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Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

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- with international search report

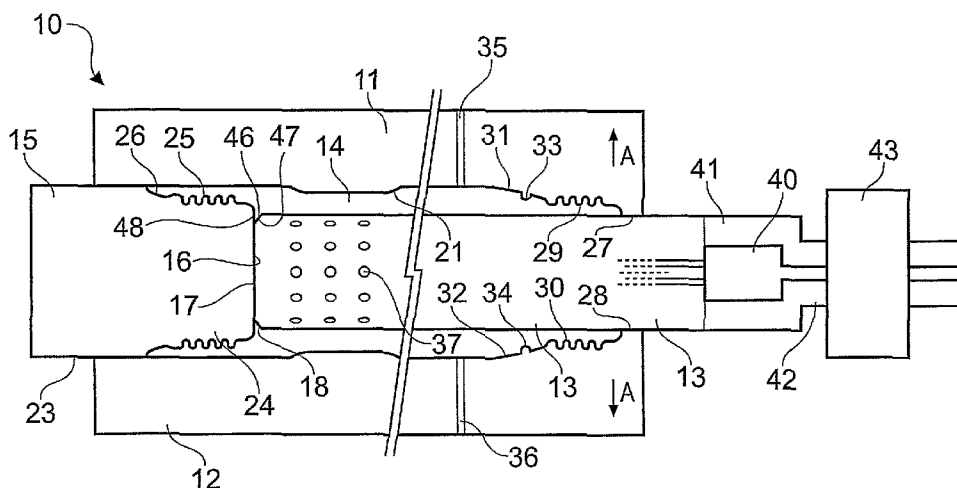
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26 April 2007

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND APPARATUS FOR THE PRODUCTION OF HOLLOW MOULDED ARTICLES AND A HOLLOW MOULDED ARTICLE MADE BY THE METHOD



(57) Abstract: A method of producing an injection-moulded plastics article (10) having a hollow interior, such as a pipe section, comprises the steps of forming a mould cavity having outer dye parts (11, 12) and an inner mandrill (13) to define an annular mould cavity, introducing plastics material into the mould cavity (14) and delivering a pressurised fluid to the interface between the mandrill and the inner surface of the moulded article through passages (37) in the mandrill (13) opening to the surface thereof, and withdrawing the mandrill (13) while maintaining the outer dye parts (11, 12) in a closed condition. Apparatus for producing such hollow moulded article, the hollow moulded article itself, and a method of lining an aged, broken or damaged pre-existing pipeline are also described.

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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/GB2006/002230

**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. B29C45/43 F16L15/00 F16L9/12 F16L47/16 F16L55/165  
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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)  
 B29C F16L

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 practical, search terms used)

EPO-Internal, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 103 33 160 A1 (FISCHBACH KG KUNSTSTOFF-TECHNIK) 10 February 2005 (2005-02-10) figures 7-9 -----	1
Y	US 5 490 966 A (PETERSON ET AL) 13 February 1996 (1996-02-13) figures 5-7 column 6, line 23 - line 27 -----	1
A	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 12, 5 December 2003 (2003-12-05) -& JP 2003 265934 A (ASAHI MEDICAL CO LTD), 24 September 2003 (2003-09-24) paragraph 39 of the Japanese patent; abstract; figure 3 ----- -/--	1-10

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

- "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

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- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "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

21 September 2006

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## INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 632 657 A (POTOCZKY ET AL) 30 December 1986 (1986-12-30) column 3, lines 50,51; figures 5,6 -----	1-10
A	EP 1 004 811 A (CONDOR ROHR-SYSTEM-TECHNIK GMBH) 31 May 2000 (2000-05-31) claim 15; figure 1 -----	1-10

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB2006/002230

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-10

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

## 1. claims: 1-10

Method of producing an injection moulded plastics article having a hollow interior in a mould with pressurised fluid-assisted removal of an inner mandrel, wherein the fluid is delivered through a plurality of openings.

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## 2. claims: 11-14

Mould with pressurised fluid-assisted removal of an inner mandrel having a plurality of openings, wherein the openings inhibit entry of the plastics material upon injection thereof into the mould cavity.

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## 3. claims: 11, 15-17, 20

Mould with pressurised fluid-assisted removal of an inner mandrel having a plurality of openings, wherein the mandrel comprises a cylindrically curved wall.

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## 4. claims: 11, 18

Mould with pressurised fluid-assisted removal of an inner mandrel having a plurality of openings, wherein the outer die parts and the mandrel have coolant passages.

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## 5. claims: 11, 19

Mould with pressurised fluid-assisted removal of an inner mandrel having a plurality of openings, wherein the surfaces of the outer die parts which face into the cavity are rougher than the surfaces of the mandrel.

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## 6. claims: 11,21

Mould with pressurised fluid-assisted removal of an inner mandrel having a plurality of openings, wherein one of the outer dies has a surface formation for forming a knurling.

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## 7. claims: 22-35

Pipe section made in an injection mould having at least two outer die parts and at least an inner mandrel, wherein the pipe section comprises screw threaded engagement means.

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

8. claim: 36

Method of lining an aged, broken or damaged pre-existing pipeline.

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9. claim: 37

Method of laying a subterranean pipeline.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2006/002230

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
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