SPRUSON & FERGUSON

COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1952

DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT

In support of the Convention Application made for a patent for an invention entitled:

Process and Device for Producing Large Hollow Plastic Bodies with Multi-Layered Walls

I, Gunther Richter, of Johannistal 12, D-5230 Altenkirchen, Federal Republic of Germany

do solemnly and sincerely declare as follows:-

1. I am the applicant for the patent.

2. The basic application as defined by Section 141 of the Act was made in Federal Republic of Germany on 17 October 1986 by GUNTHER RICHTER

3. I am the actual inventor of the invention.

4. The basic application referred to in paragraph 2 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application.

DECLARED at Altenkirchen this 30 day of June 1989

.....Gunther Richter.....
Gunther Richter

TO: THE COMMISSIONER OF PATENTS
AUSTRALIA

cjd142M

(12) PATENT ABRIDGMENT (11) Document No. AU-B-11037/88
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 602188

(54) Title
PROCESS AND DEVICE FOR PRODUCING LARGE HOLLOW PLASTIC BODIES WITH MULTI-LAYERED WALLS

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(57) Claim

1. A process for the discontinuous manufacture of co-extruded, hose-like multi-layer preforms from thermoplastic material to form large-volume multi-layer hollow bodies in a subdivided blowing mould in which at least two different annular melts are merged into a multi-layer melt and wherein this molten multi-layer material flows in a funnel-like flaring fashion into an annular storage space and is therefrom expelled by an annular piston which can be moved in the axial direction, acts as a co-extrusion head, and is urged upward through an annular nozzle gap by the molten multi-layer material, wherein the individual molten materials are in succession centrally merged within the annular piston to form a multi-layer melt.

2. Apparatus for the discontinuous manufacture of co-extruded, hose-like multi-layer preforms from thermoplastic material to form large-volume multi-layer hollow bodies in a subdivided blowing mould, comprising a co-extrusion head with a plurality of coaxially arranged annular flow channels which are connected via separate flow channel bores to extruder means which supply molten materials, said molten materials merging in a common, funnel-like flaring flow channel; an annular storage

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space accommodating an annular piston adapted to slide; and an annular channel following the annular storage space with a nozzle gap adapted to be closed, wherein the annular piston is provided with a plurality of annular flow channels, one said flow channel being provided for each of the material layers, said flow channels pointing in the direction of extrusion, the flow channels being arranged centrally and concentrically one behind the other inside the annular piston and merging with the common flow channel inside the annular piston.

AU-AI-11037/88

PCT

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Internationales Büro

INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation 4 :		(11) Internationale Veröffentlichungsnummer: WO 88/ 02689
B29C 47/04, 49/22	A2	(43) Internationales Veröffentlichungsdatum: 21. April 1988 (21.04.88)

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(81) Bestimmungsstaaten: AT (europäisches Patent), AU, BE (europäisches Patent), CH (europäisches Patent), DE (europäisches Patent), FR (europäisches Patent), GB (europäisches Patent), IT (europäisches Patent), JP, LU (europäisches Patent), NL (europäisches Patent), SE (europäisches Patent).

Veröffentlicht
Ohne internationalen Recherchenbericht und erneut zu veröffentlichen nach Erhalt des Berichts.

This document contains the amendments made under Section 49 and is correct for printing.

A.U.J.P. - 2 JUN 1988

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- 6 MAY 1988
PATENT OFFICE

(54) Title: PROCESS AND DEVICE FOR PRODUCING LARGE HOLLOW PLASTIC BODIES WITH MULTI-LAYERED WALLS

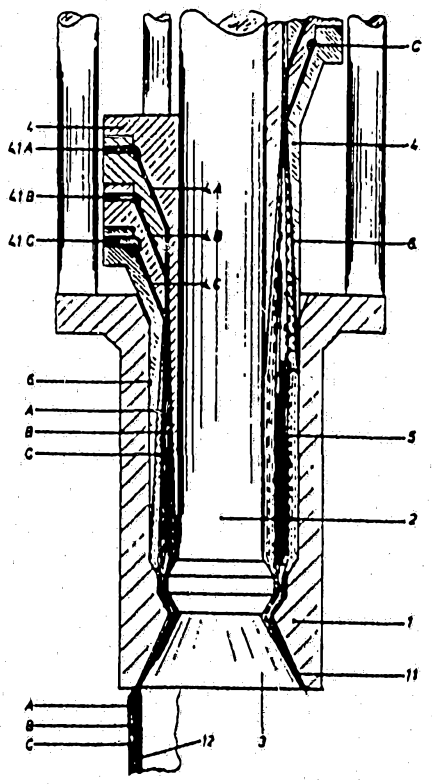
(54) Bezeichnung: VERFAHREN UND VORRICHTUNG ZUR HERSTELLUNG GROSSVOLUMIGER HOHLKÖRPER AUS KUNSTSTOFF MIT MEHRSCHICHTIGEN WANDUNGEN

(57) Abstract

Process and device for producing large hollow bodies with multilayered plastic walls. In order to reduce the cost of the process and its control, and to obtain a uniform wall layer profile, several layers of material are brought together within an axially movable annular piston, forming a multilayered molten mass. The multilayered molton mass flows inside the annular piston, fanning out in the direction of an annular storage space. The annular piston is moved backwards by the molten mass and the latter is pressed out of an extrusion die as a multilayered extruded material by the forward movement of the annular piston.

