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(54) Title
**PISTON DIAPHRAGM PUMP FOR DELIVERING DOSES OF LIQUIDS**

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| (31) Number | (32) Date | (33) Country |
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(56) Prior Art Documents
**US 4309153**

(57) Claim

1. A piston diaphragm pump for the delivery of liquids, such as surfactants, wetting agents or the like, in doses, comprising:

a pump piston which is displaceably guided in a pump tube surrounding a pump pressure chamber, and which is designed to be electromagnetically driven against the force of a return spring by an electromagnetic coil surrounding the pump tube; and

a pump diaphragm which is fixedly connected to the pump piston on the suction side and peripherally clamped in a pump housing, so that the diaphragm faces a pump suction chamber at one end, the pump diaphragm being centrally traversed by the pump piston which is formed with a full-length longitudinal bore connecting the pump pressure chamber to the pump suction chamber, the pump piston being further provided with a piston valve installed in the longitudinal bore, wherein:

a working chamber lying on that side of the pump diaphragm remote from the pump suction chamber serves as an additional pressure chamber which is permanently connected to the longitudinal bore through the piston leading to the pump pressure chamber by transverse channels present in the pump piston behind the piston valve.

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P 41 30 166.8 11. September 1991 (11.09.91) DE

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(81) Bestimmungsstaaten: AU, CA, FI, JP, NO, US, europäisches Patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE).

Veröffentlicht
*Mit internationalem Recherchenbericht.*

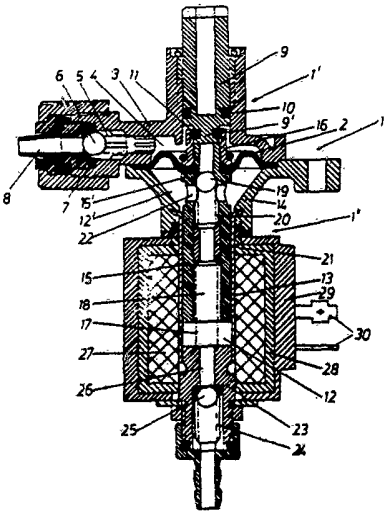
650489

(54) Title: PISTON DIAPHRAGM PUMP FOR DELIVERING DOSES OF LIQUIDS

(54) Bezeichnung: KOLBENMEMBRANPUMPE ZUM DOSIERTEN FÖRDERN VON FLÜSSIGKEITEN

(57) Abstract

A piston diaphragm pump for delivering doses of liquids, in particular surfactants, wetting agents or the like, has a pump piston (15) movably guided in a pump tube (13) that encloses the pump pressure chamber (12), and can be electromagnetically driven against the force of a return spring (17) by a magnetic coil (27) that surrounds the pump tube (13). In addition, a pump diaphragm (2) that is peripherically clamped to the pump housing (1) and faces on one side the pump suction chamber (4) is rigidly connected on the suction side to the pump piston (15). A longitudinal bore (18), within which is arranged a pump piston (15) provided with a piston valve (19), extends centrally through the pump diaphragm (2) and links the pressure chamber (12) to the suction room (4). In order to obtain the same pump capacity with reduced pump lifts, without the need for providing a specially sealed guidance of the pump piston in the pump tube, the working chamber located on the side of the pump diaphragm (2) opposite to the suction chamber (4) is designed as an additional pump pressure chamber (12') that is constantly connected to the piston longitudinal bore (18) that leads to the pump tube pressure chamber (12) by cross-channels (22) arranged in the pump piston (15) behind the piston valve (19).




