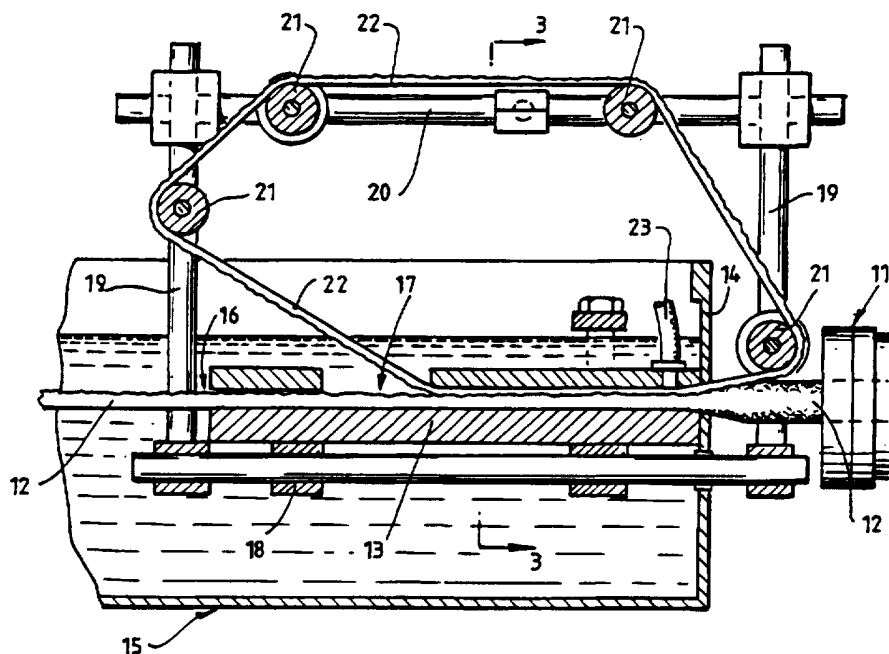




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/AU95/00837</p> <p>(22) International Filing Date: 12 December 1995 (12.12.95)</p> <p>(30) Priority Data: PN 0015 12 December 1994 (12.12.94) AU</p> <p>(71) Applicant (for all designated States except US): GARMOND AUSTRALIA PTY. LTD. [AU/AU]; 34 Carrick Drive, Tullamarine, VIC 3043 (AU).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): SKINNER, Leslie, John [AU/AU]; 58C Camerons Road, Bacchus Marsh, VIC 3340 (AU).</p> <p>(74) Agent: CARTER SMITH & BEADLE; Qantas House, 2 Railway Parade, Camberwell, VIC 3124 (AU).</p>		<p>(81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).</p> <p>Published With international search report.</p>

(54) Title: ON-LINE EMBOSSED SYSTEM FOR PLASTIC PROFILE EXTRUSION



(57) Abstract

The production of continuous embossed extruded product (12) is facilitated by a forming block (13) including a continuous moveable surface (22). The moveable surface (22), preferably in the form of a belt (22), moves in contact with extruded product (12) as it passes through the forming block (13). The moveable surface (22) has a pattern thereon which thereby creates a complementary embossed pattern on the extruded product (12).

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ON-LINE EMBOSSING SYSTEM FOR PLASTIC PROFILE EXTRUSION

Technical Field

The present invention relates to an on-line embossing system for plastic profile extrusion, and more particularly to a profile forming tool for extruding decorative trim from an extrusion machine, especially decorative trim formed of plastics material and having an embossed surface. The invention also relates to a method of extruding continuous strip material having an embossed surface.

Background Art

In the plastics industry, dies for plastics extruders are well known and take many different forms. In the field of decorative trims, many different dies are used to extrude many different cross-sectional shapes of trim which are used for many different purposes. For example, extruded decorative trim is used in the construction of picture frames and for this purpose it is manufactured in many different cross-sectional shapes and sizes. In the event that a high relief embossed surface is required on the moulding it has been necessary to perform a further process after the extrusion process. This involves the depositing of additional material on the surface of the extrusion and rolling or pressing the additional material (which becomes bonded to the extrusion) with the required embossing pattern.