(57) Zusammenfassung

Verfahren und Vorrichtung zur Herstellung großvolumiger Hohlkörper mit einer mehrschichtigen Wandung aus Kunststoff. Um den verfahrens- und steuerungstechnischen Aufwand zu verringern und ein gleichmäßiges Wandschichtenprofil zu erhalten, werden mehrere Materialschichten innerhalb eines in axialer Richtung beweglichen Ringkolbens zu einer mehrschichtigen Materialschmelze zusammengeführt, diese mehrschichtige Materialschmelze fließt innerhalb des Ringkolbens sich trichterförmig erweiternd in einen Ringspeicherraum, der Ringkolben wird von der Materialschmelze zurückbewegt und die Materialschmelze wird durch Vorwärtsbewegung des Ringkolbens als mehrschichtiges Extrudat aus einer Düse ausgepreßt.



Method and Apparatus for the Discontinuous Manufacture of Co-Extruded, Hose-Like Multi-Layer Preforms from Thermoplastic Material to Form Large-Volume Multi-Layer Hollow Bodies

The invention relates to a process for the discontinuous manufacture of co-extruded, hose-like multi-layer preforms from thermoplastic material to form large-volume multi-layer hollow bodies in a subdivided blowing mould in which at least two different annular melts are merged into a multi-layer melt and wherein this molten multi-layer material flows in a funnel-like flaring fashion into an annular storage space and is therefrom expelled by an annular piston which can be moved in the axial direction, acts as a co-extrusion head, and is urged upward through an annular nozzle gap by the molten multi-layer material, and to apparatus for practising this process.

From the generic German Patent Application 27 12 910 Laid Open for Public Inspection (Figure 3) there is known a process for the discontinuous manufacture of co-extruded hose-like multi-layer preforms from thermoplastic material to form multi-layer hollow bodies in a subdivided blowing mould, wherein the various molten materials are introduced into special guide slits of an annular piston and are converted to ring shape by 180° deflections. These ring-shaped molten masses merge in a radially directed peripheral channel from which, after an additional 90° reflection, they pass into a common annular flow channel. This flow channel discharges on one side into an annular storage space preceding the annular piston, with the annular piston being pushed back by the inflowing melt and with the annular storage space, which increases in this way, being filled. Subsequently, these molten materials are expelled by the annular piston through a nozzle gap which can be closed. Merging of the two molten materials under an almost obtuse angle necessarily causes the individual molten materials to develop into a not precisely predictable wall thickness of the molten multi-layer material. As a consequence of the 90° deflection of the molten multi-layer material, the development of the wall thickness of the individual melts is impaired in the composite structure.

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When the two-layer melt flows on one side into the annular storage space, there, and in the exit from the annular storage space, the various melts travel greatly different path lengths, which likewise may detrimentally affect the wall thicknesses of the individual melts. All these effects contribute to changes of the layer thicknesses and this manifests itself in a detrimental fashion in the blown hollow body, e.g., in the form of a partial destruction of a layer. These shortcomings play a greater role when the size of the hollow body to be manufactured increases. This known process is unsuitable in the case of large-volume hollow bodies which have a volume in excess of 20 litres, and have, say, 1000 litres.

To the storage head according to European Patent Application 0,249,866 there are fed at least two different molten materials which are introduced into separate, coaxially disposed feed channels of a stationary co-extrusion head, the channels having annular cross section. All the feed channels merge at one point from which the multi-layer melt flows into an annular channel. At its end far from the feed channels, the annular channel becomes an expanded channel portion the largest cross section of which corresponds to the cross section of an expansion space in the annular piston. This expanded channel portion is relatively short so that the molten multi-layer material is forced to greatly expand over a relatively short path length. Up to this region of expansion, the sequences of operations of Figures 1 and 2 and of Figures 3 and 4 of European Patent Application 0,249,866 are indentical.

