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(54) Title: FLEXIBLE PIPE FOR A PIPE CONSTRUCTION EXTENDING THROUGH A ROOF

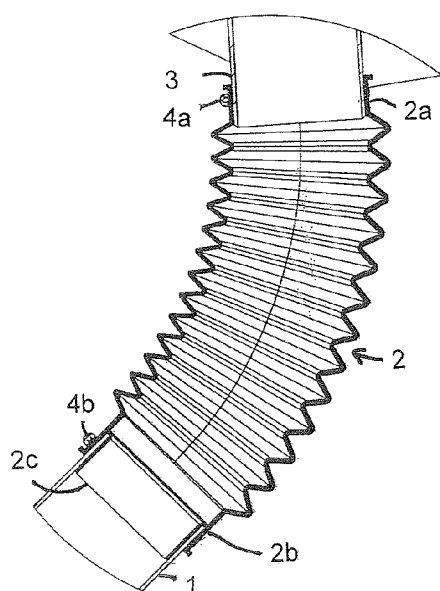


Fig. 4

(57) Abstract: This invention relates to a flexible pipe (2) for a pipe construction extending through a roof. This flexible pipe is an accordion-like pipe, made of rubber, having a cylindrical upper end (2a) intended to be slipped onto the lower end of a pipe part (3) extending above the roof, and a cylindrical lower part (2b) intended, in turn, to be slipped onto the upper end of a lower pipe part (1) which ends underneath the roof, said cylindrical parts (2a, 2b) being attachable to the ends of said pipe parts (3, 1) by means of host clamps (4a, 4b). The invention is characterized in that inside the cylindrical lower part (2b) of the flexible pipe (2) a cylindrical collar (2c) has been arranged having an outer diameter corresponding to the inner diameter of the pipe part (1) to be connected to the lower end of the flexible pipe (2) and said collar being joined in its upper end tightly to the inner surface of the cylindrical lower end (2b) so that between the cylindrical collar (2c) and the cylindrical part (2b) surrounding the collar a receiving space is formed to receive the upper end of the pipe part (1) to be connected thereto.

Flexible pipe for a pipe construction extending through a roof

5 This invention relates to a flexible pipe for a pipe construction extending through a roof, whereby the flexible pipe is an accordion-like pipe made of rubber and having a cylindrical upper end intended to be slipped onto the lower end of a pipe part extending above the roof, and a cylindrical lower part intended, in turn, to be slipped onto the upper end of a lower pipe part which ends underneath the roof, said cylindrical parts being attachable to
10 the ends of said pipe parts by means of hose clamps. Such constructions are used when sewer vent pipes, ventilation pipes for air-conditioning, cooker-hood exhaust pipes etc. are passed through the roof out of the building. Due to the flexible pipe, the pipes do not need to be aligned while the accordion-like construction compensates the contractions of the pipes and the movements of the structures.

15 A drawback of a flexible pipe of the above-mentioned type is a risk of leakage which may occur especially in the winter, when condensate is formed inside the pipe flowing along the wall of the pipe and penetrating partly at the upper part of the flexible pipe, into the space between the cylindrical part of the flexible pipe and the pipe part surrounding said pipe
20 part, a possible water leakage being thus prevented only by a hose clamp.

Such water leakage has been attempted to prevent with a solution in which to the lower end of the flexible pipe a rigid plastic part having a greater thickness than the accordion-like part has been attached, the free end of which has been formed to fit tightly inside the
25 socket of the pipe to be connected. According to one embodiment the accordion-like part of the flexible pipe has been made of plastics, whereby the wall thickness has been less than one millimetre. The accordion-like part has been attached to the thick cylindrical plastic part by gluing. Drawbacks of such flexible pipe are its complicated manufacture and laborious mounting; furthermore, there is a risk that the glue-joint will break. In addition,
30 higher expenses are caused by the fact that according to the provisions the pipe end to be connected must be provided with a socket.

