AU9216549

(12) PATENT ABRIDGMENT (11) Document No. AU-B-16549/92
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 654352

(54) Title
A METHOD FOR MANUFACTURING A JOINT PIPE

International Patent Classification(s)
(51)[5] **B29C 053/62** **F16L 047/06**

(21) Application No. : **16549/92** (22) Application Date : **29.04.92**

(87) PCT Publication Number : **WO92/19438**

(30) Priority Data

(31) Number	(32) Date	(33) Country
912101	**30.04.91**	**FI FINLAND**

(43) Publication Date : **21.12.92**

(44) Publication Date of Accepted Application : **03.11.94**

(71) Applicant(s)
OY KWH PIPE AB

(72) Inventor(s)
KRISTIAN SUNDQVIST; GUNNAR BLOMQVIST

(74) Attorney or Agent
SPRUSON & FERGUSON , GPO Box 3898, SYDNEY NSW 2001

(56) Prior Art Documents
US 3243328

(57) Claim

1. A method for manufacturing a joint pipe at an end of a thermoplastic pipe (4) by spirally winding an extruded melt thermoplastic profile (7) with an overlapping around a weakly conical section (6) of a rotatably driven, heated mandrel (2), spraying cooling water from the outside over the extruded joint pipe (1), cutting the free end of the joint pipe by means of a rotating knife (9) and removing the completed joint pipe from the mandrel, characterized in that an end of a prefabricated thermoplastic pipe (4) is pushed onto a mainly cylindrical end section (3) of the mandrel (2), said end section (3) having a diameter corresponding to the inner diameter of the pipe (4) and towards a radial stop surface (5) of the mandrel (2) connecting the end section (3) and the weakly conical section (6) of the mandrel (2) and having a width corresponding to the wall thickness of the pipe end (4); the winding of the melt profile (7) exites from that end of the mandrel (2), which is turned

.../2

away from the pipe end (4), and continues towards and over the pipe end to a desired overlapping degree between the extruded joint pipe (1) and the pipe end (4), whereby the extruder is stopped while the mandrel (2) and the pipe (4) are still rotating.

OPI DATE 21/12/92 APPLN. ID 16549/92
AOJP DATE 28/01/93 PCT NUMBER PCT/FI92/00130

AU9216549

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :
B29C 53/62

A1

(11) International Publication Number: WO 92/19438

(43) International Publication Date: 12 November 1992 (12.11.92)

(21) International Application Number: PCT/FI92/00130

(22) International Filing Date: 29 April 1992 (29.04.92)

(30) Priority data:
912101 30 April 1991 (30.04.91) FI

(71) Applicant *(for all designated States except US)*: OY KWH PIPE AB [FI/FI]; PB 21, SF-65101 Vasa (FI).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)* : SUNDQVIST, Kristian [FI/FI]; Mathesiusgatan 23, SF-66900 Nykarleby (FI). BLOMQVIST, Gunnar [FI/FI]; SF-65520 Helsingby (FI).

(74) Agent: OY JALO ANT-WUORINEN AB; Skepparebrinken 2 A, SF-00120 Helsingfors (FI).

(81) Designated States: AT (European patent), AU, BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), MC (European patent), NL (European patent), NO, SE (European patent), US.

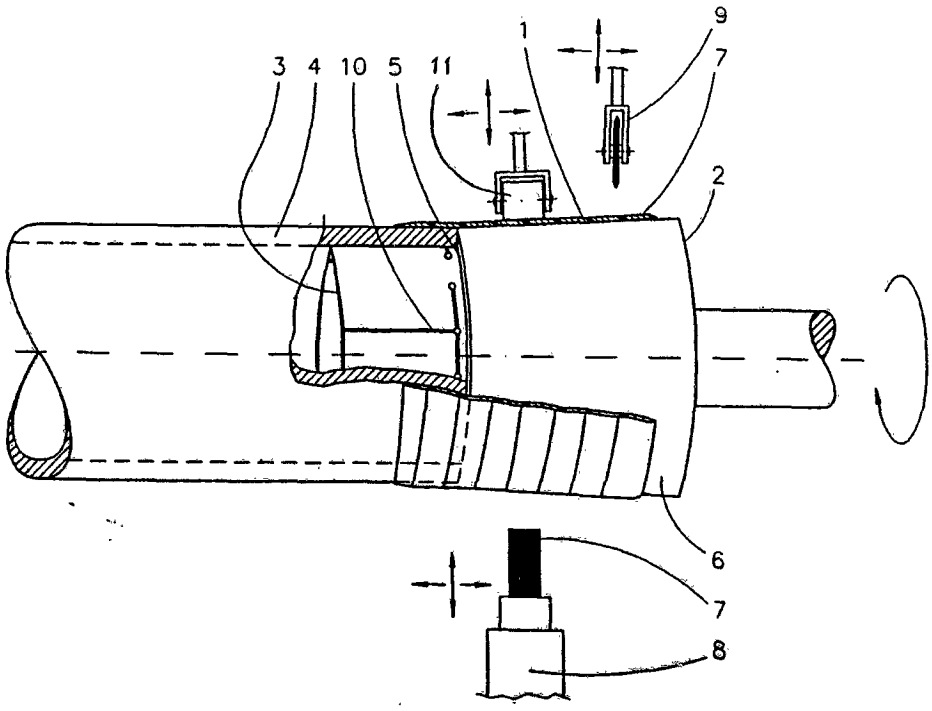
Published
With international search report.
In English translation (filed in Swedish).