In the embodiment according to Figures 1 and 2, the molten multi-layer material flows from the expansion space into the pile-up space or annular storage space through a second enlarged portion formed by slopes. There an other expansion or change in the cross section of the molten multi-layer material takes place. The same is pushed back into its position according to Figure 2 by slopes of the annular piston. As soon as the pile-up space is completely filled with the molten multi-layer material, the expulsion movement

is initiated by the downward movable annular piston, and a hose-like multi-layer preform is produced via an annular nozzle. Specifically the second enlargement of the cross section or the expansion of the molten multi-layer material (the first [expansion] takes place in the enlarged channel portion and the second expansion occurs in the region of the slopes of the annular piston) implies the risk of not maintaining the structure of the molten multi-layer material. The thicknesses of the inidividual layers of the melt can deform in dissimilar fashion so that the hose-like preform, but even more so, the blown finished hollow body, no longer has the desired layer thicknesses. But it is the greatest disadvantage of the process sequence of Figures 1 and 2 that, upon extruding the hose-like preform, i.e., in the movement of the annular piston from the position shown in Figure 2 into the position shown in Figure 1, the pile-up space is not fully emptied in the direction of flow and part of the multi-layer melt, which is located in the pile-up space, must flow back into the expansion space. This further impairs the structure of the molten multi-layer material yet manifests itself only in the subseqeunt preform. There the desired layer thicknesses may no longer be present or at least the outer layer may be destroyed.

Also in the embodiment shown in Figures 3 and 4 of European Patent Application 0,249,866 the cross section of the multi-layer melt is changed several times. At first the multi-layer melt expands when it flows from the annular channel into the expansion space which also forms the annular storage space. On this occasion, the annular piston is moved from its position of filling shown in Figure 3 into the position of expulsion shown in Figure 4. The cross section of the multi-layer melt is deformed from the expansion space when the melt flows through the tapering portion into the annular channel confined by sealing rings. Behind this annular channel the multi-layer melt expands again when it flows into the larger annular space which precedes the nozzle line and which is not marked per se. This annular space is defined by the sealing rings and is formed when the annular piston moves from the position shown in Figure 3 into the position shown in Figure 4. This movement takes place against the direction of flow of the multi-layer melt and may likewise impair the structure of the multi-layer melt, particularly of the outer layer.

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The above-cited annular space is reduced during the oppositely directed movement of the annular piston, i.e., when the expansion space is being filled. This means that the major part of the molten multi-layer material which is in this annular space (the nozzle being closed) must flow back into the annular channel which is confined by the two sealing rings. This return flow of the multi-layer melt likewise impairs the structure of the individual layers whereby at least the outermost layer of the next preform and of the blown hollow body is strongly affected if not interrupted.

When compared with the storage head known from Figure 3 of German Patent Application 27 12 910 Laid Open for Public Inspection and the process practised with it, the goal of the present invention is to create a process according to Claim 1, wherein mixing of the material layers is ensured and undesirable changes in layer thickness during flowing into the annular storage space or during the expulsion operation, particularly in the subsequent blowing of the hollow body, are precluded.

In order to solve the problem, the process steps recited in patent claim 1 are proposed. The gradual, funnel-like flaring transition of the multi-layer melt from the annular channel to the annular storage space (which transition takes place only in the annular piston) ensures that the individual layers of the melt are not modified in their structure but are rather conserved.

Multiple changes in the cross section of the multi-layer melt or even a return flow of the multi-layer melt do not occur.

Apparatus for practicing the process according to the invention is defined in Claims 2 - 8.

In what follows, the invention is explained in detail by way of an embodiment shown in a drawing. There show
Figure 1, a cross section of an annular piston store of apparatus according to the invention;
Figure 2, the annular piston store of Figure 1 with extruder means; and

Figure 3, an enlarged partial section of the annular piston store of Figure 1 with the individual material layers.

Figure 1 of the drawing shows an annular piston store or annular pile-up head which serves to manufacture multi-layered co-extruded hose-shaped preforms from a thermoplastic material to form large-volume multi-layer hollow bodies in a subdivided blowing mould. In this embodiment, the wall of the hose-like preform and, hence, the wall of the ensuing hollow body are formed by three layers or three molten materials A, B, C. The annular piston store or annular pile-up head is composed of a mantle 1 which is joined with a housing not indicated in detail. Within mantle 1 there is a spindle 2 which is adapted to slide axially with a mushroom-shaped nozzle 3 and through which an annular nozzle gap 11 can be opened between mantle 1 and spindle 2 (Figure 3). For the purpose of moving spindle 2 and, hence, mushroom-shaped nozzle 3 in the axial direction, spindle 2 at its end far from mushroom-shaped nozzle 3 is provided with a piston 8 which is guided in the housing and, when necessary, can be subjected to a pressure on one of its two sides.

On spindle 2 and inside mantle 1 there is guided an annular piston 4 adapted to be moved axially, which annular piston likewise can be moved toward mushroom-shaped nozzle 3 through a piston 7 disposed inside the housing. For this purpose, piston 7 is one one side subjected to a pressure medium.