The object of the present invention is to provide such a flexible pipe in which these problems have been eliminated. This object is achievable by a pipe which is characterized in

that inside the cylindrical lower end of the flexible pipe a cylindrical collar has been mounted having an outer diameter corresponding to the inner diameter of the pipe part to be connected to the lower end of the flexible pipe and said collar being joined in its upper end tightly to the inner surface of the cylindrical lower end so that between the cylindrical collar and the cylindrical part surrounding the collar a receiving space is formed to receive the upper end of the pipe part to be connected thereto. Due to this, a flexible pipe is obtained being simply to manufacture and secure to use, whereby the flexibility of the rubber allows the wall thickness of the flexible pipe to be of the same dimension as the wall of the pipe to be connected, which flexible pipe can be manufactured in one manufacturing step without gluing or other joining of the components. Due to the above-described construction the flexible pipe according to the invention, the pipe to which it is to be connected does not have to be a socket pipe.

In order to facilitate mounting of the flexible pipe, the cylindrical collar in the lower end of the flexible pipe is arranged to extend farther out of the flexible pipe than the cylindrical part surrounding it. Due to this it is possible to see during the mounting step that the cylindrical collar does not get wrinkled but the free end of it can be inserted into the pipe to be connected before the cylindrical part surrounding the same is slipped onto said pipe to be connected. Due to the cylindrical collar water dripping from the upper end of the pipe will flow downwards along the pipe and remain permanently inside the pipe thus being prevented from penetrating to the outer surface of the pipe at the point of the host clip clamping the cylindrical part. Thus, the only function of the host clamp clamping the cylindrical part of the lower end of the flexible pipe is to arrest the flexible pipe to the pipe to be connected thereto.

Suitable material for the manufacture of the flexible pipe is so-called EPDM rubber, i.e. ethylene-propylene-diene monomer rubber.

In the following the invention is described in more detail with reference to the accompanying drawings, wherein

Fig. 1 shows an example of the construction to which the flexible pipe according to the invention has been mounted, seen from three different directions,

Fig. 2 shows a perspective view of the construction of figure 1, seen diagonally from above,

Fig. 3 shows the detail E of figure 1 in enlarged scale,
Fig. 4 shows the detail D of figure 1 in enlarged scale,
Fig. 5 shows the detail C of figure 1 in even more enlarged scale, and
Fig. 6 shows the detail B of figure 1 in even more enlarged scale.

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The pipe construction shown in figures 1 and 2 passing through a roof, comprises a socket-free lower pipe part 1 for e.g. a ventilation pipe, said pipe part 1 ending underneath the roof, a flexible pipe 2 according to the invention mounted to the upper end of said pipe part 1 as well as a pipe part 3 extending above the roof and being mounted to the upper end of
10 the flexible pipe.

The flexible pipe is an accordion-like pipe, made of rubber, comprising a cylindrical upper end 2a intended to be slipped onto the lower end of the pipe part 3 extending above the roof, and a cylindrical lower end 2b intended, in turn, to be slipped onto the upper end of
15 the lower pipe part 1 which ends underneath the roof. Said cylindrical parts 2a and 2b are mountable to the ends of said pipe part 3 and said pipe part 1 by means of hose clamps 4a and 4b.

According to the invention, inside the cylindrical lower end 2b of the flexible pipe a cylindrical collar 2c has been arranged, having an outer diameter corresponding to the inner
20 diameter of the pipe part 1 to be connected to the lower end of the flexible pipe 2, and said collar being joined in its upper end tightly to the inner surface of the cylindrical lower end 2b so that between the cylindrical collar 2c and the cylindrical part 2b surrounding the collar a cylindrical receiving space is formed to receive the upper end of the pipe part 1 to be
25 connected. This construction enables effective prevention of any water leakage from the pipe, since the water flowing along the inner walls of the flexible pipe will flow from the inner surface of the cylindrical part 2b to the inner surface of the cylindrical collar 2c and does not come into contact with the inner surface of the pipe part 1 until it reaches the lower end of the cylindrical collar 2c.

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According to a preferred embodiment, the cylindrical collar 2c of the flexible pipe 2 extends farther away from the accordion-like part of the flexible pipe 2 than the cylindrical part 2b surrounding it which facilitates mounting of the pipe, because the free end of the cylindrical collar can be mounted inside the lower pipe part 1 before the cylindrical part 2b

will be slipped onto the upper part of said pipe part 1. This enables to secure that the cylindrical collar 2c does not get wrinkled during mounting.

5 The flexible pipe 2 is manufactured from EPDM rubber, i.e. ethylene-propylene-diene monomer rubber, the durability (strength) and flexibility properties of which have been proved suitable for use in the flexible pipe according to the invention.