INTERNATIONALER RECHERCHENBERICHT PCT/EP 92/02029

Internationales Aktenzeichen

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

**(57) Zusammenfassung** Eine zum dosierten Fördern von Flüssigkeiten, insbesondere Tensiden, Netzmitteln od.dgl. bestimmte Kolbenmembranpumpe ist mit einem in einem den Pumpendruckraum (12) umschließenden Pumpenrohr (13) verschieblich geführten und durch eine letzteres umgebende Magnetspule (27) entgegen der Wirkung einer Rückstellfeder (17) elektromagnetisch antreibbaren Pumpenkolben (15) versehen. Weiterhin ist dabei mit letzterem eine saugseitig fest verbundene, im Pumpengehäuse (1) peripher eingespannte und mit ihrer einen Seite dem Pumpensaugraum (4) zugewandte Pumpenmembran (2) vorhanden, die von dem mit einer durchgehenden, den Druckraum (12) mit dem Saugraum (4) verbindenden Längsbohrung (18) und einem darin eingebauten Kolbenventil (19) versehenen Pumpenkolben (15) zentral durchsetzt ist. Um bei gleichen Fördermengen mit geringeren Pumpenhüben auszukommen und auf eine besondere abgedichtete Führung des Pumpenkolbens im Pumpenrohr zu verzichten, ist der auf der dem Saugraum (4) abgewandten Seite der Pumpenmembran (2) liegende Arbeitsraum als zusätzlicher Pumpendruckraum (12') ausgebildet, der über im Pumpenkolben (15) hinter dem Kolbenventil (19) vorhandene Querkanäle (22) mit der zum Pumpenrohr-Druckraum (12) führenden Kolben-Längsbohrung (18) ständig verbunden ist.

# Piston Diaphragm Pump for Delivering Doses of Liquids

This invention relates to a piston diaphragm pump for the delivery of liquids, more particularly surfactants, wetting agents or the like, in doses comprising a pump piston which is displaceably guided in a pump tube surrounding the pump pressure chamber and which is designed to be electromagnetically driven against the force of a return spring by a ~~magnetic~~ electromagnetic coil surrounding the pump tube and a pump diaphragm which is fixedly connected to the pump piston on the suction side and peripherally clamped in the pump housing, so that it faces the pump suction chamber at one end, and which is centrally traversed by the pump piston formed with a full-length longitudinal bore connecting the pressure chamber to the suction chamber, the pump piston being further provided with a piston valve installed in the longitudinal bore.

A piston diaphragm pump of the above type is known from **DE-OS 28 31 437**. Whereas, in this known piston diaphragm pump, the particular liquid is drawn into the suction chamber through the flexible diaphragm, the liquid to be dosed is displaced from the pressure chamber solely the pump piston which is fixedly connected to the diaphragm and which, to this end, is sealingly guided in the pump tube surrounding the pressure chamber. Not only does this require corresponding sealing, it can also lead to seizing of the pump piston after prolonged breaks in operation through drying of the liquid to be dosed. Since, in addition, the pump piston has a much smaller effective cross-section than the pump diaphragm and since both operate with the same lift because they are fixedly connected at both ends, less liquid is always displaced

from the pump pressure chamber during the particular delivery stroke of the pump than is taken into the suction chamber through the diaphragm. The result of this is that the suction chamber has to be connected to the liquid reservoir by a special liquid line designed to be shut off by a non-return valve to enable the quantity of liquid delivered in excess into the suction chamber to be returned to the reservoir during the return stroke of the pump membrane. Another disadvantage of the known pump is that, because of its comparatively small delivery cross-section, the pump piston and, hence, the diaphragm have to complete comparatively large strokes to enable a certain volume of liquid to be delivered in dosed form.

It is the object of the present invention to overcome or substantially ameliorate the above disadvantages.

There is disclosed herein a piston diaphragm pump for the delivery of liquids, such as surfactants, wetting agents or the like, in doses, comprising:

a pump piston which is displaceably guided in a pump tube surrounding a pump pressure chamber, and which is designed to be electromagnetically driven against the force of a return spring by an electromagnetic coil surrounding the pump tube; and

a pump diaphragm which is fixedly connected to the pump piston on the suction side and peripherally clamped in a pump housing, so that the diaphragm faces a pump suction chamber at one end, the pump diaphragm being centrally traversed by the pump piston which is formed with a full-length longitudinal bore connecting the pump pressure chamber to the pump suction chamber, the pump piston being further provided with a piston valve installed in the longitudinal bore, wherein:

a working chamber lying on that side of the pump diaphragm remote from the pump suction chamber serves as an additional pressure chamber which is permanently connected to the longitudinal bore through the piston leading to the pump pressure chamber by transverse channels present in the pump piston behind the piston valve.