654352

(54) Title: A METHOD FOR MANUFACTURING A JOINT PIPE

(57) Abstract

The present invention relates to a method for manufacturing a joint pipe (1) from a spirally wound thermoplastic profile (7) at an end of a thermoplastic pipe (4). The invention is characterized in that the end of the pipe (4), which will be furnished with a joint pipe (1), is pushed onto a rotatably driven, weakly conical mandrel (2), after which a melt profile (7) of thermoplast is spirally extruded with a certain overlapping around the mandrel (2) and the pipe end (4), starting farthest away from the pipe (4), until the desired overlapping between the joint pipe (1) and the pipe end (4) is obtained, the joint pipe (1) is cooled and the end surface of it is cut uniform, after which the pipe (4) furnished with the joint pipe is removed from the mandrel (2).



A method for manufacturing a joint pipe

The present invention relates to a method for manufacturing a joint pipe from a spirally wound thermoplastic profile at an end of a thermoplastic pipe.

The invention is characterized by the following steps:

- the pipe end is pushed onto a rotatably driven, heated mandrel comprising a mainly cylindrical end section corresponding to the inner diameter of the pipe end, which end section transfers via a radial stop surface corresponding to the wall thickness of the pipe end into a weakly conical section,

- a melt profile made of thermoplast is extruded spirally with an overlapping around the conical section of the mandrel exiting from that end of the mandrel, which is turned away from the pipe end, and continuing inside against and over that,

- when a desired overlapping degree between the extruded joint pipe and the pipe end is reached, the extruder is stopped while the mandrel and pipe continuously rotate,

- cooling water is sprayed from the outside over the extruded joint pipe,

- the free end of the joint pipe is cut uniform by means of a rotating knife, and

- the pipe end with the completed joint pipe are removed from the mamdrel.

The remaining characteristics of the invention are presented in the accompanying claims 2-8.

The invention is next described in more detail with reference to the accompanying drawings, in which

Fig. 1 shows a scheme of principle of a joint pipe manufactured according to the present invention,

Fig. 2 shows another example of a joint pipe manufactured according to the invention, and

Fig. 3 and 4 show alternative applications of the joint pipe of Fig. 2.

When manufacturing a joint pipe 1, a rotatably driven, heated mandrel 2 with a mainly cylindrical end section 3 is used, through which a pipe end 4, which is to be provided with the joint pipe 1, is applicable. The cylindrical end section 3 has an outer diameter, which mainly corresponds to the inner diameter of the pipe end 4. The cylindrical end section 3 transfers via a radially directed stop surface 5 into a weakly conical main section 6. The end surface of the pipe end 4 is intended to be located against this stop surface 5 during the entire manufacturing process, because of which the width of the stop surface 5 preferably corresponds to the wall thickness of the pipe end 4 so that a transition as uniform as possible is obtained between the outer surface of the pipe end 4 and the conical main section 6 of the mandrel 2.

