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NOTICE OF ENTITLEMENT

66 1032

I (We) F Olle Mattsson
authorised by FM MATTSSON AB
of Box 427, S-792 Mora, SWEDEN

the applicant in respect of an application for a patent for an invention entitled "A throughflow valve and a metal mould tool for manufacturing a valve seat or a valve body"
filed under Australian Application No. 24872/92, 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(s) 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:~~

~~The basic application(s) listed on the request form is (are) the first application(s) made in a Convention country in respect of the invention.~~

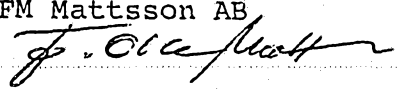
PART 3 - Must be completed if the application was made under the PCT and claims priority.

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:

The basic application(s) listed in the declaration made under Article 8 of the PCT is (are) the first application(s) made in a Convention country in respect of the invention.

Dated this 11 day of January 1994

Signed FM Mattsson AB  Status Managing director

Signatory's Name F Olle Mattsson



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(12) PATENT ABRIDGMENT (11) Document No. AU-B-24872/92
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 661032

(54) Title
VALVE WITH A ROUGHENED VALVE SEALING SURFACE & TOOL FOR MANUFACTURE THEREOF

International Patent Classification(s)

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(56) Prior Art Documents
AU 471124 39631/72 31.9.74.7
AU 209306 18744/56 74.7
AU 11498/33 24.5.04.2

(57) Claim

1. A throughflow valve, particularly a check valve or a safety valve for a damper means of a mixer valve, provided with a valve seat and a valve body, wherein the valve will permit a limited volume of fluid to pass through the valve when the valve is closed with the valve body in abutment with the valve seat, characterized in that the valve seat surface of the valve seat and/or seat abutment surface of the valve body is/are irregular or roughened so as to permit a limited flow of fluid to pass between the irregularities in the valve-seat surface and/or the valve-body surface.

3. A metal mould tool for manufacturing the valve seat or valve body of a throughflow valve according to claim 1 or 2, characterized in that the tool surface forming the seat surface or the valve-body surface has an irregular surface created by a sparking operation, wherein an electric voltage is applied between the tool surface and an electrode so as to generate an electric arc which pits the tool material to form the irregularities therein,

(11) AU-B-24872/92

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(10) 661032

these irregularities then being transferred to the valve seat or the valve body in a subsequent injection moulding process.



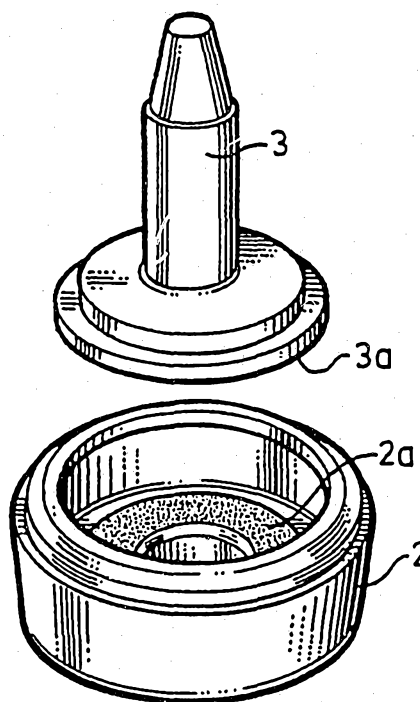
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<p>(51) International Patent Classification ⁵ : F16K 1/32</p>	<p>A1</p>	<p>(11) International Publication Number: WO 93/04308 (43) International Publication Date: 4 March 1993 (04.03.93)</p>
<p>(21) International Application Number: PCT/SE92/00565 (22) International Filing Date: 20 August 1992 (20.08.92) (30) Priority data: 9102413-3 21 August 1991 (21.08.91) SE (71) Applicant (for all designated States except US): FM MATTS- SON AB [SE/SE]; Box 427, S-792 27 MORA (SE). (72) Inventor; and (75) Inventor/Applicant (for US only) : ANDERSSON, Sven [SE/SE]; Vattnäs 6797, S-792 97 MORA (SE). (74) Agents: WENNBORG, Göte et al.; Kransell & Wennborg AB, Box 27834, S-115 93 Stockholm (SE).</p>		<p>(81) Designated States: AU, CA, FI, JP, NO, US, European pa- tent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE). Published With international search report.</p> <p style="font-size: 2em; text-align: center;">661032</p>

