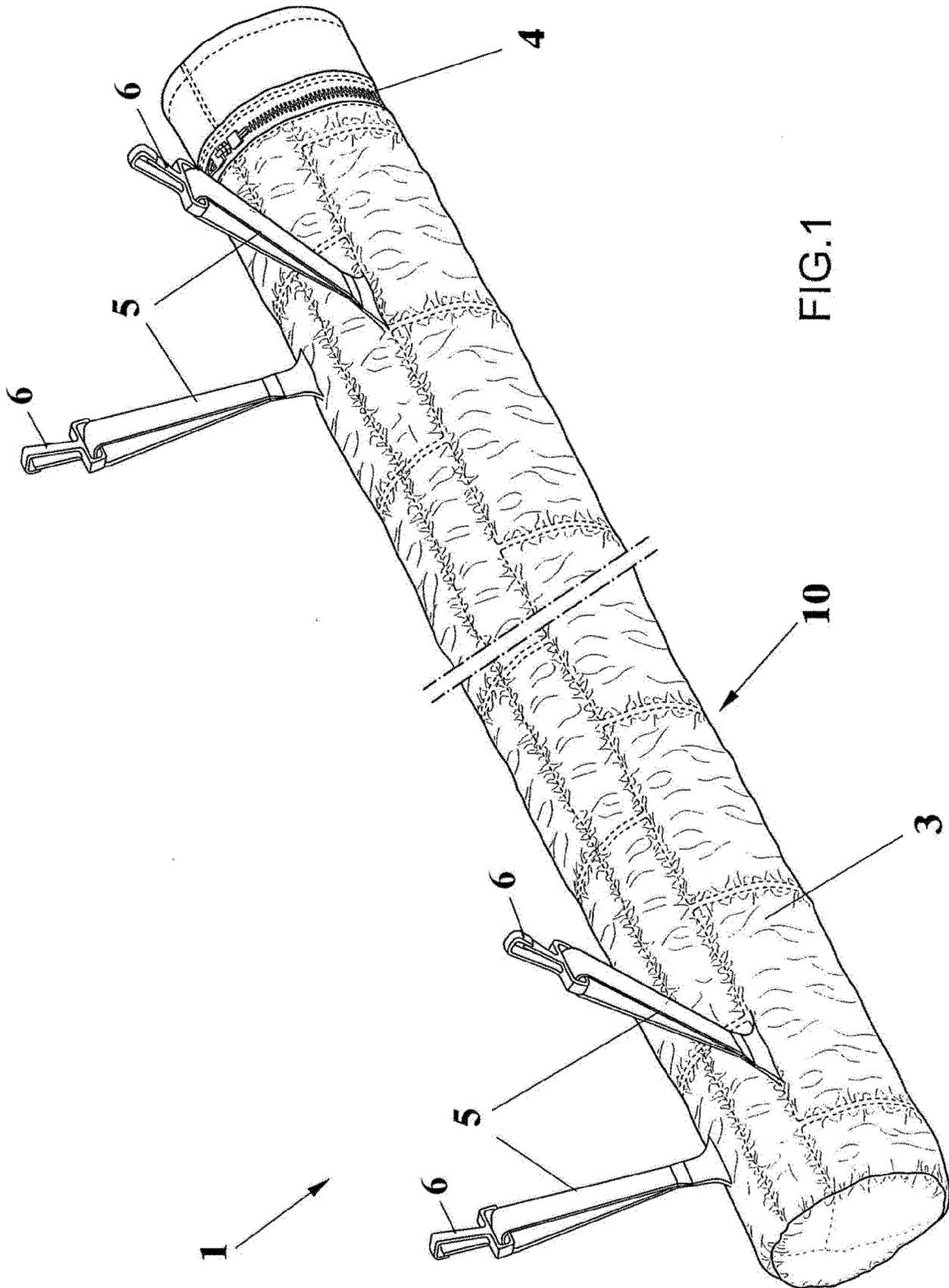
element (3) are joined together by temporary joining means (4).