In the embodiment illustrated, annular piston 4 is composed of four fixedly joined annular piston portions which are configured and assembled so that an annular flow channel 4.A, 4.B, 4.C. is formed between the respective neighbouring annular piston portions. Each of the annular flow channels 4.A, 4.B, 4.C communicates with a radially extending flow channel bore 4.1A, 4.1B, 4.1C (Figure 3) in the region of each of which an extruder 9, 10 is connected. Extruders 9, 10 are arranged in, say, a star-like configuration around the annular piston store or the annular pile-up head so that the third extruder cannot be recognzied in the drawing or, for the sake of improving the representation, was not sketched or marked. In principle, it is possible to connect

two flow channels 4.A and 4.C., to a common extruder 9 or 10. But this implies that the corresponding layers or melts A and C can be composed of the same material. In the embodiment described, molten material A is polyethylene, molten material B is an adhesion promoter, and molten material C is a barrier material, e.g., EVOH. The corresponding melts are present in extruders 9, 10. These extruders 9, 10 are connected with annular piston 4 through articulated joints 9.2, 10.2.

When viewed in the axial direction, annular flow channels 4.A, 4.B, 4.C become a common flow channel 6 which is disposed in central position in annular piston 4. Flow channel 6 is delimited by annular protrusions which are located at the front and rear annular portions of annular piston 4. Annular flow channel 6 flares gradually, fully inside annular piston 4, in a funnel-shaped fashion and expands up to approximately the width of annular storage space 5. In order to ensure that extruders 9, 10, which have an articulated connection to annular piston 4, can follow the movement of annular piston 4, extruders 9, 10 are mounted in an articulation which can be additionally moved in the axial direction.

In the operation of the apparatus described above, annular piston 4 assumes an initial position in which it is as close as possible to nozzle 11 or to the mushroom-shaped nozzle 3, i.e., the annular protrusions of the piston members protrude as far as possible into annular storage space 5 (left part of Figure 3). Molten materials A, B, C, which flow in through flow channel bores 4.1A, 4.1B, 4.1C and flow channels 4.A, 4.B, 4.C, merge in succession in flow channel 6 and, after that, flow into annular storage space 5 through the gradually, funnel-like expanding flow channel 6. While this happens, annular piston 4 is retracted or withdrawn in accordance with the volume to be expelled (Figure 3, right side). In annular storage space 5 there are now three annular layers of different molten materials A, B, C. As soon as annular piston 4 has assumed its predetermined end position as shown on the right side of Figure 3, piston 7 is subjected to the pressure medium. As a consequence, annular piston 4 moves from the right-side representation back into the left-side representation of Figure 3, and molten materials A, B, C of

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annular storage space 5 are expelled as extrudates by annular piston 4 via the nozzle gap 11 which was opened in the meantime. This extrudate 12 forms a multi-layer hose-like preform which is composed of three different layers in accordance with the different molten materials A, B, C. It turned out that destruction of these layers or modification of the layer thicknesses do not occur during the extrusion operation. The individual layers behave precisely proportionately to the changes in the cross sections in the flow process, during both the conveying and the expulsion operations.

By modifying the embodiment described, the annular pistons 4 can be rigidly joined with extruders 9, 10. However, in this case extruders 9, 10 must be supported so that they can move. Furthermore, annular piston 4 and extruders 9, 10 can be rigidly joined with the frame of the machine. But in this case, mantle 1 and spindle 2 with mushroom-shaped nozzle 3 must perform the vertical motion. For reasons originating from the specific synthetic material, it may be expedient to have a melt produced by only one extruder flow through two annular flow channels, e.g., 4.A, 4.B, into common flow channel 6. On the other hand, two melts of an adhesion promoting agent can be fed via separate flow channels to the common channel 6 between two molten materials the two outer melts of which can be composed of the same material [sic] In all cases the different molten materials merge only in channel 6 or in annular piston 4.

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The claims defining the invention are as follows:

1. A process for the discontinuous manufacture of co-extruded, hose-like multi-layer preforms from thermoplastic material to form large-volume multi-layer hollow bodies in a subdivided blowing mould in which at least two different annular melts are merged into a multi-layer melt and wherein this molten multi-layer material flows in a funnel-like flaring fashion into an annular storage space and is therefrom expelled by an annular piston which can be moved in the axial direction, acts as a co-extrusion head, and is urged upward through an annular nozzle gap by the molten multi-layer material, wherein the individual molten materials are in succession centrally merged within the annular piston to form a multi-layer melt.