A preferred embodiment of the invention ensures that the pumping movements of the diaphragm also become fully effective on the pressure chamber side and the pump piston merely serves as a drive element for the pump diaphragm designed to be actuated by the electromagnetic

coil and the return spring acting thereon. Accordingly, the piston no longer has to be specially sealed in the pump tube, but instead may be guided therein with greater tolerances, so that there is virtually no danger of seizing through liquid which has dried out after prolonged breaks in operation. Since, in addition, the liquid to be displaced from the pressure chamber via the pump diaphragm corresponds in volume to the particular quantity of liquid drawn into the suction chamber, there is no need for a special return pipe from the suction chamber to the liquid reservoir. Comparable delivery volumes of liquid can be obtained with relatively small delivery strokes of the diaphragm and, hence, the pump piston which in turn leads - in the same way as its unsealed guiding in the pump tube - to less heating and to reduced friction losses.

The piston valve is best provided in the immediate vicinity of that end of the pump piston which passes through the pump diaphragm while the transverse channels are best provided immediately behind that end of the pump piston. This provides for a particularly compact construction of that part of the pump situated on the pressure chamber side, particularly if, in addition, the pump housing is tapered in the manner of a funnel towards the pump tube in its region surrounding the transverse channels and the diaphragm pressure chamber.

In another embodiment of the invention, a pump piston stop provided with a seal is advantageously provided in that part of the housing which surrounds the pump suction chamber, acting as a safety valve separating the pressure chamber from the suction chamber in the stop position of the pump piston brought about by the return spring. In this way, unwanted flow of the delivery medium from the pressure chamber into the suction chamber and vice versa is effectively prevented, even after

prolonged stoppage times of the pump when the piston valve may possibly be prevented from closing by dry, crystallized liquid residues.

Finally, in another embodiment of the invention, a rectifier which converts the current supplying the ~~magnetic~~ electromagnetic coil into pulsating direct current is built into the current lead and is preferably integrated into that part of the pump housing which surrounds the electromagnetic coil. This provides for quiet, current-saving driving of the diaphragm pump through the pump piston acting as an armature. It goes without saying that the switching on and off of the electromagnetic diaphragm drive is generally controlled by a pulse generator which is installed in the consumer pipe or container to be charged with the liquid to be dosed and which responds to the particular demand for that liquid.

One advantageous embodiment of the piston diaphragm pump according to the invention is shown as an axial longitudinal section on a scale of about 2:1 in the accompanying drawing.

The piston diaphragm pump illustrated comprises a multi-compartment pump housing 1 which is divided by the pump diaphragm 2 peripherally clamped in the housing into an upper intake zone 1' and a lower pressure zone 1'' which also accommodates the pump drive.

In the suction zone 1', the suction chamber 4 is situated between the upper part 3 of the housing and the diaphragm 2. The suction chamber 4 is designed to be connected to a reservoir (not shown) for the liquid to be dosed via the suction valve - consisting of the spring 5, the valve ball 6 and the associated seal 7 - and the connecting socket 8 and a feed line to be mounted thereon. In addition, the upper part 3 of the housing accommodates the stroke adjustment screw 9 mounted for displacement therein. The stroke adjustment screw 9 is sealingly

guided with respect to the upper part 3 of the housing by the O-ring 10. In addition, the stroke adjustment screw 9 comprises a front end 9' of stepped diameter which acts both as a pump piston stop in conjunction with the O-ring 11 embedded therein and as a safety valve in conjunction with the facing end of the piston pump, as will be described in more detail hereinafter.

The pump tube 13 surrounding the pump pressure chamber 12 is provided in the lower pump zone 1'', being fixedly connected at its upper end to the middle part 14 of the housing. The middle part 14 of the housing is tapered in the manner of a funnel towards the pump tube 13. Together with the pump diaphragm 2, its surrounds an additional pump pressure chamber 12' which is permanently connected to the above-mentioned pressure chamber 12 surrounded by the tube 13.

The pump piston 15 consisting of soft iron is guided for displacement in the pump tube 13 without any sealing. At its upper end 15', the pump piston is fixedly connected to the diaphragm 2 through which it centrally passes. The fixed connection is established by the bushing 16 which is designed to be screwed onto the end 15' of the pump piston, projecting beyond it, and which, in the illustrated inoperative position of the pump piston 15, surrounds the front end 9' and the O-ring seal 11 of the stroke adjustment screw 9 present thereon and hence acts as a safety valve.