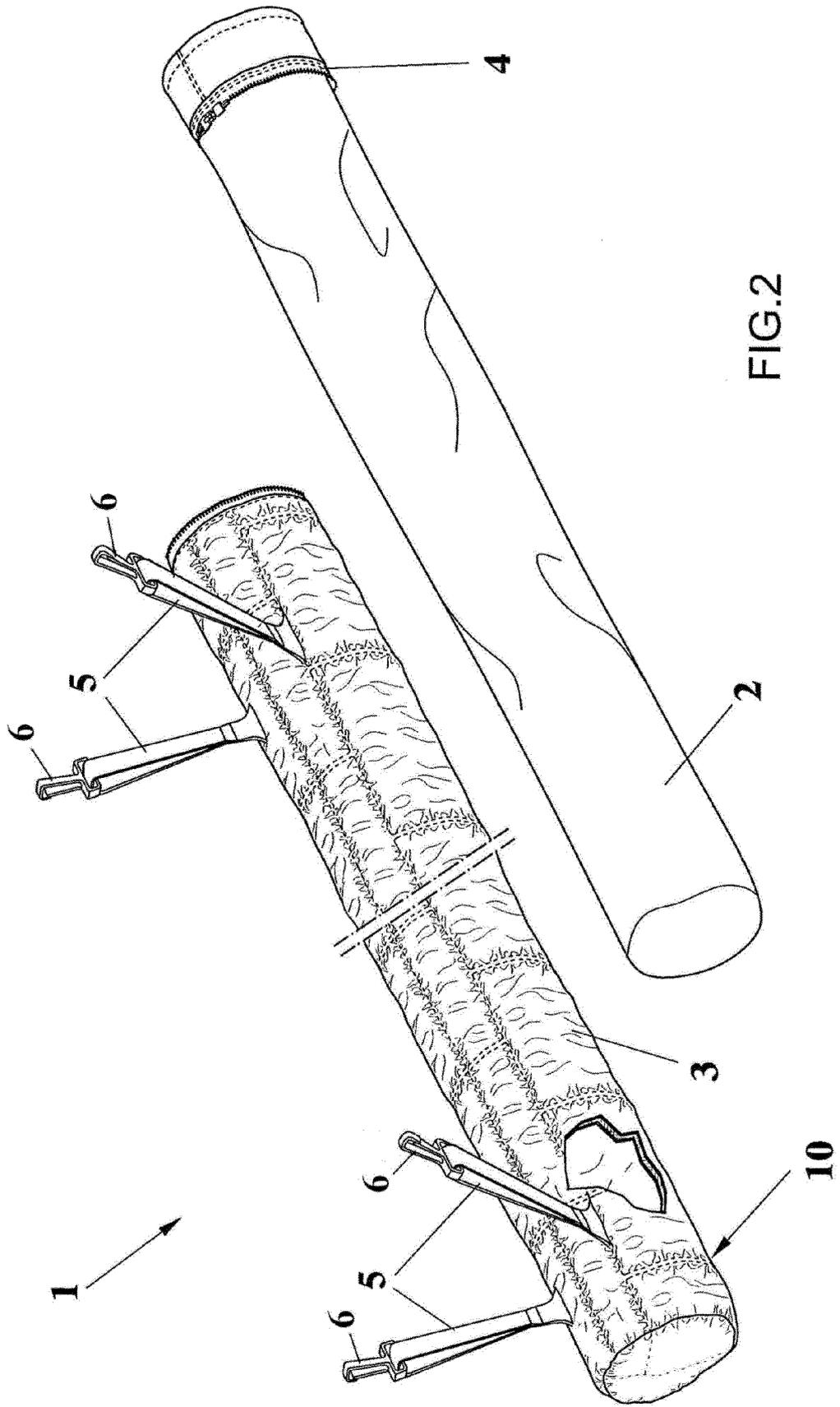
- 4. A modular duct construction, according to claim 3, **characterized in that** said temporary joining means (4) consist of zipper fasteners. 5
  
- 5. A modular duct construction, according to one or more of the preceding claims, **characterized in that** said modular duct construction comprises hanging means (5) for hanging the tubular body on a supporting structure. 10
  
- 6. A modular duct construction, according to claim 5, **characterized in that** said hanging means comprise a plurality of strip elements (5) each including a respective hook member (6). 15
  
- 7. A modular duct construction, according to claim 3, **characterized in that** said temporary joining means (4) are also suitable for joining together a plurality of said tubular elements. 20
  