Claims

1. A flexible pipe (2) for a pipe construction extending through a roof, the flexible
5 pipe being an accordion-like pipe, made of rubber, having a cylindrical upper end
(2a) intended to be slipped onto the lower end of a pipe part (3) extending above
the roof, and a cylindrical lower part (2b) intended, in turn, to be slipped onto the
upper end of a lower pipe part (1) that ends underneath the roof, said cylindrical
10 parts (2a, 2b) being attachable to the ends of said pipe parts (3,1) by means of host
clamps (4a, 4b), **characterized** in that inside the cylindrical lower part (2b) of the
flexible pipe (2) a cylindrical collar (2c) has been arranged having an outer diame-
ter corresponding to the inner diameter of the pipe part (1) to be connected to the
lower end of the flexible pipe (2) and said collar being joined in its upper end
15 tightly to the inner surface of the cylindrical lower end (2b) so that between the cy-
lindrical collar (2c) and the cylindrical part (2b) surrounding the collar a receiving
space is formed to receive the upper end of the pipe part (1) to be connected
thereto.
2. The flexible pipe (2) according to claim 1, **characterized** in that the cylindrical col-
20 lar (2c) extends farther out of the flexible pipe (2) than the cylindrical part (2b) sur-
rounding it.
3. The flexible pipe (2) according to claim 1, **characterized** in that as material of the
25 pipe EPDM rubber has been used.

30

AMENDED CLAIMS**received by the International Bureau on 19 November 2009 (19.11.2009)**

1. A flexible pipe (2) for a pipe construction extending through a roof, the flexible pipe being an accordion-like pipe, made of rubber, having a cylindrical upper end (2a) intended to be slipped onto the lower end of a pipe part (3) extending above the roof, and a cylindrical lower part (2b) intended, in turn, to be slipped onto the upper end of a lower pipe part (1) that ends underneath the roof, said cylindrical parts (2a, 2b) being attachable to the ends of said pipe parts (3,1) by means of host clamps (4a, 4b), **characterized** in that inside the cylindrical lower part (2b) of the flexible pipe (2) a cylindrical collar (2c) has been arranged extending farther out of the flexible pipe (2) than the cylindrical part (2b) surrounding it and having an outer diameter corresponding to the inner diameter of the pipe part (1) to be connected to the lower end of the flexible pipe (2) and said collar being joined in its upper end tightly to the inner surface of the cylindrical lower end (2b) so that between the cylindrical collar (2c) and the cylindrical part (2b) surrounding the collar a receiving space is formed to receive the upper end of the pipe part (1) to be connected thereto.
2. The flexible pipe (2) according to claim 1, **characterized** in that as material of the pipe EPDM rubber has been used.