After the pipe end 4 is applied onto the cylindrical section of the mandrel 2, the mandrel 2 is continuously maintained in rotation and heated up to at least ca. 100°C. When the mandrel 2 has reached t a desired temperature, a melt profile 7 of thermoplast is extruded on the main section 6 of the rotating mandrel, starting at that end of the mandrel 2, which is located farthest away from the pipe end 4. The extrusion is preferably carried

out with an extruder nozzle 8 of a mainly rectangular cross-section, which extruder nozzle 8 may be transferred in an axial direction along the mandrel 2. The transferring of the extruder nozzle 8 in a direction against the pipe end 4 occurs synchronically with the rotational speed of the mandrel 2 such that the extruder nozzle 8 for each rotation the mandrel 2 rotates transfers in the direction against the pipe end 4 by a distance slightly less than the width of the melt profile such that a certain overlapping is obtained. In this way, a spiral winding of the melt profile 7 around the mandrel 2 and pipe end 4 is obtained, where limiting winding turns are located tightly one above the other such that a welding-together of the melt profiles is obtained. For improving the welding together and for obtaining a more uniform surface on the joint pipe, the overlapping is pressed down with a rotating roll 11, which follows the extruder head. The extrusion continues until a desired overlapping between the melt profile 7 and the pipe end 4 is obtained, after which the extruder is stopped, while the rotation of the pipe end 4 and the mandrel 2 may continue. Thus, a uniform transition in the material thickness between the mantle of the pipe end 4 and the joint pipe 1 is obtained.

When the extrusion is stopped, the thermoplastic material in the joint pipe 1 is cooled down by spraying cooling water from the outside upon the extruded joint pipe 1. When the thermoplast material has set, the free end of the joint pipe 1 is cut uniform with a rotating knife 9, whereby an absolutely uniform surface is obtained. Finally, the pipe end 4 with the completed joint pipe 1 are removed from the mandrel 2, after which the manufacturing of next joint pipe may be started.

Heating of the mandrel 2 may e.g. be performed with a gas blower from the inside or the outside, or in an inductive way from the outside.

For ensuring the fixing between the pipe end 4 and the mandrel 2 during the different manufacturing steps, the cylindrical section 3 of the mandrel 2 may suitably be of an expansive construction, whereby the mantle of the section 3 is divided by a number of axially directed gaps 10, and the expansion is achieved in a hydraulic, pneumatic or solely mechanical way via toggle joints.

The welding-together of the spiral wound melt profiles 7 may be intensified by applying a weak mechanical loading on the melt profiles 7 e.g. by means of a rotating roll 11 affecting the melt profiles 7 located close to each others on the mandrel 2, immediately after the nozzle 8.

The rotating knife 9 comprises preferably a freely rotatable circular blade, which may be pressed in a hydraulic or mechanical way against the joint pipe 1 extruded on the mandrel 2.

The pipes 4, which can be provided with a joint pipe 1 according to the present invention, are thermoplastic pipes of different types, such as entirely conventional polyethylene pipes or spirally wound pipes of some other type.

The removal of the pipe end 4 with the completed joint pipe 1 from the mandrel 2 is carried out by blowing pressurized air between the mandrel 2 and joint pipe 1, preferably via small gaps or holes contained in the conical section 6 of the mandrel 2, at the same time as a push force is directed onto the joint pipe 2 in a direction against the pipe 4.

In Fig. 2 to 4 a preferable embodiment of the joint pipe 1 is shown. In connection with the manufacturing of this joint pipe, the conical section 6 of the mandrel has a mainly cylindrical end section with an increased diameter so that the joint pipe 1 manufactured obtains a cylindrical end section 11 extended in a corresponding manner. In joining-together of pipes by means of such a joint pipe 1, the joint pipe may be used, depending on the application area, as such, or, when higher requirements are set on the sealing, a rubber seal 12 according to Fig. 3 or a welding ring 13 according to Fig. 4 may be used. As a result of this possibility, the application range for the joint pipe 1 manufactured according to the invention increases significantly.

Claims:

1. A method for manufacturing a joint pipe at an end of a thermoplastic pipe (4) by spirally winding an extruded melt thermoplastic profile (7) with an overlapping around a weakly conical section (6) of a rotatably driven, heated mandrel (2), spraying cooling water from the outside over the extruded joint pipe (1), cutting the free end of the joint pipe by means of a rotating knife (9) and removing the completed joint pipe from the mandrel, characterized in that an end of a prefabricated thermoplastic pipe (4) is pushed onto a mainly cylindrical end section (3) of the mandrel (2), said end section (3) having a diameter corresponding to the inner diameter of the pipe (4) and towards a radial stop surface (5) of the mandrel (2) connecting the end section (3) and the weakly conical section (6) of the mandrel (2) and having a width corresponding to the wall thickness of the pipe end (4); the winding of the melt profile (7) exites from that end of the mandrel (2), which is turned away from the pipe end (4), and continues towards and over the pipe end to a desired overlapping degree between the extruded joint pipe (1) and the pipe end (4), whereby the extruder is stopped while the mandrel (2) and the pipe (4) are still rotating.