- 8. A modular duct construction, according to one or more of the preceding claims, **characterized in that** said tubular body is formed by components having different shapes and configurations and being adapted to be combined in modular manner to provide air distributing systems having different size and configurations. 25  
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- 9. A modular duct construction, according to one or more of the preceding claims, **characterized in that** said tubular body is made as a straight length member, a T joint member, or a curved length member. 35
  
- 10. A modular duct construction, according to claim 6, **characterized in that** said hook members (6) are applied to tie-rod or cable assemblies (6') or suspended to existing ceilings or structures. 40

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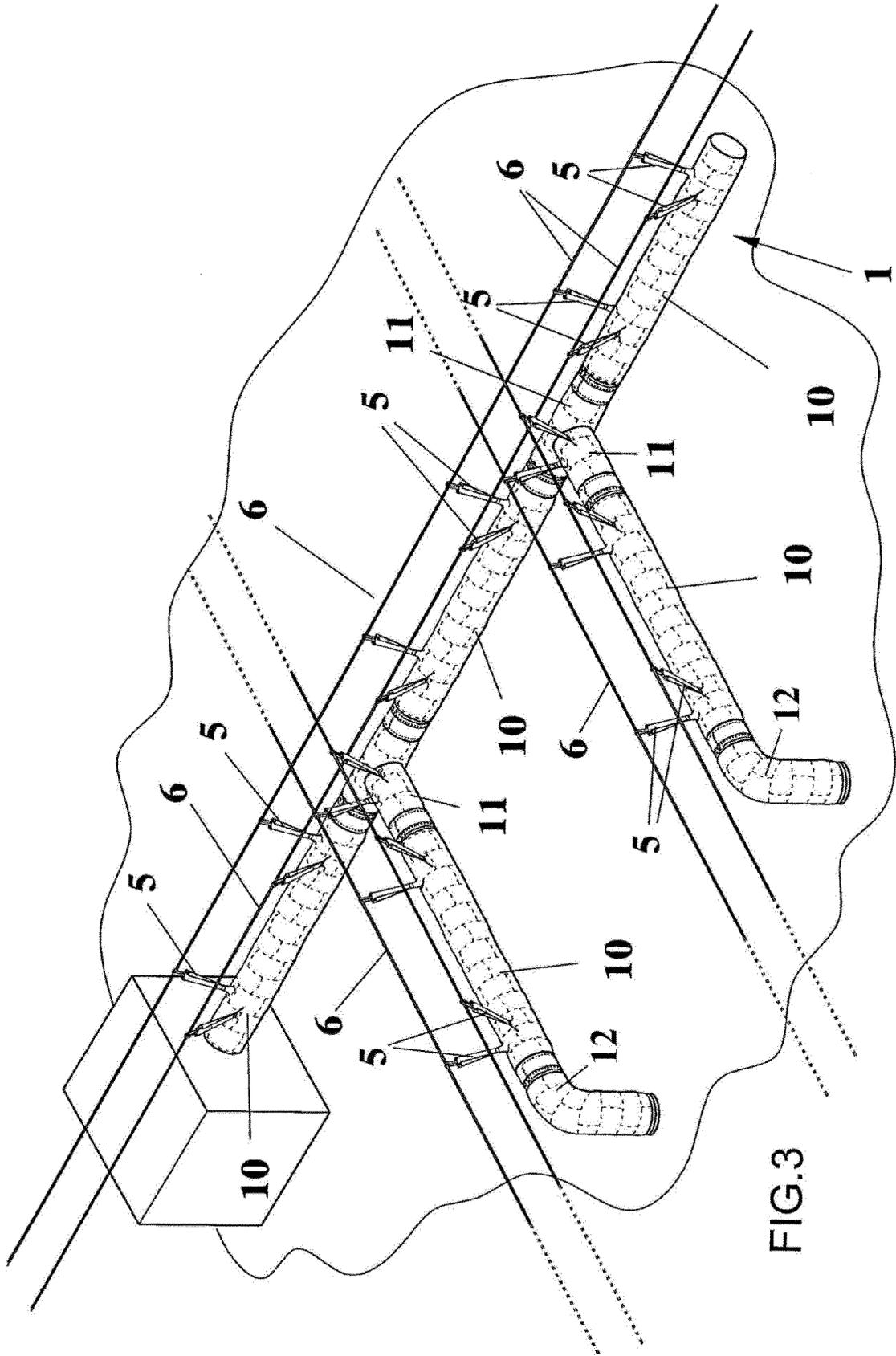


