

652976

AUSTRALIA
Patents Act 1990

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Section 29 (1)
Regulation 3.1(2)

NOTICE OF ENTITLEMENT
(To be filed before acceptance)

I/We Ing. Georg Wolff
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being *the applicant/*authorised by the applicant in respect of an application for a patent for an invention entitled "Cup-shaped hydraulic-cylinder unit

filed under Application No. 89196/91, state the following:-

Part 1 - Must be completed for all applications.

The person(s) nominated for the grant of the patent:

☐ ~~is/are the actual inventor(s)~~

or

☒ has, for the following reasons, gained entitlement from the actual inventor(s):
The nominated person is a person who would if a patent
were granted upon an application made by the actual inventor
be entitled to have the patent assigned to it

~~Part 2 - Must be completed if the application is a Convention application.~~

~~The person(s) nominated for the grant of the patent is/are:~~

- ☐ the applicant(s) of the basic application(s) listed on the patent request form
or
☐ entitled to rely on the basic application(s) listed on the patent request form
by reason of the following:

Part 3 - must be completed if the application was made under the PCT and
claims priority.

The person(s) nominated for the grant of the patent is/are:

☒ the applicant(s) of the application(s) listed in the declaration under Article 8
of the PCT

or

☐ entitled to rely on the application(s) listed in the declaration under Article-8
of the PCT by reason of the following:-

(continued over)

N The basic application(s) ~~listed on the patent request form/~~referred to in the declaration under Article 8 of the PCT ~~is/are~~ the application(s) first made in a Convention country in respect of the invention.

4600/Weiss, Oberstdt 61

Ing. Georg Wolff

technischer Leiter

Date: May 13, 1993



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(12) PATENT ABRIDGMENT (11) Document No. AU-B-89196/91
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CUP-SHAPED HYDRAULIC-CYLINDER UNIT
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2358/90 21.11.90 AT AUSTRIA
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- (57) Claim

1. Potlike hydraulic cylinder comprising a cylinder pot (1), a piston (2), which constitutes a cover for the pot, a rubber-elastic plastic body (4), which occupies the pressure space between the cylinder pot (1) and the piston (2) and which forms a closed pocket (6) that is provided with a partition (7), which is substantially parallel to the bottom and constitutes the bottom of the pocket and is connected to at least one bottom extension (8) of the cylinder pot (1), which extension protrudes axially into the plastic body (4), and at least one pressure line (9) for a hydraulic fluid, which pressure line extends through the bottom extension (8) and the partition (7) and opens into the pocket (6), characterized in that the partition (7) is adjoined by a peripheral wall (10), which protrudes toward the piston (2) and defines with the pot wall a guiding gap for the deformation of the plastic body (4).

2.

OPI DATE 25/06/92

APPLN. ID

89196 / 91



AOJP DATE 06/08/92

PCT NUMBER PCT/AT91/00119

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(81) Bestimmungsstaaten: AT (europäisches Patent), AU, BE (europäisches Patent), CA, CH (europäisches Patent), DE (europäisches Patent), DK (europäisches Patent), ES (europäisches Patent), FR (europäisches Patent), GB (europäisches Patent), GR (europäisches Patent), IT (europäisches Patent), KR, LU (europäisches Patent), NL (europäisches Patent), SE (europäisches Patent), US.

Veröffentlicht

Mit internationalem Recherchenbericht.