(54) Title: A THROUGHFLOW VALVE AND A METAL MOULD TOOL FOR MANUFACTURING A VALVE SEAT OR A VALVE BODY

(57) Abstract

A throughflow valve (1) comprising a valve seat (2) and a valve body (3) is intended to permit a given flow of fluid to pass therethrough when the valve is closed. To this end, the mutually abutting surfaces (2a; 3a) of the valve seat and/or the valve body are irregular or roughened, these irregularities having a size of 20-100 µm. The invention also relates to a mould tool provided with corresponding irregular or roughened surface created by a so-called sparking operation.



A Throughflow Valve and a Metal Mould Tool for
Manufacturing a Valve Seat or a Valve Body

5 Field of the Invention

The present invention relates to a throughflow valve having a valve seat and valve body, particularly a check valve or safety valve for mixer valve damping means, in which a
10 limited flow of fluid through the valve is permitted even when the valve body lies against the valve seat.

According to another aspect, the invention also relates to a metal mould tool for manufacturing the valve seat or valve
15 body of such a throughflow valve.

State of the Art

Throughflow valves, such as check valves, in which a desired, restricted flow of fluid is permitted through the valve with the aid of a V-shaped recess in the surface of the seat when the valve is closed are known to the art. One serious drawback with valve seats of this kind, however, is that contaminants or foreign bodies present in the fluid that passes
20 through the valve are easily caught in the V-shaped recess, thereby preventing the desired minimum flow of fluid or "leakage" through the valve when the valve is closed. The contaminants become wedged in the recess and are liable to jeopardize effective long-term functioning of the valve.

30 Also known to the art are different types of valves having sintered or porous valve bodies or barrier elements, which permit a given flow of fluid through the valve when the valve is closed. Examples of such valves are found described in
35 DE,A1,3.140.438 (Wittenstein) and JP,A,61-96274 (Sumitomo Electric). These valves, however, are expensive to manufacture and problems are encountered in accurately determining the minimum amount of fluid that shall flow through

the valve, particularly since there is a risk that contaminants carried by the fluid will collect in the porous or elastic valve material when the valve has been in use for some time.

5

Other, related valves used for different purposes than the aforesaid valves are described, for instance, in US,A,3,185,438 (Smirra), EP,A1, 0 401 607 (Bürkert) and EP,A2,0 381 925 (Cummins Engine Company).

10

SE,B,8604612-5 (publication No. 455.124) (FM Mattsson) describes a single-lever type mixer valve provided with a damping arrangement which incorporates a throttle plate functioning as a throughpass valve of the kind intended here.

15

Object of the Invention

The object of the present invention is to provide at low cost an improved throughflow valve which will avoid the drawbacks of the earlier known, similar valves and which can be used in different contexts.

20

Disclosure of the Invention

~~25 These and other objects are fulfilled by an inventive~~
throughflow valve of the aforescribed kind and generally characterized in that the surface of the valve seat and/or the valve body is irregular or roughened so as to permit a limited flow of fluid to pass between the irregularities in
30 the valve-seat surface and/or the valve body surface.

30

This valve feature enables a minimum flow of fluid through the valve to be ensured without blockaging of the valve, in
~~distinction to the earlier known valves.~~

35



The present invention provides a throughflow valve, particularly a check valve or a safety valve for a damper means of a mixer valve, provided with a valve seat and a valve body, wherein the valve will permit a limited volume of fluid to pass through the valve when the valve is closed with the valve body in abutment with the valve seat, characterized in that the valve seat surface of the valve seat and/or seat abutment surface of the valve body is/are irregular or roughened so as to permit a limited flow of fluid to pass between the irregularities in the valve-seat surface and/or the valve-body surface.

This valve feature enables a minimum flow of fluid through the valve to be ensured without blockaging of the valve, in distinction to the earlier known valves.



Although fluid-carried contaminants may fasten in the roughened or irregular surface, it has been found in practice that these contaminants will be dislodged and removed within a short period of time, the effect produced by contact of the valve body with the valve seat also contributing in this respect.

The contaminants thus have no tendency to become firmly wedged, as in the case of valve seats provided with V-shaped grooves.

In practice, at least the major part of the irregularities should have a size in the order of 20-100 μm .

