

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
6 December 2007 (06.12.2007)

PCT

(10) International Publication Number
WO 2007/138159 A1

(51) International Patent Classification:

F16L 47/06 (2006.01) *B29C 65/56* (2006.01)

F16L 47/16 (2006.01)

(21) International Application Number:

PCT/FI2007/050292

(22) International Filing Date: 23 May 2007 (23.05.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

06114575.1 26 May 2006 (26.05.2006) EP

(71) Applicant (for all designated States except US): **UPONOR INNOVATION AB** [SE/SE]; Industrivägen, S-51381 Fristad (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LARSSON, Thomas** [SE/SE]; Skäfteruna Grenadjärtorpet, S-73691 Kungsör (SE). **SMAHL, Jarmo** [FI/FI]; Satukaari 10, FI-15550 Nastola (FI).

(74) Agent: **KOLSTER OY AB**; Iso Roobertinkatu 23, P.O. Box 148, FI-00121 Helsinki (FI).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

Published:

— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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: PIPE FITTING

(57) Abstract: A pipe fitting comprises a plastic body (2) and a reinforcement ring (3) around the outside of the plastic body (2). The reinforcement ring (3) holds body expansion under control. The reinforcement ring (3) is positioned at a distance (d) from the front end of the pipe fitting (1).

WO 2007/138159 A1

Pipe fitting

Background of the invention

The invention relates to a pipe fitting comprising a plastic body and a reinforcement ring around the outside of the plastic body.

Pipe fittings having internal taper threads or female threads are commonly used in the plumbing industry. Parts having male pipe threads are threaded into female pipe threads in the fitting to form a pipe joint. Pipe fittings made of plastic with female pipe threads are particularly susceptible to structural failure. It is known to solve this problem by placing a reinforcement ring around the outside of the female pipe fitting to restrict and/or inhibit expansion and splitting of the pipe fitting. However, there is a need to improve the female pipe fittings.

US 5 582 439 discloses a strengthened pipe fitting for connecting to an externally threaded surface. The strengthened pipe fitting comprises a pipe fitting having an internally threaded surface and a compression band fitted onto the attachment end of the pipe fitting. The pipe fitting is initially manufactured, in absence of the compression band, to have an internally threaded surface with a pitch diameter larger than that specified for mating with the externally threaded surface. The compression band is then fitted onto the attachment end of the pipe fitting. The compression band is uniquely sized to compress the internally threaded surface sufficiently so that the internally threaded surface of the strengthened pipe fitting mates with the externally threaded member. However, the manufacture of such a fitting is quite difficult and complex.

Brief description of the invention

The object of the present invention is to provide an improved pipe fitting.

The pipe fitting of the invention is characterized in that the reinforcement ring is positioned at a distance from the front end of the pipe fitting.

The described pipe fitting comprises a body made of plastic and a reinforcement ring around the outside of the plastic body. The reinforcement ring is positioned at a distance from the front end of the pipe fitting. The reinforcement ring holds body expansion under control. Thus, the reinforcement ring reduces displacements in the plastic body and in this way reduces tensile stresses developed in the plastic body. Because there is a distance between

the reinforcement ring and the front end of the pipe fitting, excessive force during the tightening of the male part in to the pipe fitting can be prevented.

In one embodiment, the corner of the reinforcement ring located at the back end of the reinforcement ring and against the plastic body of the pipe fitting is rounded. This reduces stress peaks in the plastic body, which are caused by the male part that is to some extent conical. In another embodiment, the plastic body comprises a support rib in the fitting, which supports the back end of the reinforcement ring. This rib also supports the fitting against the stresses caused by the conical male part which bends the reinforcement ring.

In a yet another embodiment, the plastic body of the fitting is manufactured separately from the reinforcement ring and the reinforcement ring is snapped on the body. Manufacturing the body and the reinforcement ring separately provides the advantages that the pipe fitting is easy to manufacture and it is easier to make the structures and forms of the body and reinforcement ring with the desired properties.

Brief description of the figures

The invention will be described in detail with reference to the accompanying figure which schematically shows a side view of a part of a pipe fitting in cross section.