FIG.3

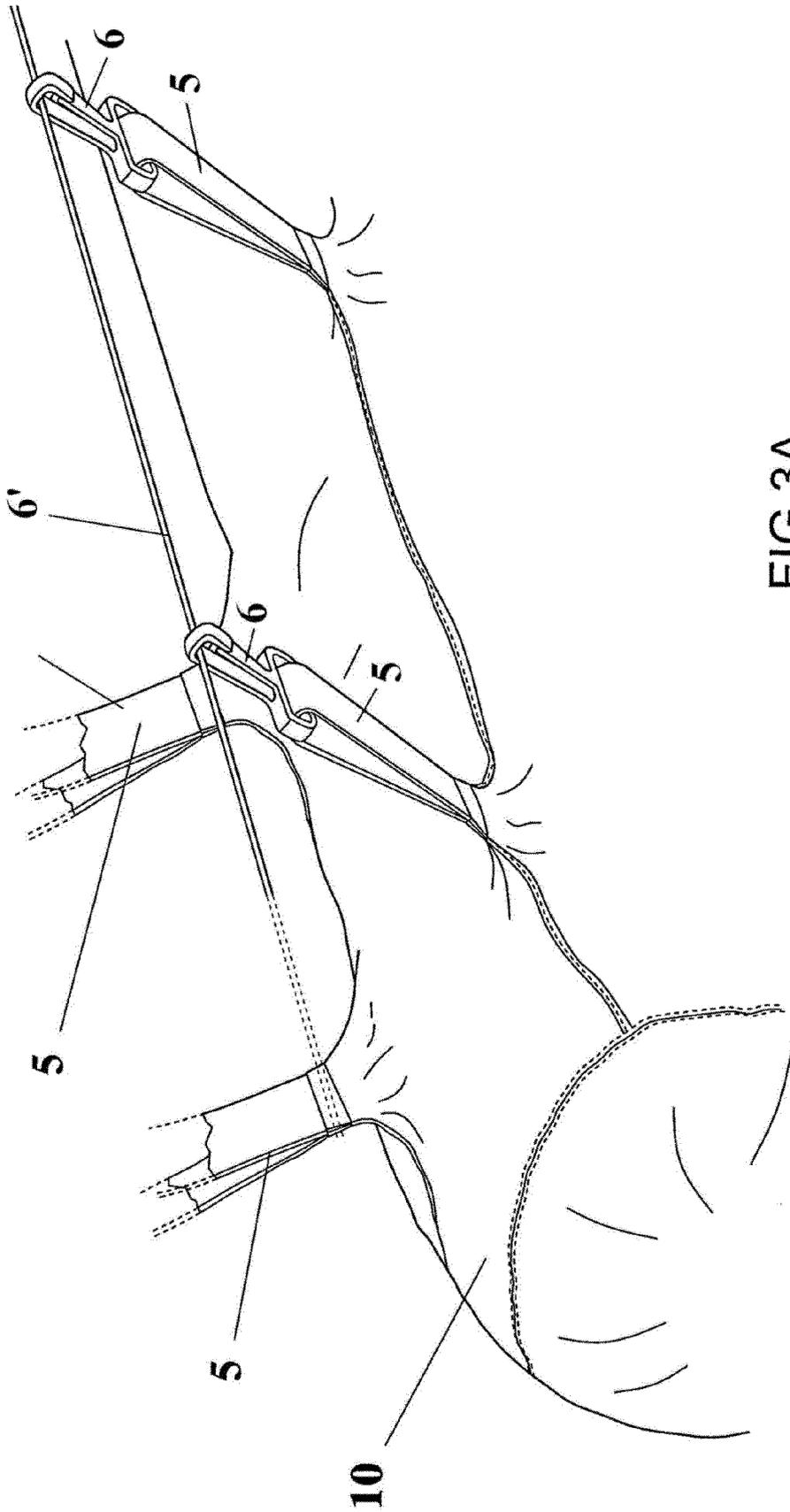


FIG.3A