The pump piston 15 is under the effect of the return spring 17 which seeks to keep it in the inoperative position illustrated. The piston 15 is additionally provided with a longitudinal bore 18 which extends over its entire length and at the upper end of which the piston valve consisting of the valve ball 19 and the return spring 20 is installed in the immediate vicinity of the diaphragm 2. The abutment 21 built into the

longitudinal bore 18 of the piston 15 acts as a support for the two springs 17 and 20. The transverse channels 22 through which the diaphragm pressure chamber 12' is permanently connected to the longitudinal bore 18 and hence to the pressure chamber 12 are machined into the piston immediately below the piston valve ball 19. Accordingly, the chambers 12 and 12' form a common pump pressure chamber of comparatively large volume.

The pump pressure chamber 12 is closed underneath by the closure element 23 which is fixedly connected to the pump tube 13 and which accommodates the pump pressure valve consisting of the spring 24 and the valve ball 25, the pump pressure valve enabling the pressure line 26 leading to the consumer in the closure element 23 to be shut off and opened.

Arranged directly around the pump tube 13 is the ~~magnetic~~ electromagnetic coil 27 which, after corresponding excitation with current, enables the pump piston 15 to be driven against the force of the return spring 17 acting thereon for delivery of the particular medium. The ~~magnetic~~ electromagnetic coil 27 is surrounded by the plastic jacket 28 which in turn is surrounded by the part 29 of the housing on the outside of which the two current terminals 30 are provided. A rectifier (not shown) known per se is accommodated in the housing 29 in the current lead to the ~~magnetic~~ electromagnetic coil 27, converting the current supplied to the ~~magnetic~~ electromagnetic coil 27 into pulsating direct current.

If the ~~magnetic~~ electromagnetic coil 27 is excited with current by a pulse generator (not shown) which is present in the vicinity of the consumer and which monitors the demand for the liquid to be dosed, the pump piston 15 and the diaphragm 2 fixedly connected thereto are moved downwards in the drawing so that, on the one hand, liquid is delivered from the common pressure chamber 12,12' into the consumer line through the pressure valve 25 while, on the

other hand, the suction chamber 4 is refilled with the corresponding quantity of liquid to be dosed through the diaphragm 2 via the suction valve 6 which then opens. The piston valve 19 is closed during the above-described movement of the diaphragm and piston. When the electromagnetic drive is switched off after sufficient liquid has been dosed, the pump piston 15 and the diaphragm 2 fixedly connected thereto return to their inoperative positions shown in the drawing. During this return movement, the suction valve 6 and the pressure valve 25 are closed whereas the piston valve 19 is opened so that liquid is able to pass from the suction chamber 4 into the common pressure chamber 12,12'. Towards the end of this return movement under the effect of the spring 17, the fixing bush 16 screwed onto the end 15' of the piston pump travels beyond the O-ring 11 of the stop end 9' present on the stroke adjustment screw 9. This establishes an additional, effective seal between the suction chamber 4 and the pressure chambers 12 and 12' which is particularly important should the piston valve 19 and also the other two valves 6 and 25 no longer effectively close, for example through the presence of crystallized liquid residues.

The claims defining the invention are as follows:

1. A piston diaphragm pump for the delivery of liquids, such as surfactants, wetting agents or the like, in doses, comprising:

a pump piston which is displaceably guided in a pump tube surrounding a pump pressure chamber, and which is designed to be electromagnetically driven against the force of a return spring by an electromagnetic coil surrounding the pump tube; and

a pump diaphragm which is fixedly connected to the pump piston on the suction side and peripherally clamped in a pump housing, so that the diaphragm faces a pump suction chamber at one end, the pump diaphragm being centrally traversed by the pump piston which is formed with a full-length longitudinal bore connecting the pump pressure chamber to the pump suction chamber, the pump piston being further provided with a piston valve installed in the longitudinal bore, wherein:

a working chamber lying on that side of the pump diaphragm remote from the pump suction chamber serves as an additional pressure chamber which is permanently connected to the longitudinal bore through the piston leading to the pump pressure chamber by transverse channels present in the pump piston behind the piston valve.

2. A pump as claimed in claim 1, wherein:

the piston valve is provided in the immediate vicinity of that end of the pump piston which passes through the pump diaphragm; and

the transverse channels are provided immediately behind that end of the pump piston.

3. A pump as claimed in claim 2, wherein the pump housing tapers or narrows towards the pump tube in its region surrounding the transverse channels and the additional pressure chamber.

4. A pump as claimed in any one of claims 1 to 3, wherein a pump piston stop having a seal is provided in that part of the housing which surrounds the pump suction chamber, acting as a safety valve separating the pressure chamber from the suction chamber in the stop position of the pump piston brought about by the action of the return spring.