Detailed description of the invention

The figure schematically shows a part of a pipe fitting 1. The pipe fitting 1 can be a bend or a T-fitting or a straight fitting or any other suitable pipe fitting.

The pipe fitting 1 comprises a plastic body 2 and a reinforcement ring 3 positioned around the plastic body 2. The material of the plastic body can be polypropylene PP, polyethylene PE, polyphenyl sulphone PPSU, polysulphone PSU, polyvinylidene fluoride PVDF, polytetrafluorethylene PTFE, polyketones, polyether ketone PEEK, polyacetale POM, or some other plastic material, for example. The reinforcement ring 3 can be made of metal, such as stainless steel, aluminium, copper, or brass. The reinforcement ring 3 can also be made of plastic, for example. The plastic can be reinforced such that it has better properties against elongation than the material of the plastic body 2.

The plastic body 2 comprises internal threads or female threads 4. When the pipe fitting 1 is used, a part 5 with male threads or a male part is positioned inside the plastic body such that the male threads mate with female

threads 4. The part 5 with male threads can be an end of a pipe or a pipe fitting with male threads or any other suitable part, for example.

The part 5 with male threads tends to expand the plastic body 2 of the pipe fitting 1. The purpose of the reinforcement ring is to reduce the displacement in the plastic body 2 and thereby reduce the tensile stresses developed in the plastic body 2. The reinforcement ring 3 is dimensioned such that when the stress level of the plastic body exceeds a certain degree, the reinforcement ring 3 starts to yield. This changes the tension in the plastic body to compression stress in the critical area near the front end of the plastic body. The front end of the plastic body 2 is the part of the pipe fitting which first receives the part 5 with male threads inserted into the pipe fitting 1.

The width w of the reinforcement ring 3 is significantly shorter than the length l of the part with female threads 4. Preferably the length l is more than double the width w . With this dimensioning, the feature of different stresses acting together can be avoided.

There is a distance d between the front end 3a of the reinforcement ring 3 and the front end of the pipe fitting. Because of this distance on the mouth side of the pipe fitting 1, a too tight installation of the part 5 with the male threads can be indicated. A too tight installation of the part 5 with male threads causes peeling of the front end of the plastic body 2. Thus, a too tight installation can be observed visibly. The distance d is preferably greater than 0.2 millimetres, more preferably greater than 0.5 millimetres if the inner diameter of a pipe fitting is 12 millimetres, for example.

At the back end 3b of the reinforcement ring 3, there is a rounded corner 3c. The rounded corner 3c is the inner corner of the reinforcement ring and is thus against the plastic body 2. The part 5 with male threads is typically somewhat conical and thus it tends to bend the reinforcement ring such that back end 3b stress causes stress peaks against the plastic body 2. By making the corner 3c rounded, the stress peaks in the plastic body 2 can be reduced. The radius of curvature of the rounded corner 3c is preferably greater than 0.1 millimetres, more preferably greater than 0.2 millimetres if the inner diameter of the pipe fitting is 12 mm, for example.

The outer surface of the plastic body 2 is also provided with a support rib 6. The support rib 6 also strengthens the structure of the pipe fitting such that the stresses caused by the part 5 with male threads does not break the pipe fitting 1.

The plastic body 2 of the pipe fitting 1 is manufactured separately from the reinforcement ring 3. Thus, the plastic body 2 is made by injection moulding, for example. Thereafter the reinforcement ring 3 is snapped onto the plastic body 2. Thus, it is easy to manufacture the plastic body 2 and reinforcement ring 3 such that they have all the desired properties.

For a man skilled in the art, it is obvious that in the course of technical progress, the basic idea of the invention can be carried out in numerous ways. Thus, the invention and its embodiments are not limited by the above examples but they may vary within the scope of the appended claims.

Claims

1. A pipe fitting comprising a plastic body (2) and a reinforcement ring (3) around the outside of the plastic body (2), characterized in that the reinforcement ring (3) is positioned at a distance (d) from the front end of the pipe fitting (1).

2. A pipe fitting as claimed in claim 1, characterized in that the inner corner (3c) at the back end (3b) of the reinforcement ring (3) is rounded.