It will be appreciated that in the manufacture of decorative trim the additional steps involved in providing an embossed surface on the trim considerably adds to the costs of production. In the case of extrusions used for manufacturing high volume low cost items such as picture frames, the additional costs involved in providing an embossed surface on the extrusion are significantly detrimental to the overall production cost.

Accordingly it is an object of this invention to provide a forming block which facilitates the continuous production of extruded strip having an embossed surface.

It is a further object to provide a method of extruding strip material having an embossed surface.

5 Disclosure of Invention

One broad form of the invention provides a forming block to facilitate the production of embossed extruded product, said forming block including a continuous moveable surface which is adapted to move in contact with extruded product passing through the forming block, said moveable surface having a pattern
10 thereon which is complementary to the pattern which is thereby embossed onto said extruded product.

Preferably said continuous movable surface is a belt which passes through said forming block.

Preferably said belt enters a cavity of said forming block at an inlet end together
15 with said extruded product and passes through at least a first portion of the cavity together with said extruded product, said belt being a continuous loop having said pattern on the outwardly directed surface of said loop.

According to a further broad form of the invention, the invention provides a method of extruding decorative strip material having an embossed surface, said
20 method comprising passing strip material from an extruder through a forming block having a surface which moves through the forming block in contact with said strip material to form said embossed surface.

Preferably said surface is a continuous surface formed on a belt which pass through the cavity of said die.

Brief Description of Drawings

In order that the invention may be more readily understood, one particular
5 embodiment will now be described with reference to the accompanying drawings wherein:

- Figure 1 is a plan view of an extrusion machine including a die according to the invention;
Figure 2 is a sectional view taken on the line 2-2 of Figure 1; and
10 Figure 3 is a sectional view taken on the line 3-3 of Figure 2.

Best Mode for Carry Out the Invention

Referring now to the drawings, the apparatus comprises an extruder 10 having a die head 11 from which continuous plastics strip material 12 is extruded. The strip material 12 in pliable form enters a profile forming tool in the form of a forming
15 block 13 at an inlet end thereof which is closely adjacent the die head 11. The inlet end of the forming block 13 abuts an end 14 of cooling bath 15 in which the forming block 13 is located.

The forming block 13 is in the form of a two-part cavity die wherein the cavity extends entirely through the forming block to an outlet end 16. In the present
20 embodiment the cavity is open at 17 partway along the length thereof between the inlet end and outlet end 16. This opening allows further cooling of the strip material 12 which then enters a second portion of the cavity which has a cross sectional shape in the form of the finished strip section.

The forming block 13 is supported on a base 18 within the cooling bath 15 and the
25 base extends out of the cooling bath at the end 14. The base 18 supports posts 19 which in turn support cross member 20 to form a rigid frame structure. The frame structure supports a series of pulleys 21 which are arranged to accommodate a

continuous belt 22 which passes over the pulleys and through the cavity as can be seen clearly in the drawings. The belt passes only through the first portion of the cavity. A vacuum hose 23 is connected to the top of the forming block 13 for the purpose of applying a vacuum to the first portion of the cavity.

5 The belt 22 is a moulded belt and the outer surface or face of the belt is moulded with any particular pattern which is to be embossed onto the strip material 12 as it passes through the forming block. Alternatively, the outer surface or face may be carried on a metal link chain belt or a rubber belt. Once it is moulded, the belt is joined to form a continuous belt. The pulleys 21, or at least one of the pulleys,
10 is adjustable to allow the correct tensioning of the belt 22. As can be seen in Figure 2, the belt enters the cavity at the inlet end and exits the cavity at the opening 17. As shown in Fig. 3, the cavity also defines a dedicated recess for receiving the belt 22, the cross-section of the recess being complementary to the cross-section of the belt. The plastics material used to form the strip material 12
15 includes a foaming agent such that upon entering the cavity the strip material expands to fill the cavity and form the shape defined by the cavity and belt 22 of the forming block 13. The belt 22 is caused to move through the cavity together with the strip material 12 and in so doing creates embossing on the surface of the strip material which is in contact with the belt 22. Because the belt 22 moves at
20 the same speed as the strip material 12, any form of embossed surface may be readily formed on the strip material. The strip material then continues for some distance in the cooling bath 15 whereby it solidifies and forms the completed continuous strip.