5. A pump as claimed in claim 4, wherein:

the pump piston stop comprises an internal end of a stroke adjustment screw mounted for adjustment in the housing;

the internal end is stepped in diameter, provided with said seal and adapted for sealing displacement from that end of the pump piston which passes through the pump diaphragm into its stop position; and

said seal comprises an O-ring.

6. A pump as claimed in claim 5, wherein:

a screw threaded bushing is provided on that end of the pump piston which passes through the pump diaphragm, said bushing securing the diaphragm on the pump piston; and

the pump piston in its stop position projects beyond the internal end of the stroke adjustment screw by way of the bushing.

7. A pump as claimed in any one of claims 1 to 6, wherein a rectifier which converts the current supplying the electromagnetic coil into pulsating direct current is built into the current lead to the electromagnetic coil.

8. A pump as claimed in claim 7, wherein the rectifier is integrated into that part of the pump housing which surrounds the electromagnetic coil.

9. A pump substantially as hereinbefore described with reference to the accompanying drawing.

DATED this Eighth Day of March 1995

**Lang Apparatebau Gesellschaft mit beschränkter Haftung**

Patent Attorneys for the Applicant

SPRUSON & FERGUSON

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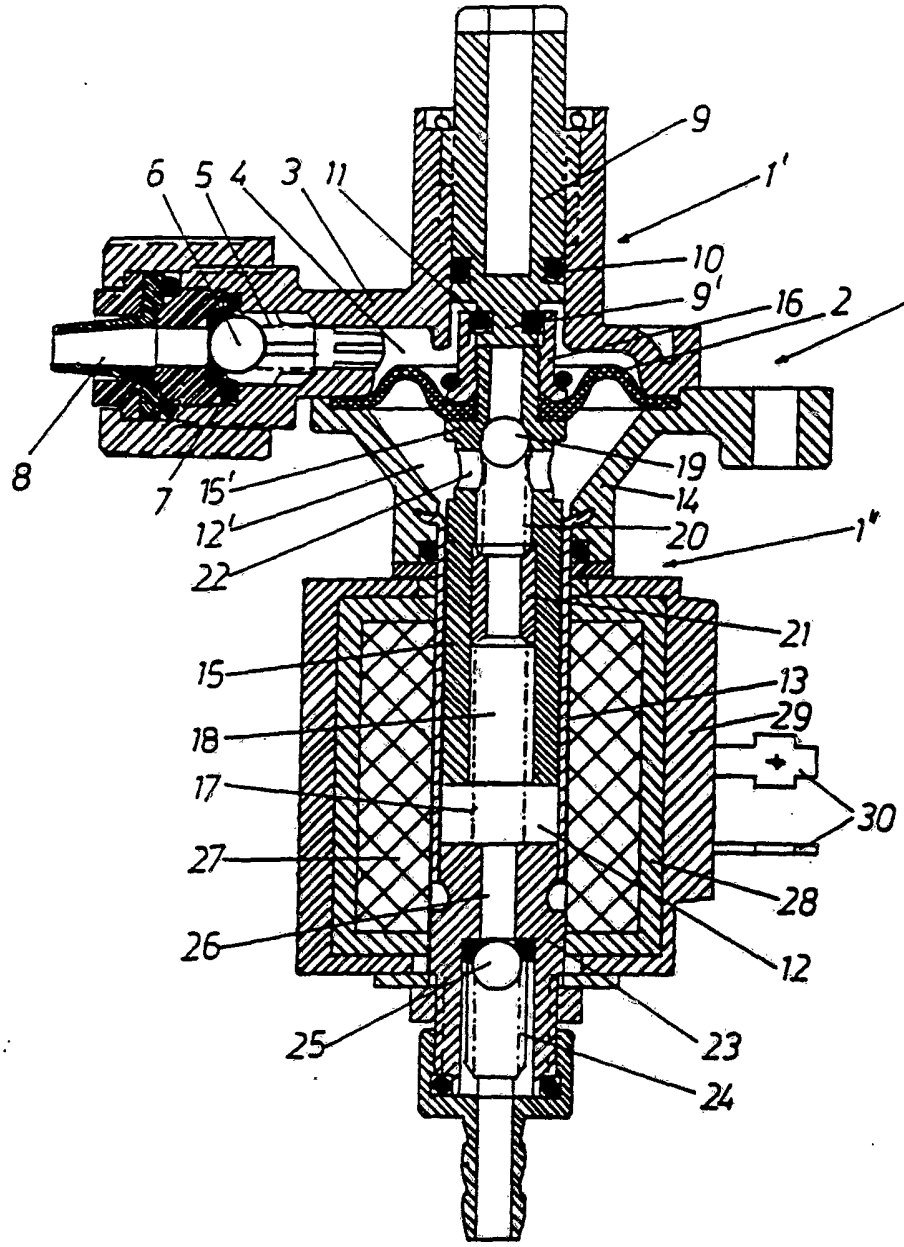
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# INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 92/02029