3. A pipe fitting as claimed in claim 2, characterized in that the radius of curvature of the rounded corner (3c) is greater than 0.1 millimetres.

4. A pipe fitting as claimed in any one of the preceding claims, characterized in that the plastic body (2) comprises a support rib (6) for supporting the back end (3b) of the reinforcement ring (3).

5. A pipe fitting as claimed in any one of the preceding claims, characterized in that the plastic body (2) is manufactured separately from the reinforcement ring (3) and the reinforcement ring (3) is snapped on the plastic body (2).

1/1

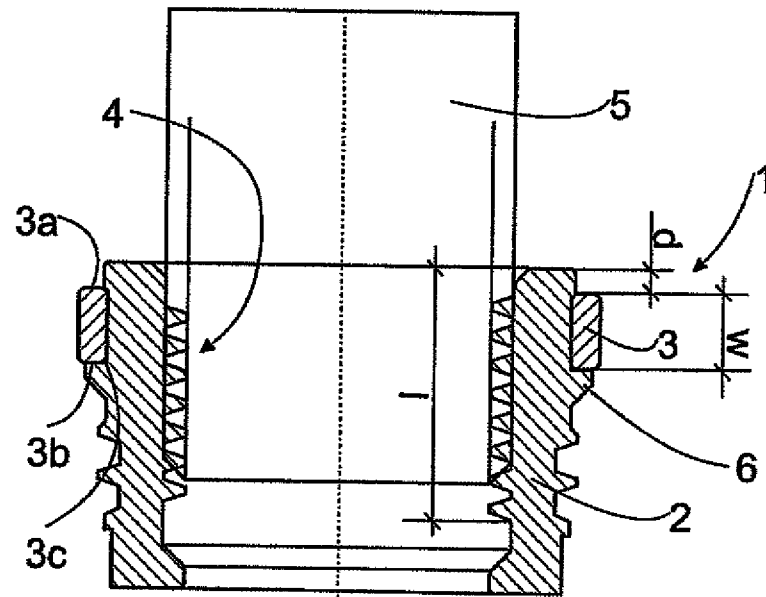


FIG.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2007/050292

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 8: B29C, F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
FI, DK, NO, SE

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.
X	WO 9500795 A1 (METCAL INC) 05 January 1995 (05.01.1995), abstract; page 6, line 22 - page 7, line 1; page 7, line 24 - page 8, line 3; figures 1-23	1-5
X	GB 1080081 A (AMP INC) 23 August 1967 (23.08.1967), page 1, lines 49-68; figures 1 and 2	1-4
X	US 2002096880 A1 (SCHULZ BRITT-ASTRID et al.) 25 July 2002 (25.07.2002), abstract; paragraph [0024]; claim 1; figure 1	1
X	US 4018462 A (SAKA YOSHIMI) 19 April 1977 (19.04.1977), abstract; column 1, lines 60-67; figure 1	1, 5
X	AT 410708 B (KE KELIT KUNSTSTOFFWERK GMBH) 25 July 2003 (25.07.2003), abstract; page 3, lines 19-22 and 34-37; claims 1 and 4; figure	1, 4



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 application or patent 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 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

31 August 2007 (31.08.2007)

Date of mailing of the international search report

24 September 2007 (24.09.2007)

Name and mailing address of the ISA/FI
National Board of Patents and Registration of Finland
P.O. Box 1160, FI-00101 HELSINKI, Finland

Facsimile No. +358 9 6939 5328

Authorized officer

Jorma Känä

Telephone No. +358 9 6939 500

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2007/050292

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
WO 9500795 A1	05/01/1995	JP 8512118T T EP 0706627 A1 CA 2165448 A1 US 5388873 A	17/12/1996 17/04/1996 05/01/1995 14/02/1995
GB 1080081 A	23/08/1967	NL 6600319 A	22/07/1966
US 2002096880 A1	25/07/2002	EP 1197733 A2 DE 20017613U U1	17/04/2002 15/02/2001
US 4018462 A	19/04/1977	None	
AT 410708 B	25/07/2003	AT 13012000 A	15/11/2002

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.

F16L 47/06 (2006.01)**F16L 47/16** (2006.01)**B29C 65/56** (2006.01)