2. Apparatus for the discontinuous manufacture of co-extruded, hose-like multi-layer preforms from thermoplastic material to form large-volume multi-layer hollow bodies in a subdivided blowing mould, comprising a co-extrusion head with a plurality of coaxially arranged annular flow channels which are connected via separate flow channel bores to extruder means which supply molten materials, said molten materials merging in a common, funnel-like flaring flow channel; an annular storage space accommodating an annular piston adapted to slide; and an annular channel following the annular storage space with a nozzle gap adapted to be closed, wherein the annular piston is provided with a plurality of annular flow channels, one said flow channel being provided for each of the material layers, said flow channels pointing in the direction of extrusion, the flow channels being arranged centrally and concentrically one behind the other inside the annular piston and merging with the common flow channel inside the annular piston.

3. The apparatus according to claim 2, wherein the flow channel flares to the width of the annular storage space fully inside the annular piston.

4. The apparatus according to claim 2 or 3, wherein the annular piston comprises:

at least two intermediate annular piston portions formed between the annular flow channels;

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inner and outer annular piston portions formed outside the annular flow channels; said piston portions concentric about a same axis.

5. The apparatus according to claim 4, wherein the inner, as well as the outer, annular piston portions have circumferential, axially extending protrusions of wedge-shaped cross section.

6. The apparatus according to any one of claims 2-5, wherein the extruder means are connected with the annular piston through articulated connection means and are mounted, near their drive means, on a rotatable shaft adapted to be moved in the longitudinal direction of the extruder means.

7. The apparatus according to any one of claims 2-5, wherein the extruder means are firmly connected with the annular piston and adapted to be moved together with the annular piston.

8. The apparatus according to any one of claims 2-5, wherein the annular piston and the extruder means are stationary and both the mantle and the spindle of the annular storage space are adapted to be moved.

9. A process for the discontinuous manufacture of co-extruded hose-like multilayer preforms from thermoplastic material substantially as hereinbefore described with reference to the accompanying drawings.

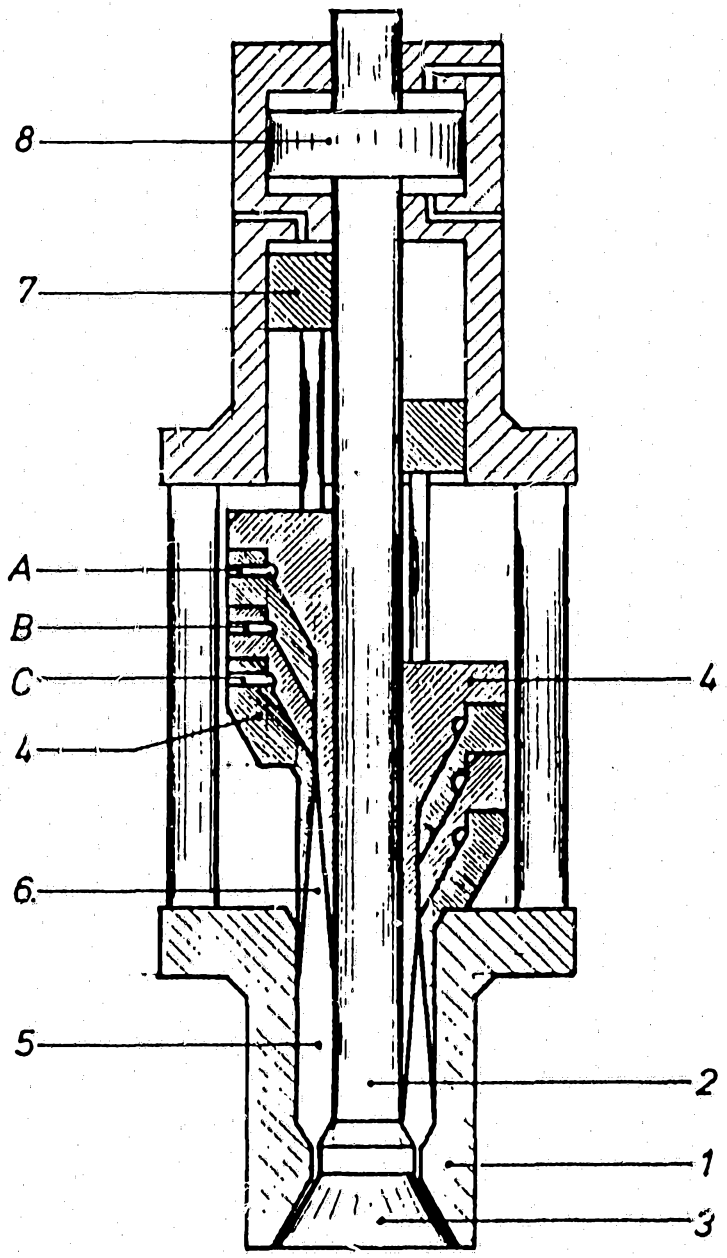
10. Apparatus for the discontinuous manufacture of co-extruded hose-like multilayer preforms from thermoplastic material substantially as hereinbefore described with reference to the accompanying drawings.