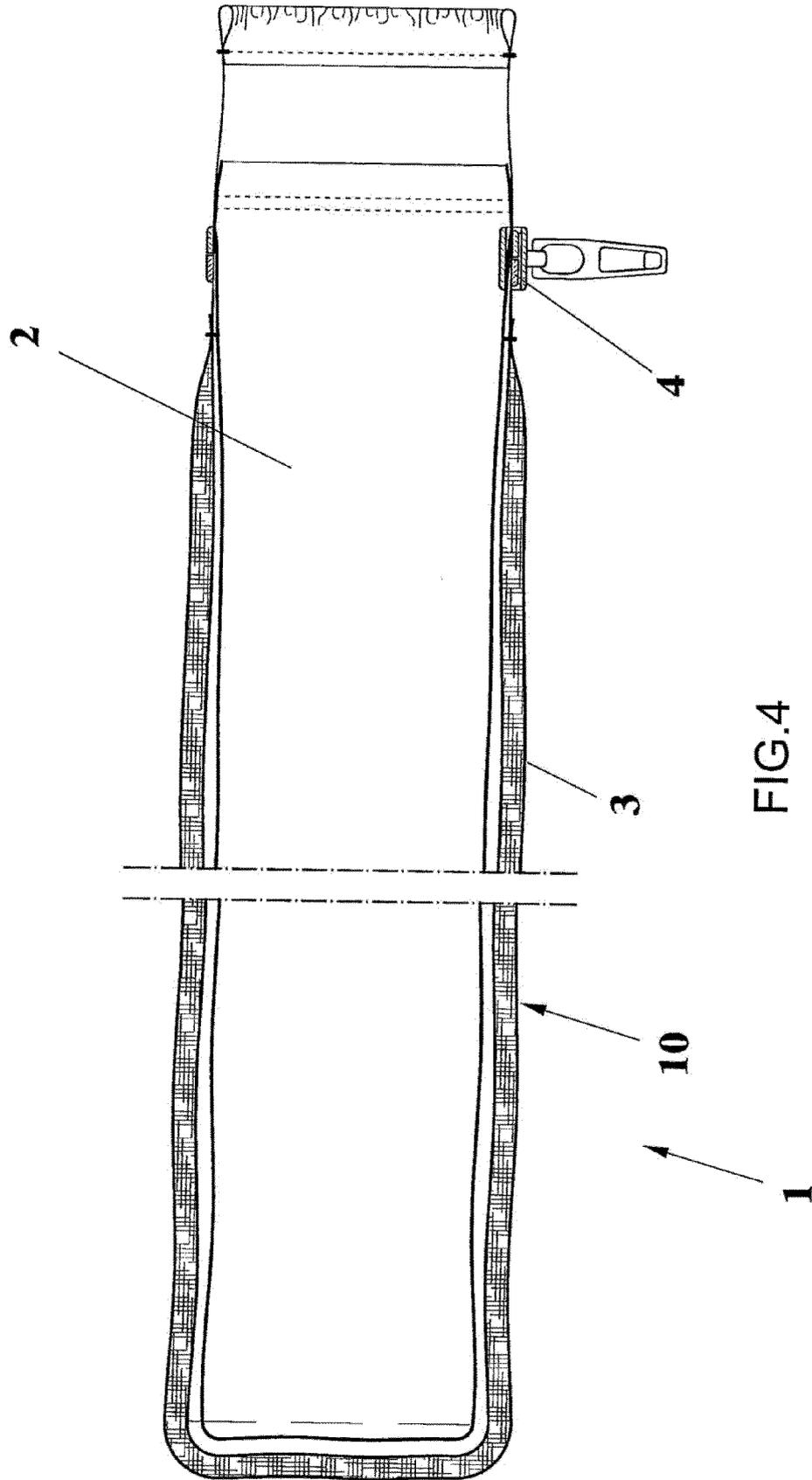
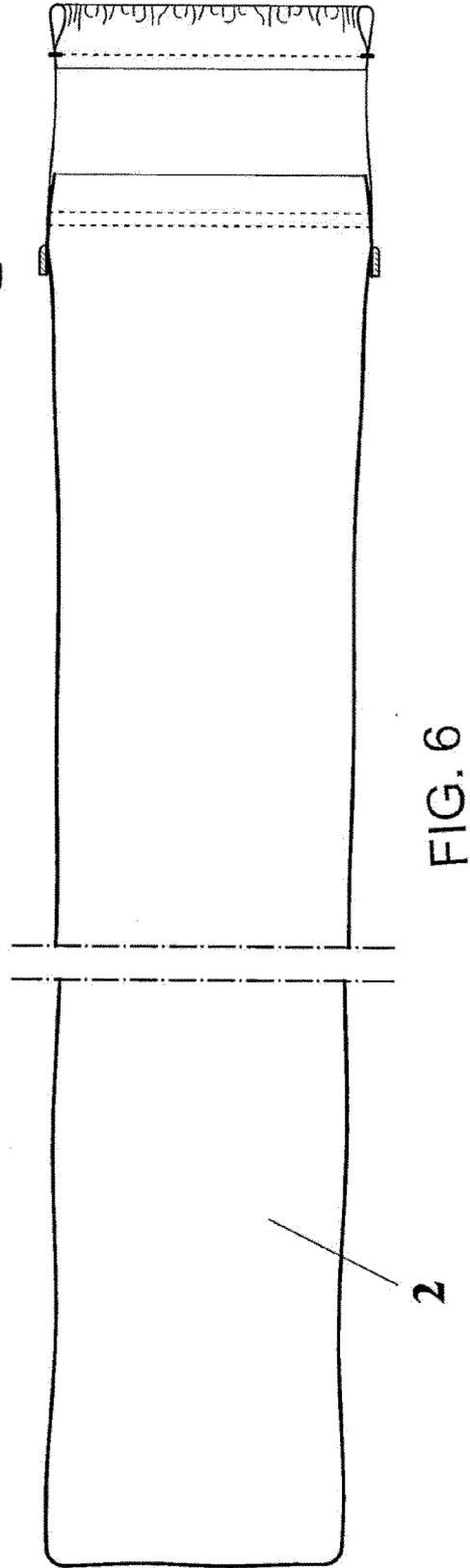