652976

(54) Title: CUP-SHAPED HYDRAULIC-CYLINDER UNIT

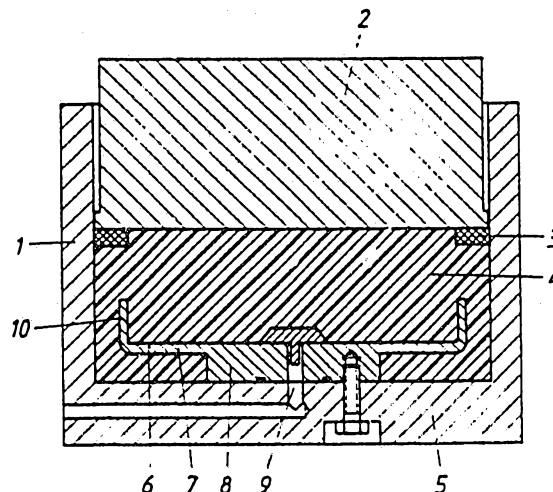
(54) Bezeichnung: TOPFARTIGER HYDRAULIKZYLINDER

(57) Abstract

The hydraulic-cylinder unit described comprises a cylinder (1) in the shape of a cup, a piston (2) which acts as the cup lid, and a body (4) made of resilient plastics material which fills the space between the cylinder (1) and the piston (2) and which forms a closed pad (6) with a dividing wall (7) running parallel to the floor of the cylinder at the bottom of the pad. The dividing wall (7) is joined to at least one cylinder-floor attachment (8) projecting longitudinally into the plastics body (4). The cylinder unit further includes a pressure line (9) for hydraulic fluid, the line passing through the floor attachment (8) and dividing wall (7) and opening out in the pad (6). In order to ensure optimum operating conditions, the dividing wall (7) extends up towards the piston (2) to form a peripheral wall (10).

(77) Zusammenfassung

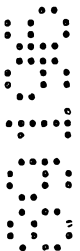
Ein topfartiger Hydraulikzylinder besteht aus einem Zylindertopf (1), einem Kolben (2) als Topfdeckel, einem den Druckraum zwischen Zylindertopf (1) und Kolben (2) ausfüllenden, gummielastischen Kunststoffkörper (4), der eine geschlossene Tasche (6) mit einer bodenparallelen Trennwand (7) als Taschenboden bildet, die mit wenigstens einem axial in den Kunststoffkörper (4) vorragenden Bodenansatz (8) des Zylindertopfes (1) verbunden ist, und aus einer den Bodenansatz (8) und die Trennwand (7) durchsetzenden, in die Tasche (6) mündenden Druckleitung (9) für ein Hydraulikmittel. Um vorteilhafte Betriebsbedingungen sicherzustellen, schließt an die Trennwand (7) eine gegen den Kolben (2) vorragende Umfangswand (10) an.



POTLIKE HYDRAULIC CYLINDER

This invention relates to an hydraulic cylinder comprising a cylindrical cup or pot, a piston, which constitutes a cover for the pot, a deformable body, which occupies the pressure space between the cylindrical pot and the piston, a partition which is substantially parallel to the bottom and is connected to at least one bottom extension of the cylindrical pot, which extension protrudes axially into the plastic body; at least one pressure line for an hydraulic fluid which extends through the bottom extension and the partition and opens into a pocket which is between the deformable body and the partition.

When conventional hydraulic cylinders are employed to apply or take up strong pressure forces by which the hydraulic cylinder is subjected to a tilting moment, it is necessary to insert expensive pressure-transmitting spherical caps into the hydraulic cylinder in order to relieve it from tilting moments. The seal which is required between the cylinder wall and the piston of the hydraulic cylinder precludes the provision of a substantial guiding gap, which would be necessary to permit a tilting of the piston. Besides, a plastic deformation of the cylinder wall is not permissible even in local regions if the sealing element is not to be endangered. For this reason relatively long pistons are used to take up the lateral forces and substantially increase the overall height. Another requirement to be met by such hydraulic cylinders resides in that they should be made from a material which has a relatively small elastic elongation and a low coefficient of expansion so that the guiding gap between



the piston and the cylinder wall cannot be expanded to an extent which would endanger the sealing element under a high load.