The irregular or roughened surface can be produced in practice by subjecting the metal mould tool used to manufacture the valve seat and/or the valve body to a "sparking operation", wherein when manufacturing the mould tool a voltage is applied between the tool and an electrode, thereby generating an electric arc which "pits" the material. The parameters applied during the sparking operation are selected so that the tool surface will be pitted with irregularities of a given desired size, which in the subsequent injection moulding process used to manufacture the valve seat or valve body will result in a corresponding roughened or "pitted" surface of the injection moulded seat.

Accordingly, another aspect of the invention relates to a metal mould tool for the manufacture of a valve seat or valve body of a throughflow valve of the kind intended here, ~~the general characteristic features of the mould tool being set forth in claim 3.~~

Brief Description of the Drawings

The invention will now be described in more detail with



reference to an exemplifying embodiment thereof and also with reference to the accompanying drawings, in which

5 Figure 1 is a perspective view of the two valve parts, namely the valve seat and the valve body of an inventive throughflow valve; and

10 Figure 2 is a cross-sectional view of a closed throughflow valve which permits a limited minimum flow of fluid there-through.

Best Mode of Carrying Out the Invention

15 The throughflow valve 1 illustrated in the drawing comprises a valve seat 2 and a valve body 3. The valve seat 2 has a seat surface 2a which abuts a corresponding surface 3a on the valve body 3 when the valve is closed, as shown in Figure 2.

20 In order to permit a given minimum flow of fluid to pass through the valve when the valve is closed, the seat surface 2a is "pitted", i.e. is roughened with a large number of irregularities having a size which may lie in the range of 20-100 μm and which in the case of an embodiment applied in practice has a size of 40-60 μm .

25 The roughened or pitted surface is produced when manufacturing the valve seat by virtue of the fact that the surface of a mould tool used to manufacture the seat surface is subjected to a so-called sparking operation so as to form a roughened or irregular surface corresponding to the surface of the
30 valve seat. In this regard, an electric voltage is applied between the surface of the mould tool and an electrode, so as to generate an electric arc and therewith pit the tool material so as to form an irregular or pitted surface thereon.

35

Alternatively, or additionally, the seat abutment surface 3a of the valve body 3 may be provided with a corresponding roughening or irregularities. Normally, however, it is sufficient for only one of the surfaces to be roughened, the valve seat part being chosen for this purpose in the majority of cases.

- The seat part and the valve body respectively may be made of any desired material, such as a plastic material or metal.
- 10 The roughened surface can be produced in many ways other than the preferred method described above. For example, a computer controlled copy milling machine can be used for the aforesaid purpose instead of the sparking operation.
- 15 The size of the irregularities may vary in accordance with the use for which the throughflow valve is intended.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A throughflow valve, particularly a check valve or a safety valve for a damper means of a mixer valve, provided with a valve seat and a valve body, wherein the valve will
5 permit a limited volume of fluid to pass through the valve when the valve is closed with the valve body in abutment with the valve seat, characterized in that the valve seat surface of the valve seat and/or seat abutment surface of the valve body is/are irregular or roughened so as to
10 permit a limited flow of fluid to pass between the irregularities in the valve-seat surface and/or the valve-body surface.

2. A valve according to claim 1, characterized in that at least the major part of the irregularities have a size
15 lying in the range of 20-100 μm .

3. A metal mould tool for manufacturing the valve seat or valve body of a throughflow valve according to claim 1 or 2, characterized in that the tool surface forming the seat surface or the valve-body surface has an irregular
20 surface created by a sparking operation, wherein an electric voltage is applied between the tool surface and an electrode so as to generate an electric arc which pits the tool material to form the irregularities therein, these irregularities then being transferred to the valve
25 seat or the valve body in a subsequent injection moulding process.

4. A throughflow valve substantially as hereinbefore described with reference to the accompanying drawings.

5. A metal mould tool for manufacturing the valve seat
30 or valve body of a throughflow valve substantially as hereinbefore described with reference to the accompanying drawings.

DATED this 9th day of May 1995

FM MATTSSON AB

Patent Attorneys for the Applicant:

F.B. RICE & CO.