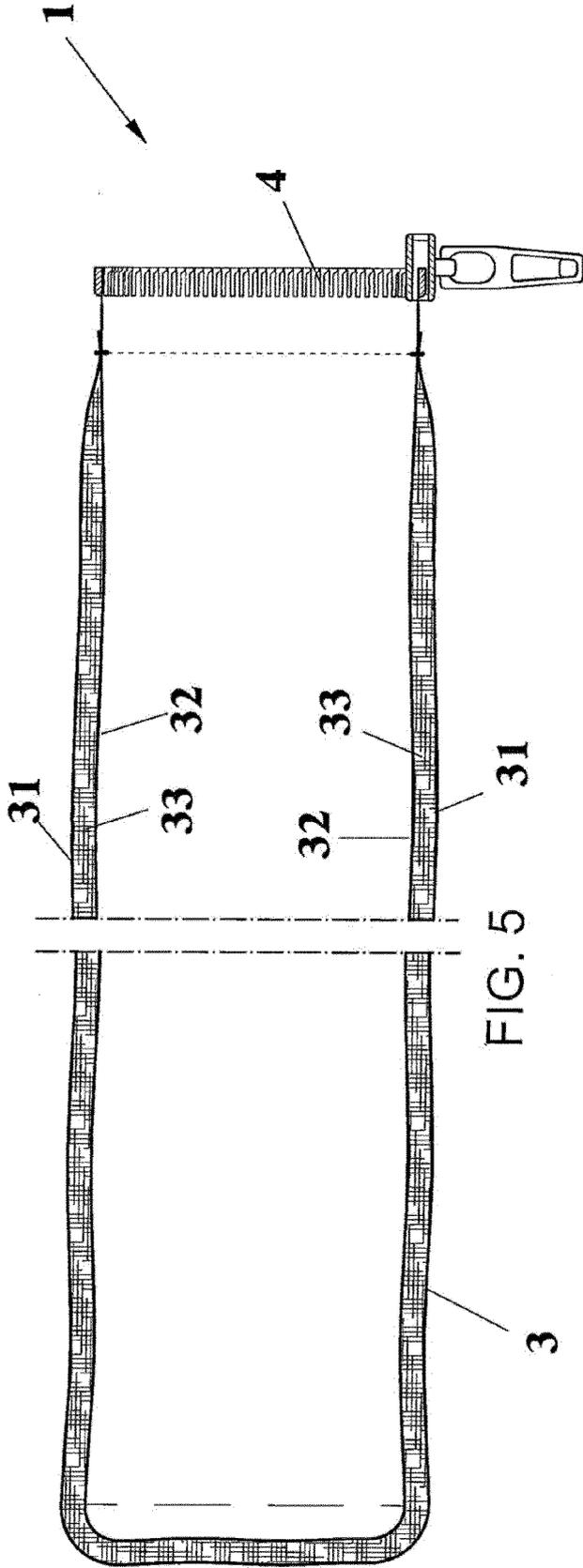