DATED this EIGHTEENTH day of JULY 1990
Gunther Richter

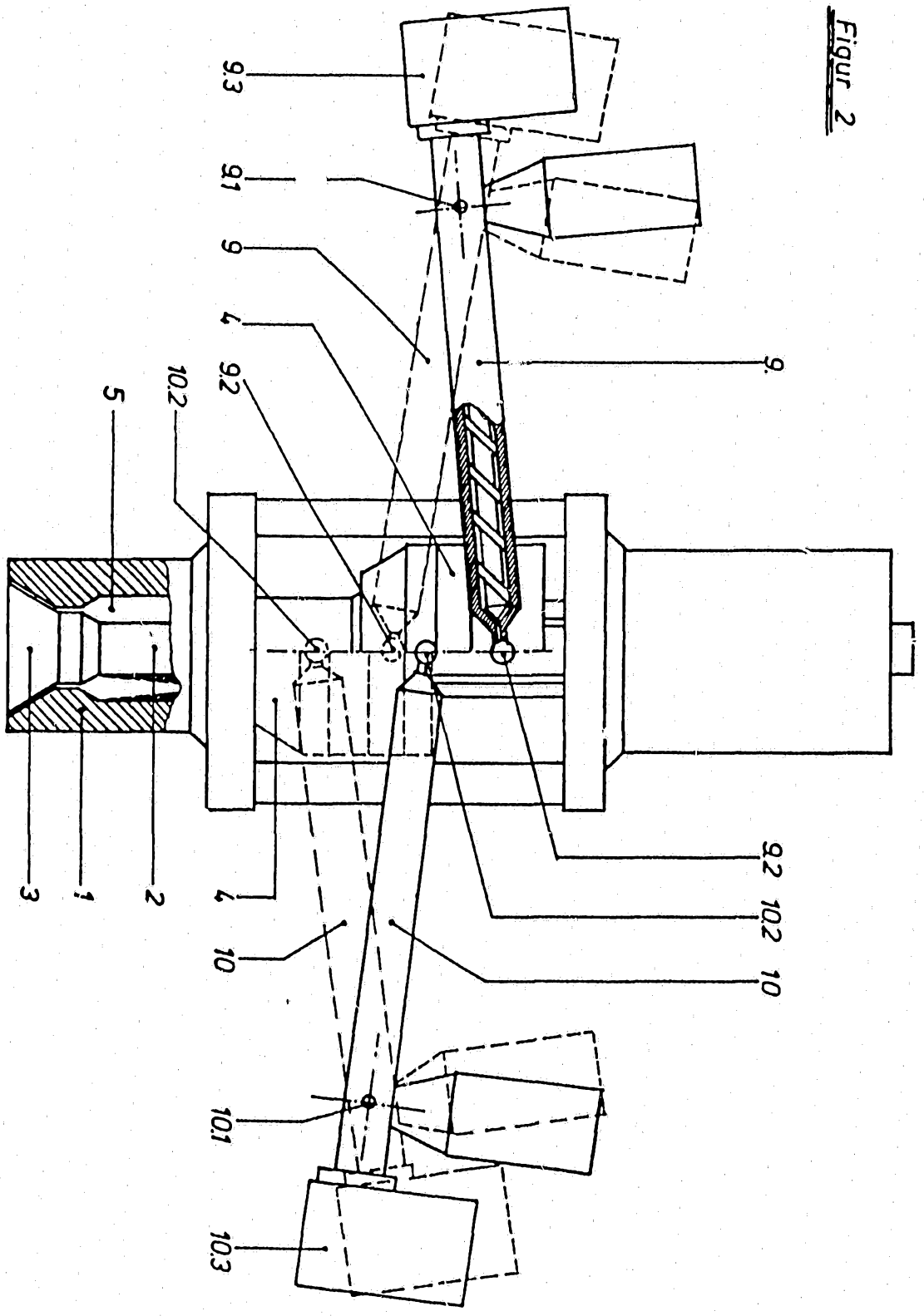
Patent Attorneys for the Applicant
SPRUSON & FERGUSON