Whilst a particular embodiment of the invention has been described hereinabove,
25 it will be readily apparent to persons skilled in the art that modifications may be readily effected without departing from the spirit and scope of the invention. For example, whilst the above described embodiment uses a continuous belt to provide the embossing, it is conceivable that in some situations a wheel may be adapted to rotate in register with the die cavity to provide the moving surface which creates

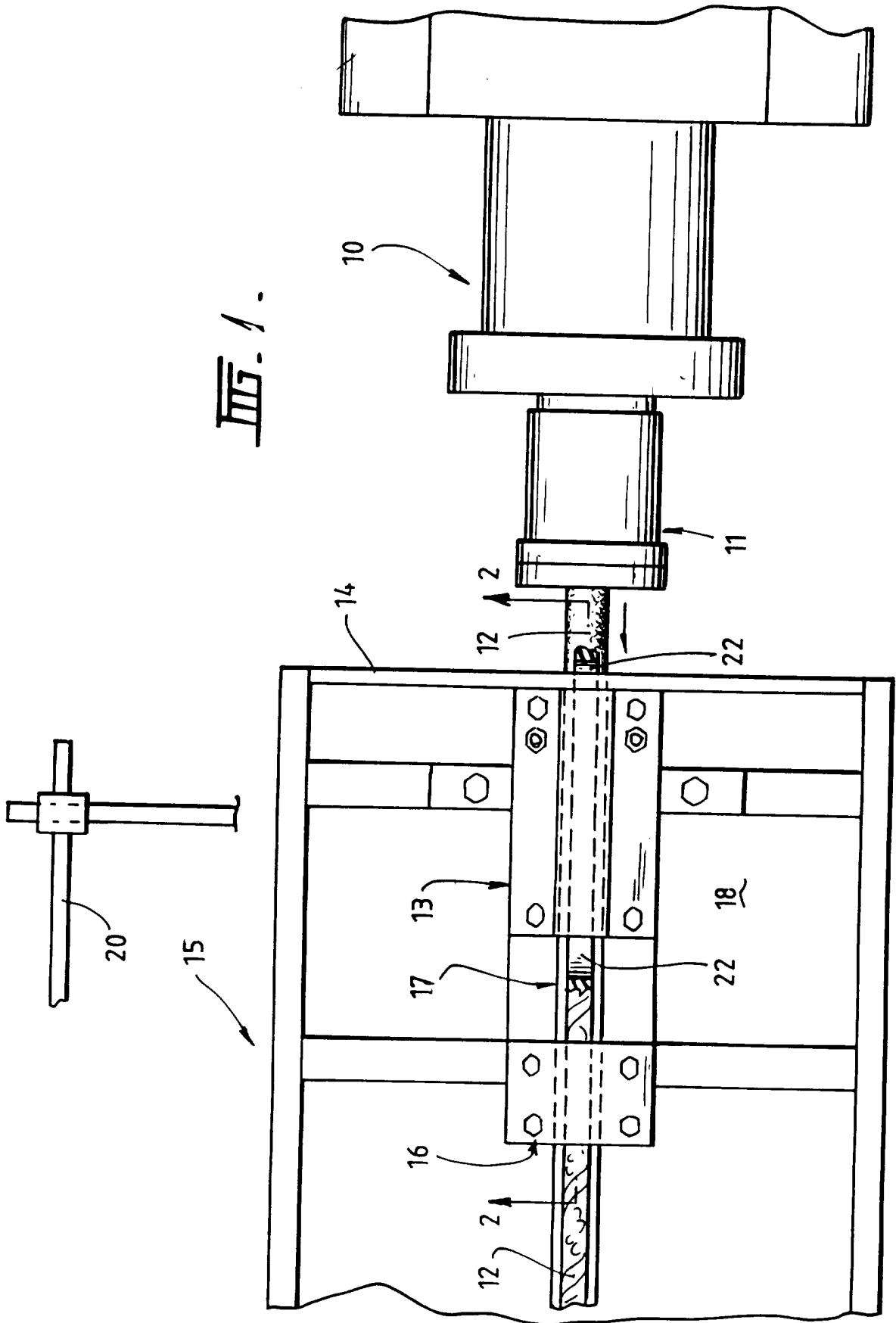
the embossing. Furthermore, the arrangement and construction of the apparatus may vary considerably from that shown in the attached drawings.