FIG.4



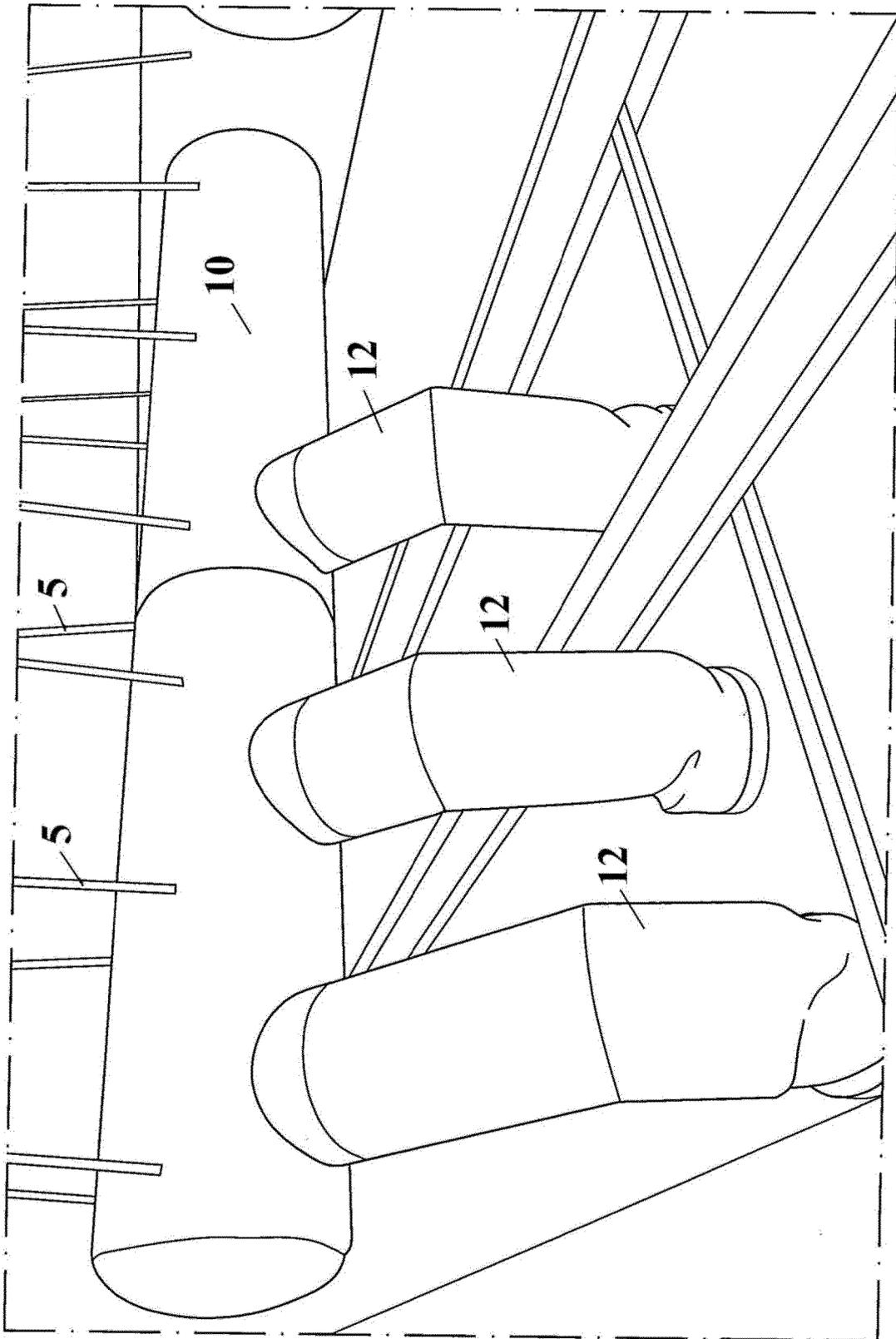


FIG. 7



EUROPEAN SEARCH REPORT

Application Number  
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Place of search Munich		Date of completion of the search 9 February 2016	Examiner Anconetani, Mirco
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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