STA/1345w

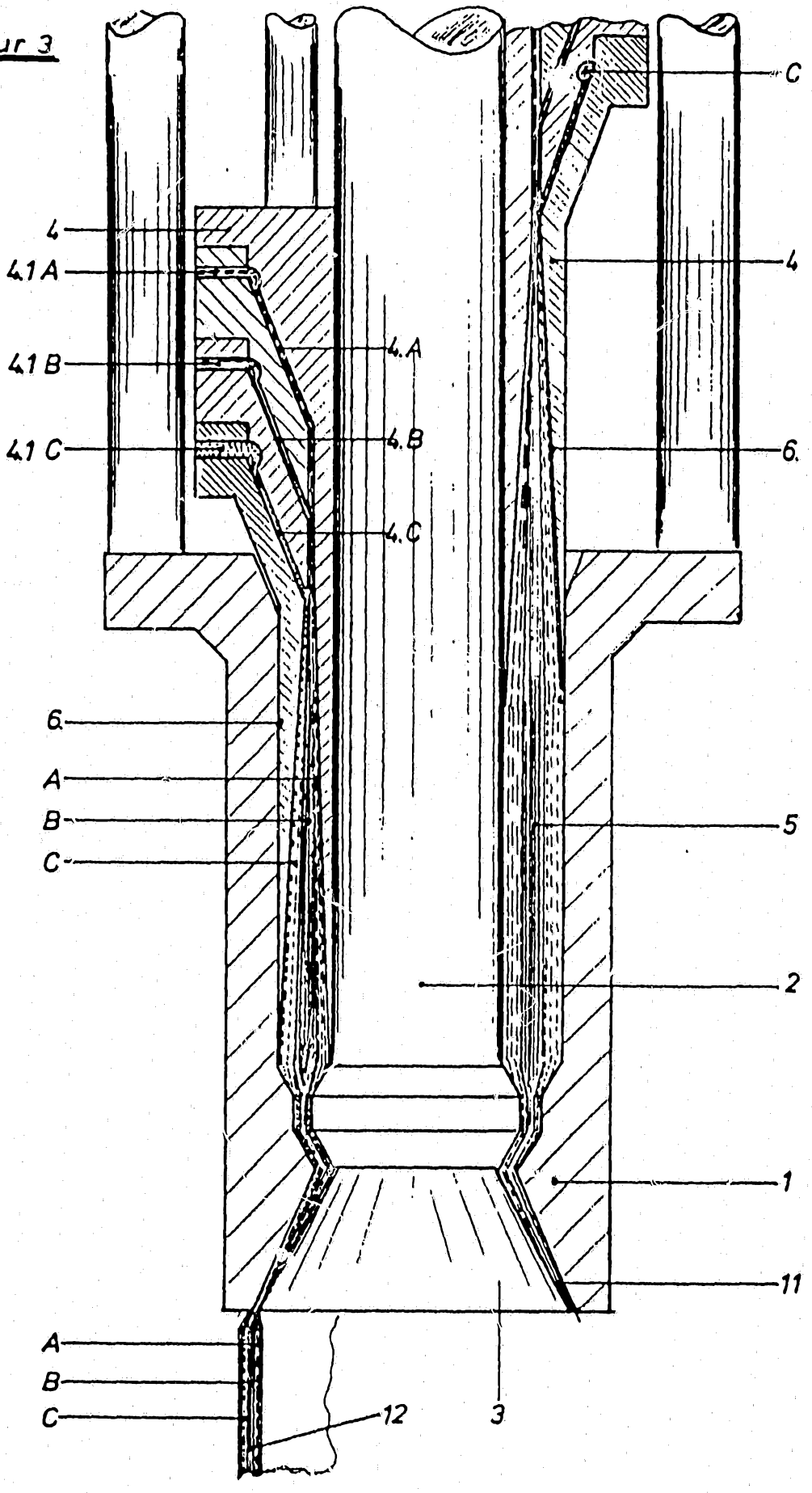
Figur 1



Figur 2



Figur 3



INTERNATIONAL SEARCH REPORT

International Application No PCT/EP87/00606

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

Int.Cl.[4] B 29 C 47/04; B 29 C 49/22

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
Int.Cl.[4]	B 29 C

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

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]
X	DE, A, 2712910 (MAUSER KG) 28 September 1978, see page 9, line 25- page 10, line 9; figure 3	1,2
Y		3-5
Y	FR, A, 2369923 (KOBE STEEL LTD) 2 June 1978, see claims; figures	3
Y	DE, B, 1113804 (ARMATUREN J. FISCHER) 14 September 1961, see claims; figure 1	4,5
X	US, A, 4152104 (D. PRZYTULLA et al.) 1st May 1979, see column 4, line 62 - column 5, line 34; figure 3	1,2
A	US, A, 4208178 (D. PRZYTULLA) 17 June 1980, see abstract; figures 3,4	1,2
A	DE, A, 2712911 (MAUSER KG) 28 September 1978, see page 7, line 32 - page 8, line 14; figure 3	1,2

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* 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
13 April 1988 (13.04.88)	19 May 1988 (19.05.88)
International Searching Authority	**Signature of Authorized Officer**
European Patent Office	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
E	EP, A, 0249866 (BEKUM MASCHINENFABRIK GmbH) 23 December 1987, see claims; figures	1,2
A	US, A, 3734662 (P.E. HARMON et al.) 22 May 1973, see the abstract; figures 1,2,4	1,2
A	DE, A, 2556350 (W. HABERLE) 23 June 1977, see claims; figures	4,5
A	FR, A, 2299957 (ISHIKAWAJIMA-HARIMA JUKOGYO K.K.) 3 September 1976, see figures	1,2
A	EP, A, 0110493 (AMERICAN CAN CO.) 13 June 1984, see figures	1,2