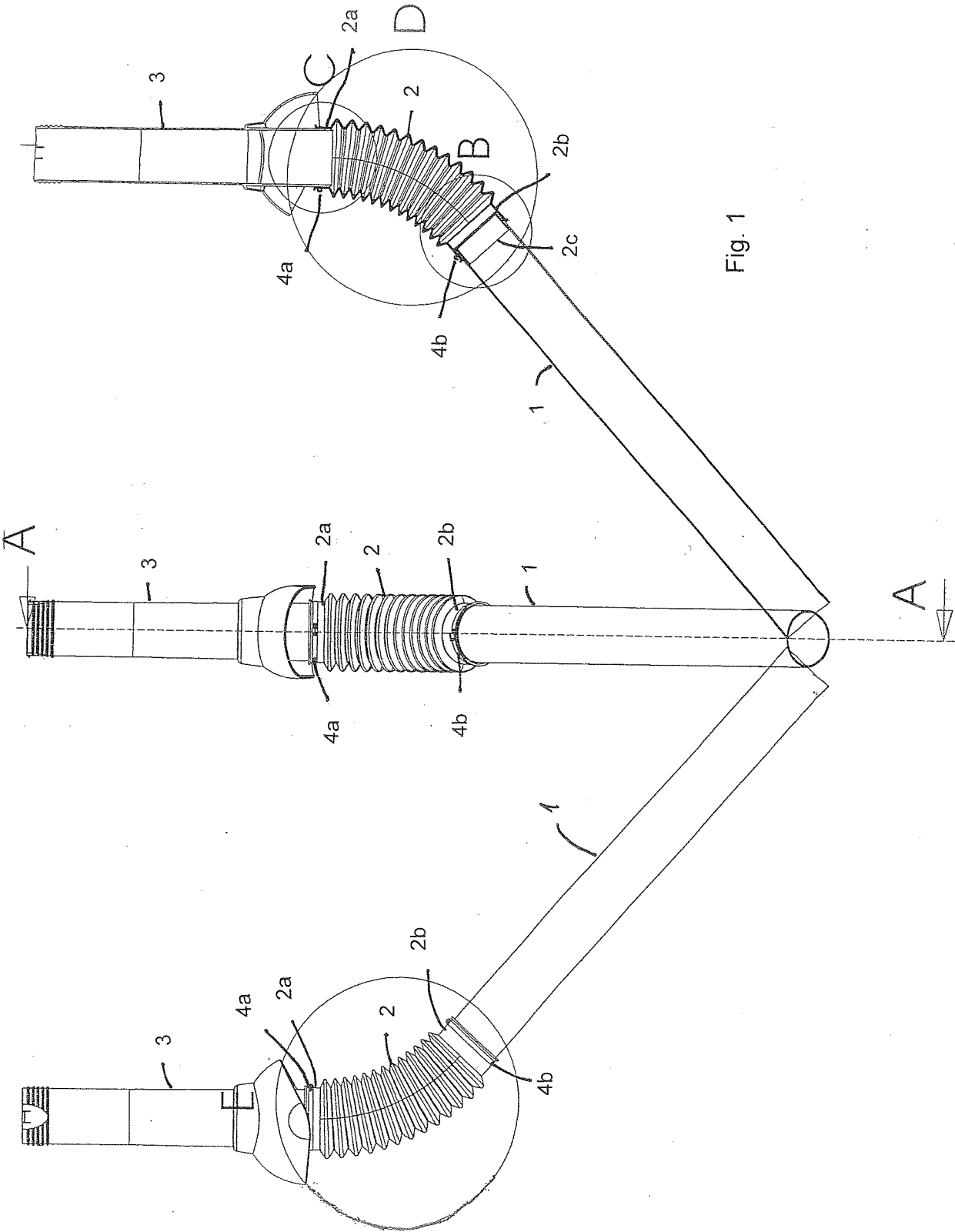
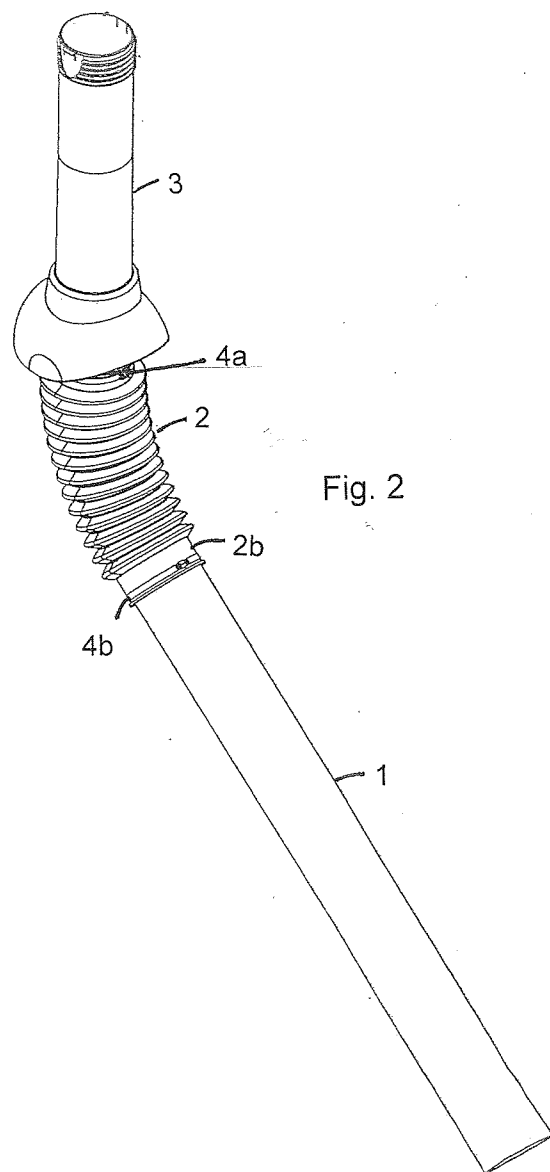