In order to avoid said disadvantages it is known from pot-shaped bearings, particularly if they are used in bridges (German Patent Specification 3,410,275), to fill the space between the cylinder pot and the piston, which constitutes a cover for the pot, by a rubber-elastic plastic body, which usually consists of an elastomer and which permits the provision between the pot wall and the piston of a guiding gap which is sufficiently large to permit a tilting of the piston relative to the cylinder pot whereas a sealing of said guiding gap against an extrusion of plastic need not be feared. Such a potlike bearing is supplied with a hydraulic fluid, which is forced into a closed pocket provided within the plastic body so that the latter owing to its incompressibility is displaced against the piston to raise the latter and the pocket is expanded. That pocket is closed at its bottom by a partition, which is joined to a bottom extension of the cylinder pot. Adjacent to the inlet for the hydraulic fluid a pressure line extends through the extension. That partition is intended to permit a hydraulic cushion to be formed under a pressure which is uniformly distributed throughout the surface area of the partition so that the plastic body disposed over the partition will uniformly be raised. But it has been found in practice that under high hydraulic pressures the partition will be pulled out of the pocket of the plastic body or the piston seal will be pulled from the piston because the deformation of the rubber-elastic plastic body cannot be controlled. For this reason the field of application of such potlike bearings is restricted although they are desirable as regards the taking up of tilting moments and lateral forces and are insusceptible to an elongation of materials.



For this reason it would be desirable to provide an hydraulic cylinder which is of the kind described first hereinbefore and is so improved by the provision of a simple means that the advantages afforded by the use of a
5 ~~rubber-elastic plastic~~ ^{resiliently deformable} body can fully be utilised but the disadvantages involved in an uncontrolled deformation of the plastic body will be avoided.

The present invention provides an hydraulic cylinder comprising a cylindrical cup, a piston which forms a cover
10 for the cup, a resiliently deformable body which occupies a space between the cylindrical cup and the piston, a partition which is substantially parallel to a bottom of the cylindrical cup and is connected to at least one
15 bottom extension of the cylindrical cup, which extension protrudes axially into the deformable body, and at least one pressure line for hydraulic fluid which extends through the bottom extension and the partition and opens into a pocket which is formed in the deformable body
adjacent the partition characterised in that the partition
20 is adjoined by a peripheral wall which projects towards the piston and defines with a cylindrical wall of the cylindrical cup a guiding gap for the deformation of the deformable body.

As a result of the guiding gap for the deformation of
25 the plastic body defined between the pot wall and the peripheral wall which adjoins the partition, the portion in which the plastic body is essentially deformable is structurally defined. Because the deformation of the rubber-elastic plastic body is thus restricted to a
30 portion of its periphery a pressure applied cannot cause the pocket of the plastic body to be pulled from the partition or an extrusion of a portion of the plastic body between the piston and the piston seal. For this reason the measure adopted in accordance with the invention has
35 the result that the potlike hydraulic cylinder-piston



assembly has a high functional reliability and during a draining of the hydraulic fluid from the pocket of the plastic body the piston will return to its initial position without difficulty because the deformation of the

5 plastic body is restricted to a portion of its periphery extending along the pot wall so that the pocket of the plastic body can readily be closed as that portion of the plastic body which is adjacent to the piston descends toward the partition.

10 It is apparent that the peripheral wall which adjoins the partition constitutes a guiding wall for the deformation of the plastic body. For this reason that wall must



have a sufficiently large height, which must be selected in dependence on the conditions in each case. To permit the peripheral wall to perform its guiding functions, an adhering of that wall to the plastic body must be prevented. The wall itself may have any of widely different designs, provided that it is ensured that the wall defines the region in which the plastic body is deformable. A particularly simple design will be obtained if the peripheral wall consists of a raised rim portion of the partition.

The subject matter of the application is shown by way of example in the drawing, in which

Figure 1 is a schematic axial sectional view showing a potlike hydraulic cylinder in accordance with the invention when it is not being supplied with hydraulic fluid and

Figure 2 is a view which is similar to Figure 1 and shows the hydraulic cylinder as it is supplied with hydraulic fluid.