2. A method according to Claim 1, characterized in that the mandrel (2) is heated into at least 100°C before the extrusion.

3. A method according to Claim 1 or 2, characterized in that the pipe end (4) may be fixed around the cylindrical section (3) of the mandrel (2) by temporarily extending this section (3).

4. A method according to any of the preceding Claims, characterized in that the extruded melt profile (7) is

subjected to a weak mechanical loading by means of a rotating roll for intensifying the welding-together of the melt profile windinds (7) overlapping each other.

5. A method according to any of the preceding Claims, **characterized** in that the rotating knife (9) comprises a freely rotating circular blade, which is pressed against the thermoplastic material of the joint pipe (1) in connection with the cutting of the end of the joint pipe (1).

6. A method according to any of the preceding Claims, **characterized** in that the pipe (4) is a conventional polyethylene pipe or a spirally wound thermoplastic pipe.

7. A method according to any of the preceding Claims, **characterized** in that the pipe end (4) with the completed joint pipe (1) are removed from the mandrel (2) by blowing pressurized air between the mandrel (2) and the joint pipe (2) at the same time as a push force is directed onto the joint pipe (1) in a direction against the pipe (4).

8. A method according to any of the preceding Claims, **characterized** in that the conical section (6) of the mandrel has a mainly cylindrical end section with an increased diameter, whereby the joint pipe manufactured obtains an end section (11) extended in a corresponding manner, which makes the application of a sealing ring (12) or a welding ring (13) possible.