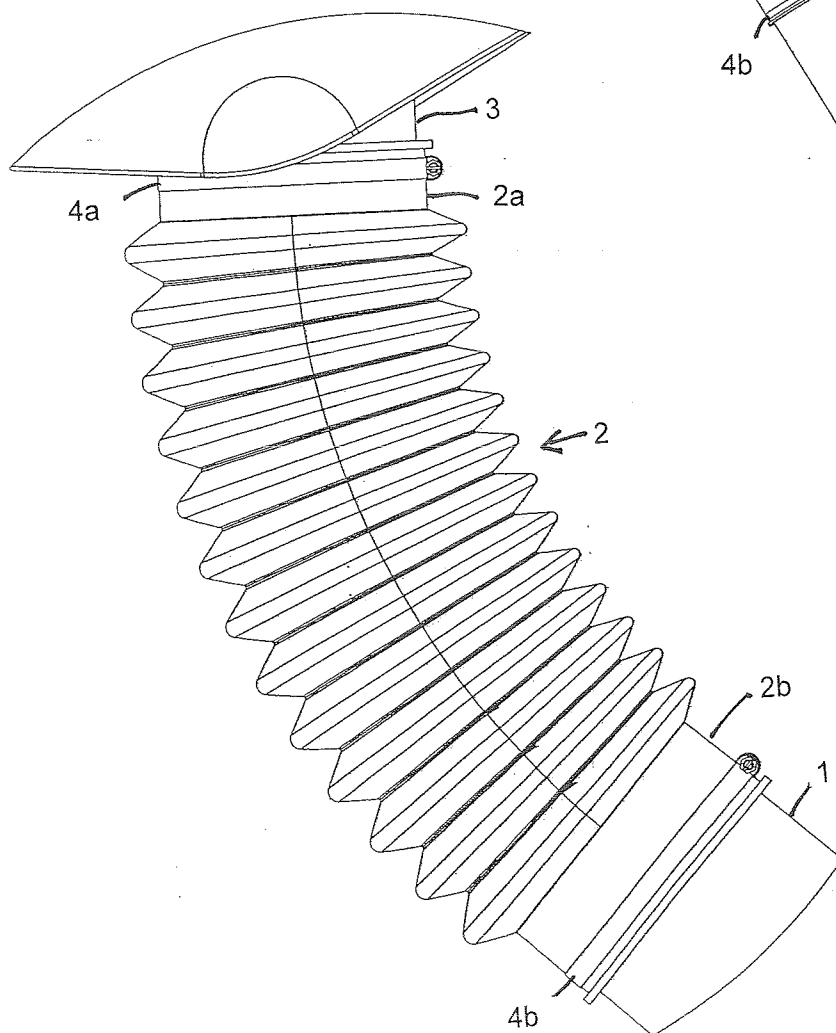