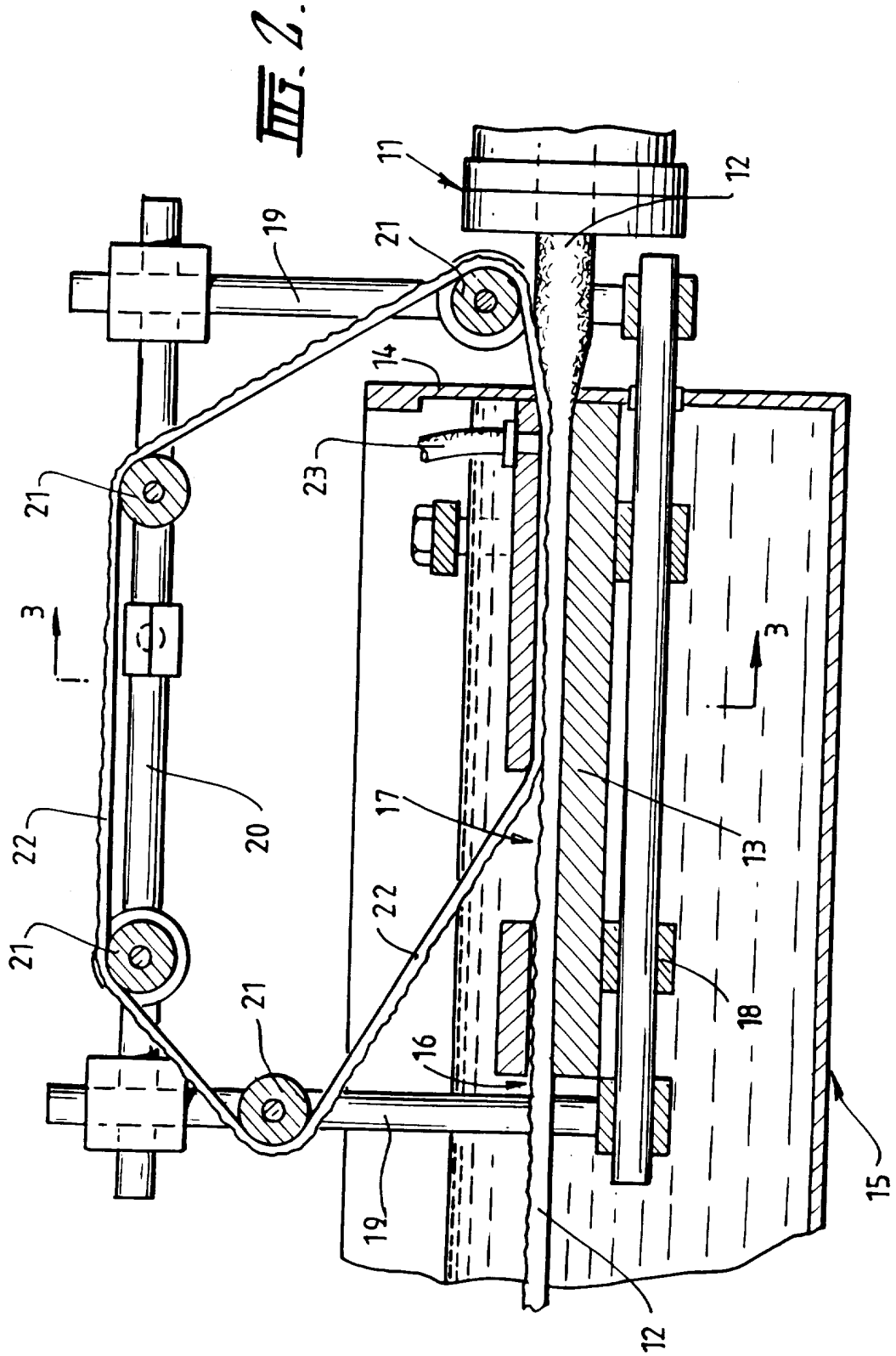
Since modifications within the spirit and scope of the invention may be readily effected by persons skilled in the art, it is to be understood that the invention is not
5 limited to the particular embodiment described, by way of example, hereinabove.