PATENT OFFICE

16549/92

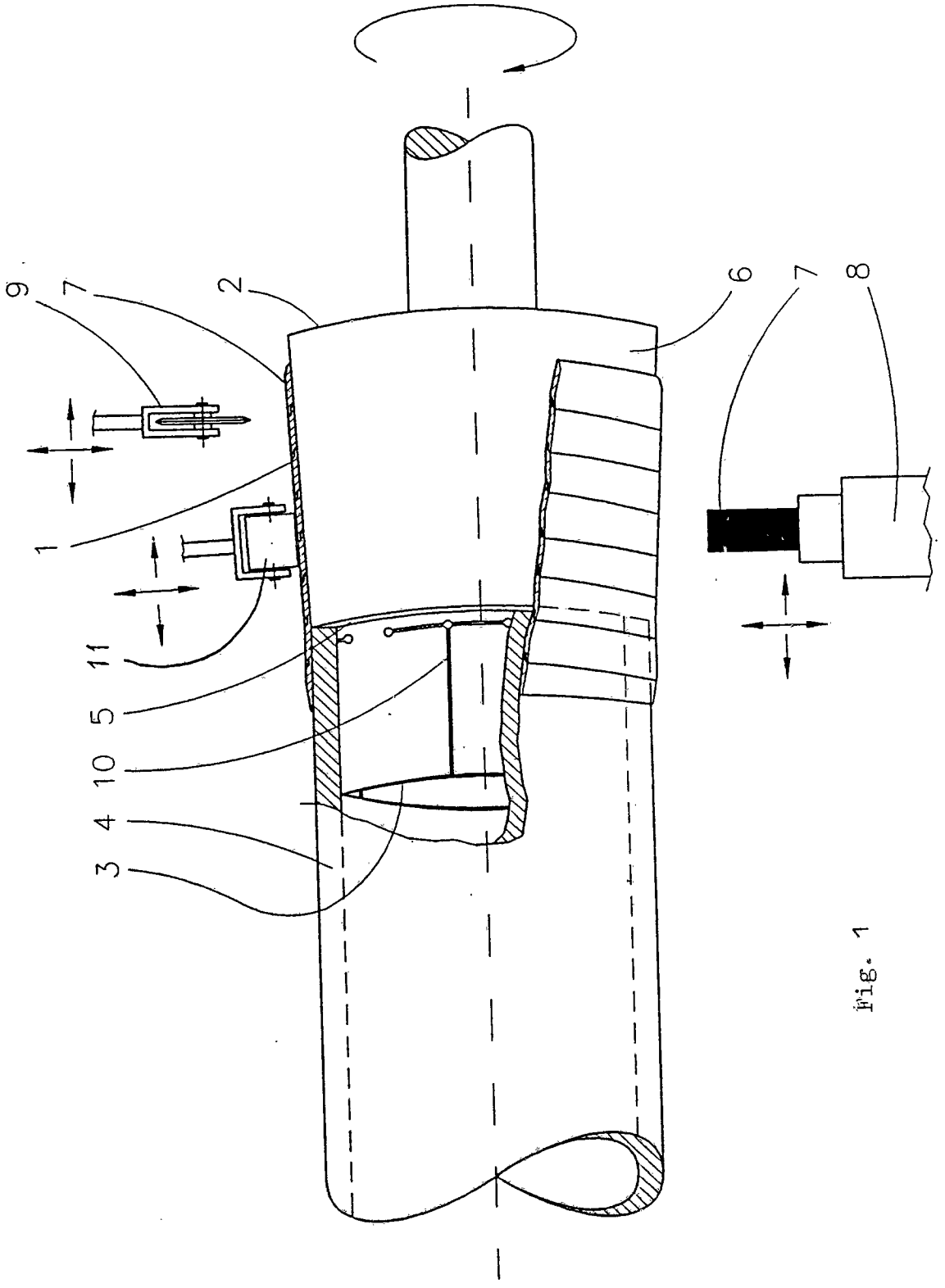


fig. 1

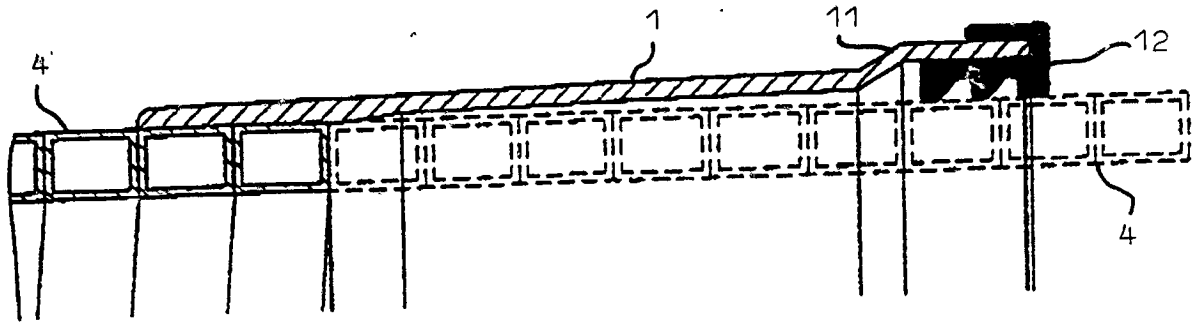


Fig. 3

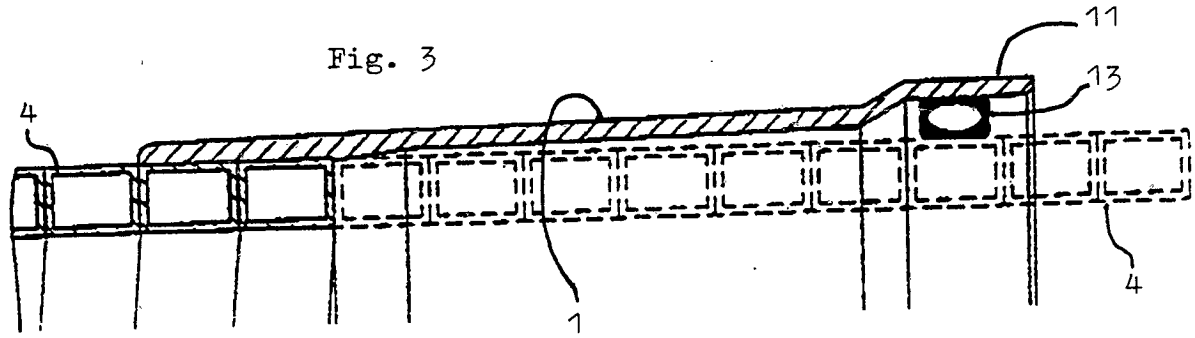


Fig. 4

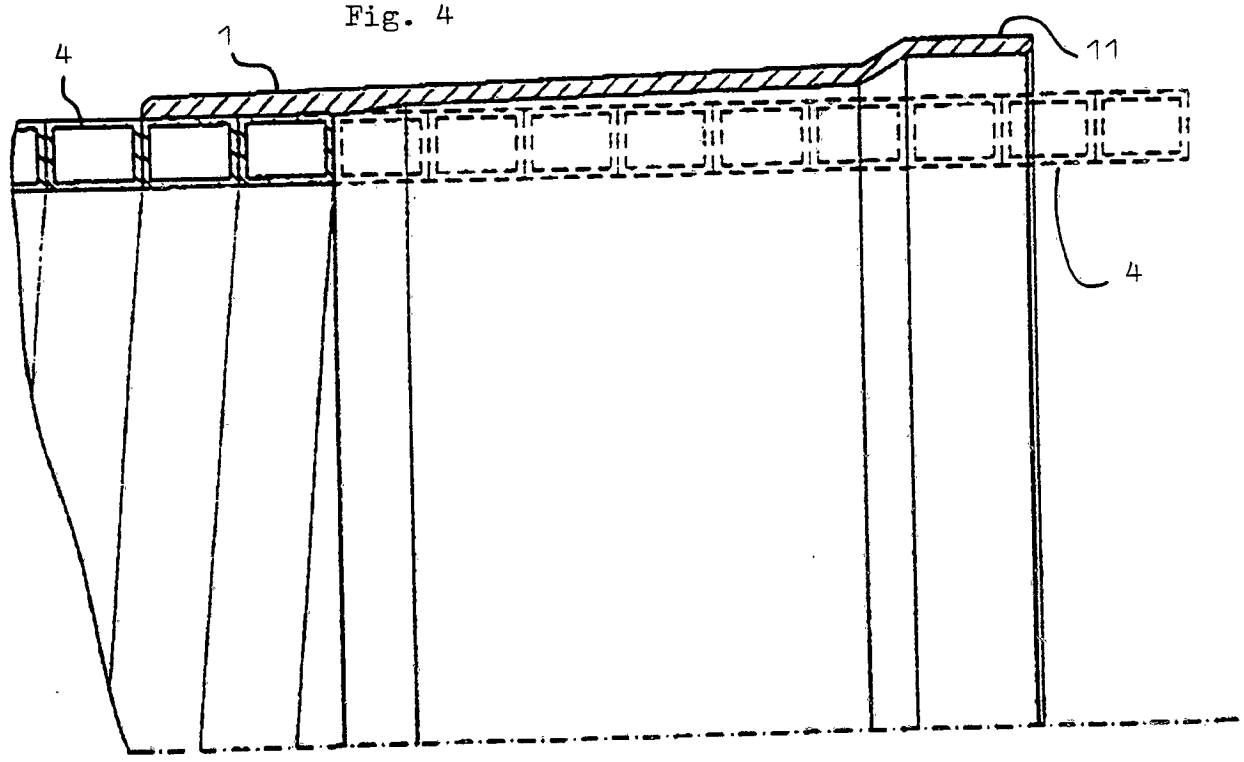


Fig. 2

INTERNATIONAL SEARCH REPORT

International Application No PCT/FI 92/00130

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: B 29 C 53/62

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
IPC5	B 29 C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in Fields Searched[8]

SE,DK,FI,NO classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
Y	SE, B, 365747 (DYNAMIT NOBEL AG) 1 April 1974, see the whole document	1-6,8
A	--	7
Y	US, A, 3243328 (P.S. BRITTON ET AL) 29 March 1966, see column 4, line 68 - column 5, line 14; figure 9	1-6,8
	--	
A	GB, A, 2232920 (CARTER HOLT HARVEY ROOFING, ALUMINIUM AND GLASS GROUP LIMITED) 2 January 1991, see the whole document	7
	--	
	--------	

* Special categories of cited documents:[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"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

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
1st July 1992	1992 -07- 24
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	Maria Reiler

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. PCT/FI 92/00130

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on 29/05/92
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
SE-B- 365747	74-04-01	AT-B-	321571	75-04-10
		BE-A-	755616	71-02-15
		CH-A-	515793	71-11-30
		DE-A-B-	1944599	71-03-11
		FR-A-	2060853	71-06-18
		GB-A-	1314404	73-04-26
		LU-A-	61619	70-12-01
		NL-A-	7012486	71-03-05
US-A- 3243328	66-03-29	NONE		
GB-A- 2232920	91-01-02	AU-D-	5010390	90-08-30