Fig. 1

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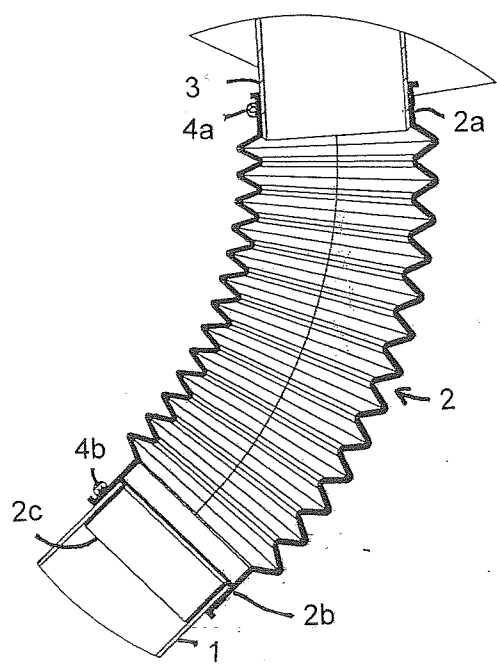


Fig. 4

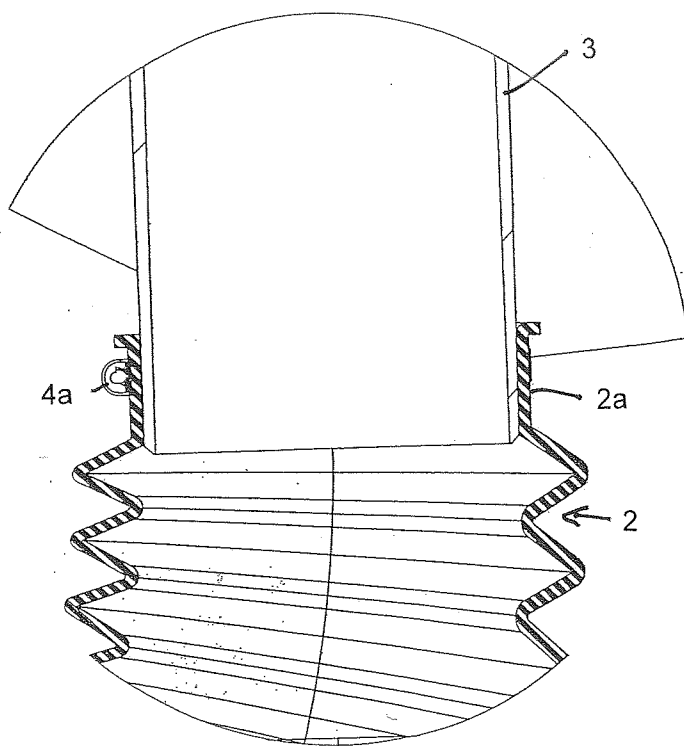


Fig. 5

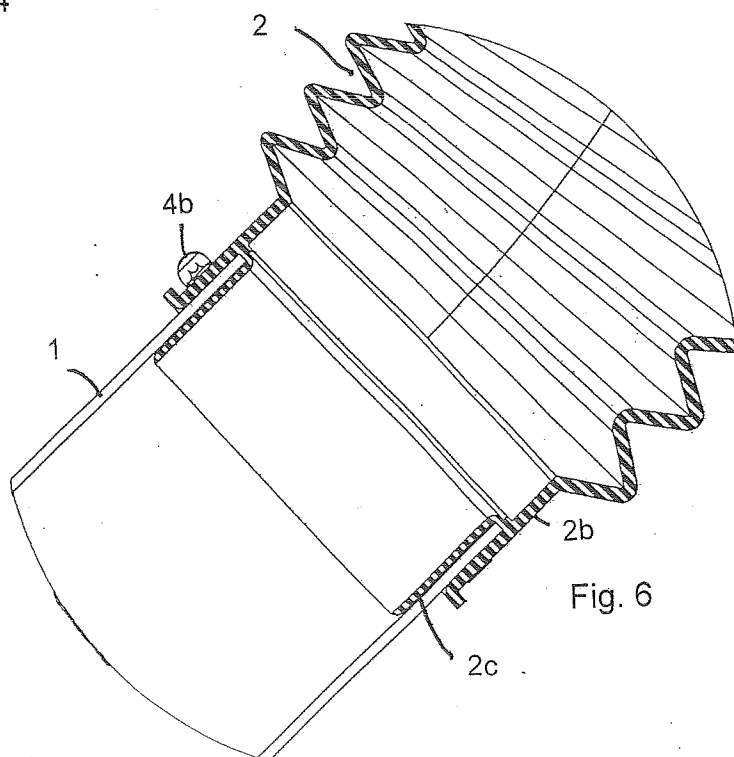


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2009/050491

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC: E04D

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

FI, SE, NO, DK

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

EPO-internal, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 8905893 A1 (KULLERVO KETOLAINEN JA EERO SAIKKONEN) 29 June 1989 (29.06.1989), whole document, particularly figure 1	1-3
Y	EP 0131086 A2 (KLOEBER FA HANS) 16 January 1985 (16.01.1985), whole document, particularly figure 1	1-3
Y	US 3874138 A (STORCH HAROLD A) 01 April 1975 (01.04.1975), whole document, particularly figure 22	1-3
Y	DE 19605462 C2 (GERHAHER MAX et al.) 09 December 1999 (09.12.1999), whole document, particularly column 5, lines 51-59; figures 4a and 4b	1-3



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 September 2009 (10.09.2009)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2009/050491

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
WO 8905893 A1	29/06/1989	AU 2820889 A NO 893336 A DK 393289 A EP 0370074 A1 AT 68034T T FI 875634 A	19/07/1989 18/08/1989 10/08/1989 30/05/1990 15/10/1991 22/06/1989
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DE 19605462 C2	09/12/1999	None	

INTERNATIONAL SEARCH REPORT

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CLASSIFICATION OF SUBJECT MATTER

Int.Cl.

E04D 13/14 (2006.01)