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. EP 8700606 SA 20059

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 European Patent Office EDP file on 04/05/88
The European 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
DE-A- 2712910	28-09-78	Keine	
FR-A- 2369923	02-06-78	NL-A- 7708676	10-05-78
		DE-A,B,C 2735571	24-05-78
		JP-A- 53059753	29-05-78
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		JP-A- 51103158	11-09-76
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		AU-A- 2181083	07-06-84
		US-A- 4522775	11-06-85

INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen PCT/EP 87/00606

I. KLASSIFIKATION DES ANMELDUNGSGEGENSTANDS (bei mehreren Klassifikationssymbolen sind alle anzugeben)[6]

Nach der Internationalen Patentklassifikation (IPC) oder nach der nationalen Klassifikation und der IPC

Int Cl 4 B 29 C 47/04; B 29 C 49/22

II. RECHERCHIERTE SACHGEBIETE

Recherchierter Mindestprüfstoff[7]

Klassifikationssystem	Klassifikationssymbole
Int. Cl 4	B 29 C

Recherchierte nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Sachgebiete fallen[8]

III. EINSCHLÄGIGE VERÖFFENTLICHUNGEN[9]

Art*	Kennzeichnung der Veröffentlichung[11], soweit erforderlich unter Angabe der maßgeblichen Teile[12]	Betr. Anspruch Nr.[13]
X	DE, A, 2712910 (MAUSER KG) 28. September 1978 siehe Seite 9, Zeile 25 - Seite 10, Zeile 9; Abbildung 3	1,2
Y		3-5
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Y	FR, A, 2369923 (KOBE STEEL LTD) 2. Juni 1978 siehe Ansprüche; Abbildungen	3
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Y	DE, B, 1113804 (ARMATUREN J. FISCHER) 14. September 1961 siehe Ansprüche; Abbildung 1	4,5
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X	US, A, 4152104 (D. PRZYTULLA et al.) 1. Mai 1979 siehe Spalte 4, Zeile 62 - Spalte 5, Zeile 34; Abbildung 3	1,2
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A	US, A, 4208178 (D. PRZYTULLA) 17. Juni 1980 siehe Zusammenfassung; Abbildung 3,4	1,2
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* Besondere Kategorien von angegebenen Veröffentlichungen[10]:

"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist

"E" älteres Dokument, das jedoch erst am oder nach dem Internationalen Anmeldedatum veröffentlicht worden ist

"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)

"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht

"P" Veröffentlichung, die vor dem Internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist

"T" Spätere Veröffentlichung, die nach dem Internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zum Verständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist

"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden

"Y" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist

"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist

IV. BESCHEINIGUNG

Datum des Abschlusses der Internationalen Recherche	Absendedatum des Internationalen Recherchenberichts
13. April 1988	19 MAY 1988
Internationale Recherchenbehörde	**Unterschrift des bevollmächtigten Bediensteten**
Europäisches Patentamt	P.C.G. VAN DER PUTTEN

Internationales Aktenzeichen PCT/EP 87/00606

III. EINSCHLÄGIGE VERÖFFENTLICHUNGEN (Fortsetzung von Blatt 2)

Art *	Kennzeichnung der Veröffentlichung, soweit erforderlich unter Angabe der maßgeblichen Teile	Betr. Anspruch Nr.
A	DE, A, 2712911 (MAUSER KG) 28. September 1978 siehe Seite 7, Zeile 32 - Seite 8, Zeile 14; Abbildung 3 --	1,2
E	EP, A, 0249866 (BEKUM MASCHINENFABRIK GmbH) 23. Dezember 1987 siehe Ansprüche; Abbildungen --	1,2
A	US, A, 3734662 (P.E. HARMON et al.) 22. Mai 1973 siehe Zusammenfassung; Abbildungen 1,2,4 --	3
A	DE, A, 2556350 (W. HABERLE) 23. Juni 1977 siehe Ansprüche; Abbildungen --	4,5
A	FR, A, 2299957 (ISHIKAWAJIMA-HARIMA JUKOGYO K.K.) 3. September 1976 siehe Abbildungen --	1,2
A	EP, A, 0110493 (AMERICAN CAN CO.) 13. Juni 1984 siehe Abbildungen	1,2

ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR.

EP 8700606
SA 20059

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben.
Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am 04/05/88
Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

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		AU-A- 2181083	07-06-84
		US-A- 4522775	11-06-85

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