Claims:

1. A forming block to facilitate the production of embossed extruded product, said forming block including a continuous moveable surface which is adapted to move in contact with extruded product passing through the forming block, said moveable surface having a pattern thereon which is complementary to the pattern which is thereby embossed onto said extruded product.
2. The forming block as claimed in claim 1 wherein the moveable surface is a continuous belt.
3. The forming block as claimed in claim 2 wherein the forming block includes a cavity extending therethrough, the belt and the extruded product passing together through at least a first portion of the cavity.
4. The forming block as claimed in claim 3 wherein the forming block includes said first portion, a second portion and an opening provided in the forming block between the first portion and the second portion, the belt extending out of the cavity through said opening.
5. The forming block as claimed in claim 3 or claim 4 wherein the first portion of the cavity also defines a recess for receiving the moving belt, the recess being complementary to the shape of the belt.
6. The forming block as claimed in claim 2 wherein the belt includes an outer moulded face defining the pattern.
7. The forming block as claimed in claim 1 wherein the forming block receives the extruded product from an outlet of an extruding machine.

8. The forming block as claimed in claim 1 wherein the forming block is located in a cooling bath.
9. A method of extruding decorative strip material having an embossed surface, said method comprising passing strip material from an extruder through a forming block, providing a moveable surface having a pattern thereon, and moving the moveable surface through the forming block in contact with said strip material to form said embossed surface.





III. 2.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 95/00837

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl⁶: B29C 59/04, 47/08; B29D 12/00

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(6):B29C 59/04, 47/08; B29D 12/00

IPC(3):B29G 2/00

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, 4128369,A,(KEMERER et al) 5 December 1978	1, 2, 6-9
X	US, 4230649,A,(BOHM et al) 28 October 1980	1, 2, 6-9
X	US, 4290248,A,(KEMERER et al) 22 September 1981	1, 2, 6-9

Further documents are listed in the continuation of Box C

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Date of the actual completion of the international search
23 February 1996

Date of mailing of the international search report

8th March 1996

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International Application No.

PCT/AU 95/00837

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP, 283284,A2,(HITEK LTD)21 September 1988	1, 2, 9
X	EP, 315012,A2,(UNICOR GmbH) 10 May 1989	1, 2, 6-9
X	DE, 4034254,C2,(UPONOR N.V.) 2 May 1991	1, 2, 6-9

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 95/00837

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian 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		Patent Family Member					
US	4128369	CA	1078124	DE	2600144	FR	2296506
		GB	1540091	IT	1059561	JP	51135962
		NL	7600092	US	4290248		
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		NO	885104	NZ	223932	PT	87003
		US	4994229	WO	8806965		
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DE	4034254	AU	64845/90	CA	2027691	FI	895105
		JP	3164228	US	5171500		

END OF ANNEX