The illustrated potlike hydraulic cylinder essentially consists of a cylinder pot 1 and a piston 2, which constitutes a cover for the pot and carries a piston seal 3, which adjoins the wall of the pot. The pressure space defined between the cylinder pot 1 and the piston 2 is occupied by a rubber-elastic plastic body 4, which at a distance from the bottom 5 of the pot forms a pocket 6, which is parallel to the bottom and in which a partition 7, which is parallel to the bottom, is inserted as the bottom of the pocket. That partition 7 is integrally connected to a bottom extension 8, which axially protrudes into the plastic body 4 and through which a pressure line 9 for a hydraulic fluid extends, which

line opens into the pocket 6. A difference from known pot-like bearings of that kind resides in that the partition 7 is provided with a peripheral wall 10, which adjoins on the outside and which in the illustrative embodiment consists of a raised rim portion of the partition 7. That peripheral wall 10 does not adhere to the plastic body 4 and separates from the remaining plastic body a peripheral portion, which during a supply of hydraulic fluid to the hydraulic cylinder is subjected to the substantial deformation, as is shown in Figure 2.

The hydraulic fluid which is forced into the pocket 6 then expands the pocket and above the partition 7 constitutes a hydraulic fluid cushion, which is essentially defined by the peripheral wall 10 and by which that portion of the plastic body which is adjacent to the body and, as a result, the piston 2 are raised. As is also apparent from Figure 2 the restriction of the deformation of the plastic body to a peripheral portion prevents a deformation of the plastic body which would adversely affect the descent of the piston 2 so that the initial position shown in Figure 1 will be assumed when the hydraulic fluid has been drained.

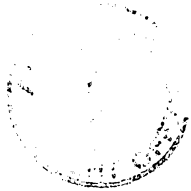
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. An hydraulic cylinder comprising a cylindrical cup, a piston which forms a cover for the cup, a resiliently deformable body which occupies a space between the
5 cylindrical cup and the piston, a partition which is substantially parallel to a bottom of the cylindrical cup and is connected to at least one bottom extension of the cylindrical cup, which extension protrudes axially into the deformable body, and at least one pressure line for
10 hydraulic fluid which extends through the bottom extension and the partition and opens into a pocket which is formed in the deformable body adjacent the partition characterised in that the partition is adjoined by a peripheral wall which projects towards the piston and
15 defines with a cylindrical wall of the cylindrical cup a guiding gap for the deformation of the deformably body.
2. An hydraulic cylinder according to claim 1, characterised in that the peripheral wall is formed by a raised rim portion of the partition.
- 20 3. An hydraulic cylinder as hereinbefore described with reference to the accompanying drawings.

DATED this 29th day of June 1994

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Patent Attorneys for the
Applicant:

F.B. RICE & CO.



ABSTRACT

POTLIKE HYDRAULIC CYLINDER

A potlike hydraulic cylinder consists of a cylinder pot (1), a piston (2), which constitutes a cover for the pot, a rubber-elastic plastic body (4), which occupies the pressure space between the cylinder pot (1) and the piston (2) and which forms a closed pocket (6) that is provided with a partition (7), which is substantially parallel to the bottom and constitutes the bottom of the pocket and is connected to at least one bottom extension (8) of the cylinder pot (1), which extension protrudes axially into the plastic body (4), and at least one pressure line (9) for a hydraulic fluid, which pressure line extends through the bottom extension (8) and the partition (7) and opens into the pocket (6). To ensure desirable operating conditions, the partition (7) is adjoined by a peripheral wall (10), which protrudes toward the piston (2).
(Figure 1).

CLAIMS

1. Potlike hydraulic cylinder comprising a cylinder pot (1), a piston (2), which constitutes a cover for the pot, a rubber-elastic plastic body (4), which occupies the pressure space between the cylinder pot (1) and the piston (2) and which forms a closed pocket (6) that is provided with a partition (7), which is substantially parallel to the bottom and constitutes the bottom of the pocket and is connected to at least one bottom extension (8) of the cylinder pot (1), which extension protrudes axially into the plastic body (4), and at least one pressure line (9) for a hydraulic fluid, which pressure line extends through the bottom extension (8) and the partition (7) and opens into the pocket (6), characterized in that the partition (7) is adjoined by a peripheral wall (10), which protrudes toward the piston (2) and defines with the pot wall a guiding gap for the deformation of the plastic body (4).