24872/92

Fig. 1

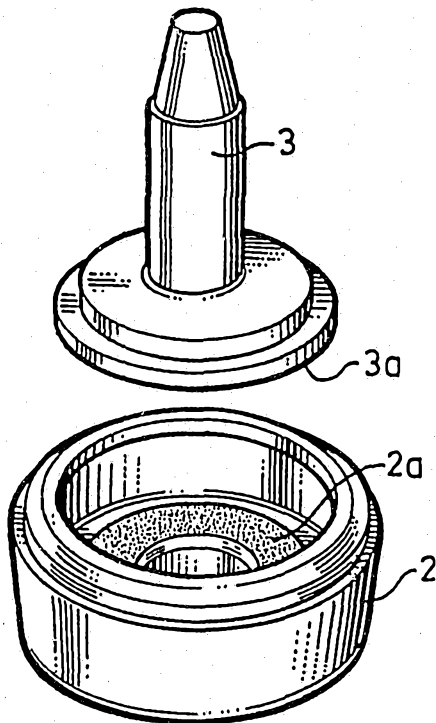
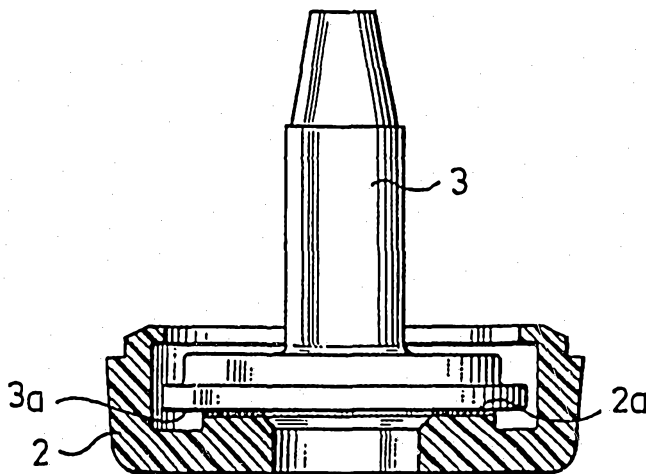


Fig. 2



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00565

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 IPC5: F 16 K 1/32											
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; border-bottom: 1px solid black;">Classification System</td> <td style="border-bottom: 1px solid black;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">IPC5</td> <td style="padding: 5px;">F 16 K</td> </tr> </table>			Classification System	Classification Symbols	IPC5	F 16 K					
Classification System	Classification Symbols										
IPC5	F 16 K										
Documentation Searched other than Minimum Documentation to the extent that such Documents are Included in Fields Searched ⁸ SE,DK,FI,NO classes as above											
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category *</th> <th style="width: 70%;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 20%;">Relevant to Claim No.¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td style="padding: 5px;">SE, B, 455124 (FM MATSSON AB) 20 June 1988, see abstract; figures 2-3; claim 1 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td style="padding: 5px;">DE, A1, 3140438 (WITTENSTEIN, MANFRED) 21 April 1983, see abstract; figure 1; claims 1-3 -- -----</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> </tbody> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	A	SE, B, 455124 (FM MATSSON AB) 20 June 1988, see abstract; figures 2-3; claim 1 --	1	A	DE, A1, 3140438 (WITTENSTEIN, MANFRED) 21 April 1983, see abstract; figure 1; claims 1-3 -- -----	1
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<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%; vertical-align: top;"> <p>"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</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&" document member of the same patent family</p> </td> </tr> </table>			<p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&" document member of the same patent family</p>							
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IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="padding: 5px;">11th November 1992</td> <td style="text-align: center; padding: 5px;">16 -11- 1992</td> </tr> <tr> <td style="border-bottom: 1px solid black;">International Searching Authority</td> <td style="border-bottom: 1px solid black;">Signature of Authorized Officer</td> </tr> <tr> <td style="text-align: center; padding: 5px;">SWEDISH PATENT OFFICE</td> <td style="padding: 5px;">C. Westberg</td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	11th November 1992	16 -11- 1992	International Searching Authority	Signature of Authorized Officer	SWEDISH PATENT OFFICE	C. Westberg	
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/SE 92/00565**

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 Swedish Patent Office EDP file on 30/09/92. The Swedish 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
SE-B- 455124	88-06-20	AU-B- 603160	90-11-08
		AU-D- 8175687	88-05-25
		EP-A-B- 0328543	89-08-23
		SE-A- 8604612	88-04-30
		WO-A- 88/03240	88-05-05
DE-A1- 3140438	83-04-21	NONE	