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl.[5] F04B17/04

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)

Int.Cl.[5] F04B ; F02M

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. |
|---|---|---|
| A | FR,E,54 797 (LAGNIEZ & SOUFFRANT)<br>1 August 1950<br>see page 3, line 55 - page 4, line 73;<br>figures 2-4 | 1 |
| A | DE,A,2 831 437 (PANICK)<br>31 January 1980<br>see the whole document | 1 |

☐ 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

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"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 | Date of mailing of the international search report |
|---|---|
| 24 November 1992 (24.11.92) | 2 December 1992 (02.12.92) |
| Name and mailing address of the ISA/<br>EUROPEAN PATENT OFFICE<br>Facsimile No. | Authorized officer<br>Telephone No. |

# ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. EP 9202029 SA 63974

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 24/11/92
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 |
|---|---|---|---|
| FR-E-54797 | | None | |
| DE-A-2831437 | 31-01-80 | FR-A,B 2431615 | 15-02-80 |
| | | JP-( - 1363552 | 09-02-87 |
| | | JP-A- 55017684 | 07-02-80 |
| | | JP-B- 61031317 | 19-07-86 |
| | | SE-B- 437700 | 11-03-85 |
| | | SE-A- 7905150 | 19-01-80 |
| | | US-A- 4309153 | 05-01-82 |
| | | US-A- 4496292 | 29-01-85 |

# INTERNATIONALER RECHERCHENBERICHT

PCT/EP 92/02029

Internationales Aktenzeichen

## 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.Kl. 5 F04B17/04

## II. RECHERCHIERTE SACHGEBIETE

Recherchierter Mindestprüfstoff [7]

| Klassifikationssytem | Klassifikationssymbole |
|---|---|
| Int.Kl. 5 | F04B ; F02M |

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

## III. EINSCHLAGIGE VEROFFENTLICHUNGEN [9]

| Art.° | Kennzeichnung der Veröffentlichung [11], soweit erforderlich unter Angabe der maßgeblichen Teile [12] | Betr. Anspruch Nr.[13] |
|---|---|---|
| A | FR,E,54 797 (LAGNIEZ & SOUFFRANT)<br>1. August 1950<br>siehe Seite 3, Zeile 55 - Seite 4, Zeile 73; Abbildungen 2-4 | 1 |
| A | DE,A,2 831 437 (PANICK)<br>31. Januar 1980<br>siehe das ganze Dokument | 1 |

[9] 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

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

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"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist

## IV. BESCHEINIGUNG

| Datum des Abschlusses der internationalen Recherche | Absendedatum des internationalen Recherchenberichts |
|---|---|
| 24.NOVEMBER 1992 | 02. 12. 92 |
| **Internationale Recherchenbehörde** | **Unterschrift des bevollmächtigten Bediensteten** |
| EUROPAISCHES PATENTAMT | VON ARX H.P. |

ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT
ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR. EP 9202029
SA 63974

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 24/11/92
Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

| Im Recherchenbericht angeführtes Patentdokument | Datum der Veröffentlichung | Mitglied(er) der Patentfamilie | | Datum der Veröffentlichung |
|---|---|---|---|---|
| FR-E-54797 | | Keine | | |
| DE-A-2831437 | 31-01-80 | FR-A,B | 2431615 | 15-02-80 |
| | | JP-C- | 1363552 | 09-02-87 |
| | | JP-A- | 55017684 | 07-02-80 |
| | | JP-B- | 61031317 | 19-07-86 |
| | | SE-B- | 437700 | 11-03-85 |
| | | SE-A- | 7905150 | 19-01-80 |
| | | US-A- | 4309153 | 05-01-82 |
| | | US-A- | 4496292 | 29-01-85 |

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