2.

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FIG.1

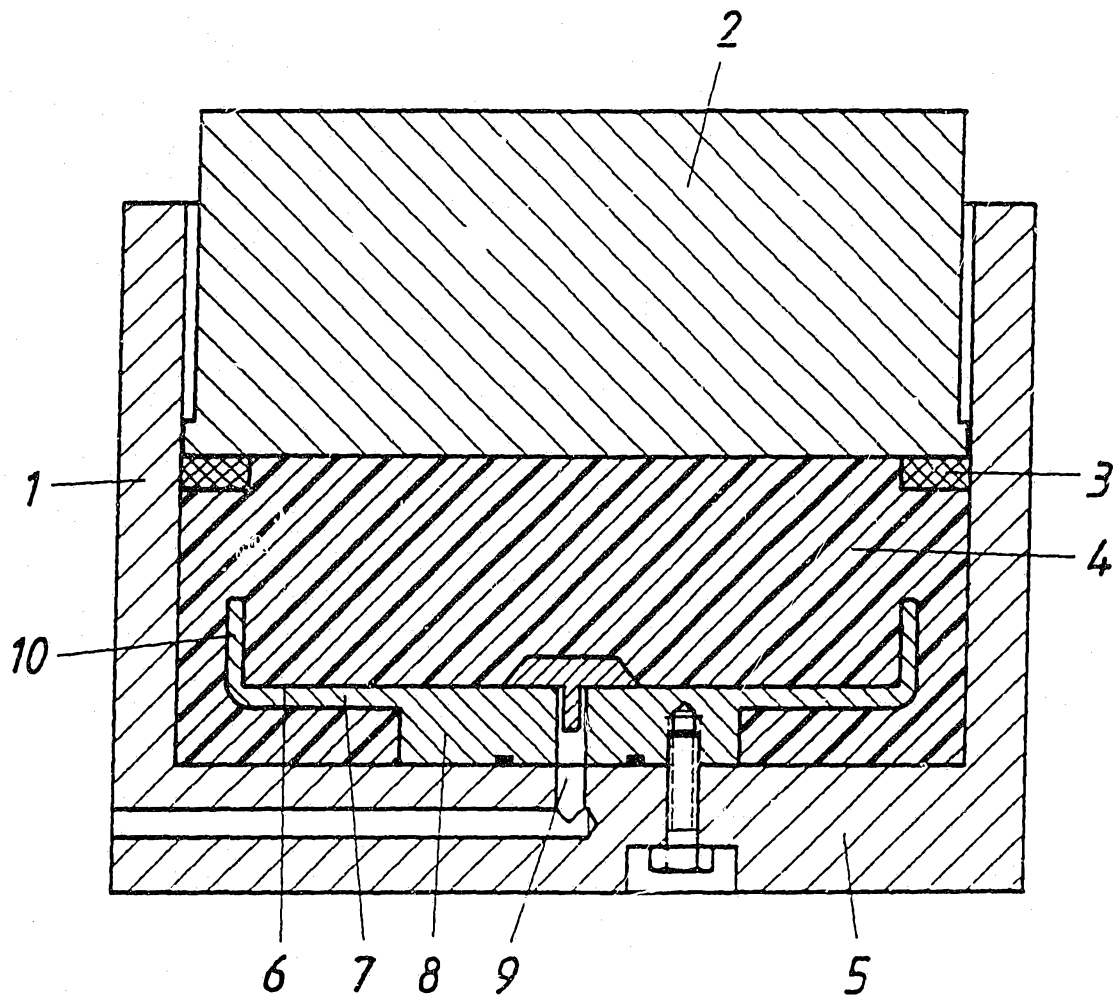
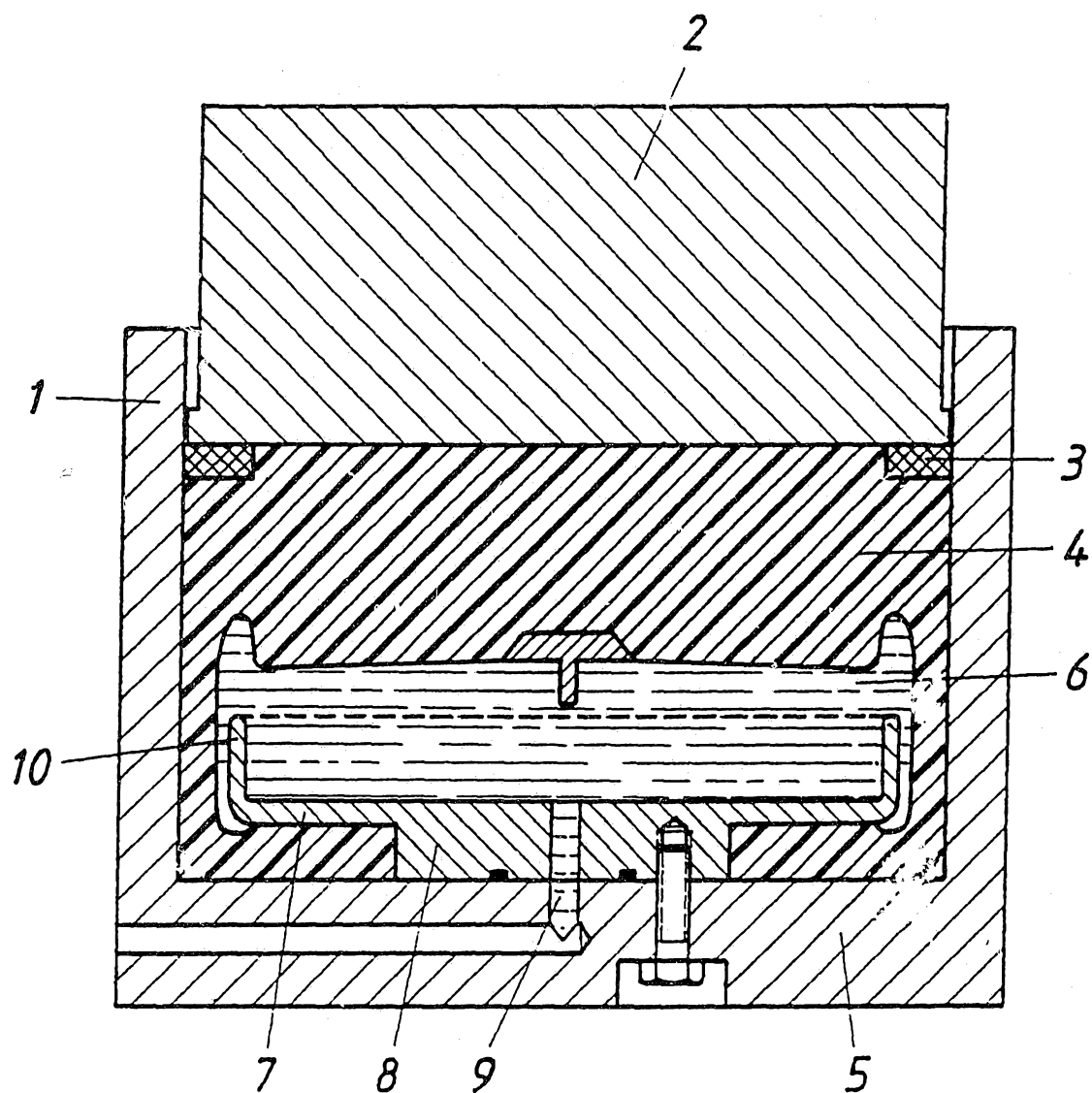


FIG. 2



INTERNATIONAL SEARCH REPORT

International Application No PCT/AT 91/00119

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. ⁵ : E 01 D 19/04		
II. FIELDS SEARCHED		
Minimum Documentation Searched *		
Classification System	Classification Symbols	
Int.Cl. ⁵ :	E 01 D; E 04 B; F 16 F; B 66 F	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	DE, C, 3 410 275 (SHW SCHWÄBISCHE HÜTTEN- WERKE GMBH) 24 October 1985 cited in the application see abstract; claim 3; figures 1,3 --	1,2
A	DE, A, 2 527 128 (GUTEHOFFNUNGSHÜTTE STERKRADE AG) 23 December 1976 see page 3, paragraph 5; figure --	1
A	EP, A, 0 183 208 (SCHWÄBISCHE HÜTTENWERKE GMBH) 4 June 1986 see page 4, line 7 - line 28 see page 9, line 1 - line 26; figure 1 -----	1,2
* 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. "Δ" 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
5 February 1992 (05.02.92)		12 February 1992 (12.02.92)
International Searching Authority		Signature of Authorized Officer
European Patent Office		

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. AT 9100119
SA 53601**

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 05/02/92

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
DE-C-3410275	24-10-85	CA-A-	1236081	03-05-88
		EP-A, B	0155622	25-09-85
		US-A-	4610431	09-09-86

DE-A-2527128	23-12-76	AT-B-	348006	25-01-79
		CH-A-	600055	15-06-78
		JP-A-	52001939	08-01-77

EP-A-0183208	04-06-86	DE-A-	3443120	05-06-86
		CA-A-	1271211	03-07-90
		US-A-	4687182	18-08-87

Int.Kl. 5	E01D ; E04B ; F16F ; B66F	
Recherchierte nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Sachgebiete fallen ⁸		
III. EINSCHLAGIGE VERÖFFENTLICHUNGEN ⁹		
Art. ⁹	Kennzeichnung der Veröffentlichung ¹¹ , soweit erforderlich unter Angabe der maßgeblichen Teile ¹²	Betr. Anspruch Nr. ¹³
X	DE,C,3 410 275 (SHW SCHWÄBISCHE HUTTENWERKE GMBH)) 24. Oktober 1985 in der Anmeldung erwähnt siehe Zusammenfassung; Anspruch 3; Abbildungen 1,3 ---	1,2
A	DE,A,2 527 128 (GUTEHOFFNUNGSHUTTE STERKRADE AG) 23. Dezember 1976 siehe Seite 3, Absatz 5; Abbildung ---	1
A	EP,A,0 183 208 (SCHWÄBISCHE HUTTENWERKE GMBH) 4. Juni 1986 siehe Seite 4, Zeile 7 - Zeile 28 siehe Seite 9, Zeile 1 - Zeile 26; Abbildung 1 ---	1,2
¹⁰ 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. BESCHIEINIGUNG		
Datum des Abschlusses der internationalen Recherche 05. FEBRUAR 1992		Absenddatum des internationalen Recherchenberichts 12 FEB 1992
Internationale Recherchenbehörde EUROPAISCHES PATENTAMT		Unterschrift des bevollmächtigten Bediensteten DE COENE P.J.S.

**ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT
ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR.**

AT 9100119
SA 53601

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
Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

05/02/92

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
DE-C-3410275	24-10-85	CA-A- 1236081	03-05-88
		EP-A, B 0155622	25-09-85
		US-A- 4610431	09-09-86

DE-A-2527128	23-12-76	AT-B- 348006	25-01-79
		CH-A- 600055	15-06-78
		JP-A- 52001939	08-01-77

EP-A-0183208	04-06-86	DE-A- 3443120	05-06-86
		CA-A- 1271211	03-07-90
		US-A- 4687182	18-08-87
