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**Datasheet for the decision
of 6 March 2007**

Case Number: T 0469/04 - 3.2.01

Application Number: 95850097.7

Publication Number: 0686794

IPC: F16K 7/16

Language of the proceedings: EN

Title of invention:
A housing for diverter valve

Patentee:
ITT Corporation

Opponent:
Crane Process Flow Technologies Limited

Headword:
-

Relevant legal provisions:
EPC Art. 56, 84

Keyword:
"Inventive step - no (main request)"
"Claims - clarity (no) (auxiliary requests)"

Decisions cited:
G 0009/91

Catchword:
-



Case Number: T 0469/04 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 6 March 2007

Appellant: Crane Process Flow Technologies Limited
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 2 February 2004
rejecting the opposition filed against European
patent No. 0686794 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
T. Karamanli

Summary of Facts and Submissions

- I. The appeal is directed against the decision posted 2 February 2004 to reject the opposition against European patent No. 0 686 794.
- II. The following prior art played a role during the appeal procedure:
- D3: US-A-5 273 075
- D8: Brochure "Sanitary diaphragm valves" by GEMÜ, Introduction page and a Technical Information page including a table with the heading 'Drain Angles'
- D9: Brochure "'SAUNDERS' diaphragm valve installation maintenance and spare parts", page 1.
- III. At oral proceedings held on 6 March 2007 the appellant (opponent) requested that the decision under appeal be set aside and the patent revoked. The respondent (patent proprietor) initially requested that the appeal be dismissed (main request) or in the alternative that the patent be maintained in amended form on the basis of respective claims 1 filed with a letter of 24 January 2007 (first to third auxiliary requests). The board found that the subject-matter of claim 1 according to the main request did not involve an inventive step. The board further expressed its opinion that the respective claims 1 according to all auxiliary requests were unclear and that those according to the second and third auxiliary requests had been amended in a way which offended the provision of Article 123(2) EPC. In response the patent proprietor filed further

amended claims to replace those according to the second and third auxiliary requests.

IV. Claim 1 according to the main request (as granted) reads as follows:

"A housing for a diverter valve comprising a valve body (10) having a chamber (24) and a partition (28) subdividing said chamber into compartments (34,36,38) characterized in, that said body has (a) a substantially flat base (12) and (b) spaced apart, front (14), rear (16) and side (18,20) walls rising from said base, that said chamber (24) has a flat floor (26) formed therein that said front and rear walls have porting (22,30,32) formed therein which opens onto said compartments, that said side walls have openings (40,42) formed therein for mounting thereto diaphragm compressor assemblies, that said partition has means (44,46) bisecting said openings, that said porting in said front wall comprises an inlet port (22) which opens onto one (34) of said compartments, that said porting in said rear wall comprises outlet ports (30,32), each of which opens onto another (36,38) of said compartments and that said ports, openings and partition have lowermost portions which are contiguous (*sic*) with, and fair into, said flat floor (26) defining a horizontal drainage plane within said body."

Claim 1 according to the first auxiliary request differs from that of the main request by the following additional wording at the end of the claim:

", when the latter is disposed horizontally".

Claim 1 according to the second auxiliary request differs from that according to the first auxiliary request by the addition of the features that the side walls are inclined from the vertical and that the front and rear walls are substantially triangular.

Claim 1 according to the third auxiliary request differs from that according to the second auxiliary request by the additional feature that the side walls are inclined from the vertical "with an angle therebetween to form 40 to 80 degrees of arc".

- V. The submissions of the opponent in respect of inventive step of the subject-matter of claim 1 according to the main request may be summarised as follows:

As acknowledged in the patent specification the closest state of the art is known from D3. This is a diverter valve which essentially comprises two diaphragm-type shut-off valves arranged in parallel and having a common inlet in a single housing. In order to achieve the stated aim of avoiding 'dead legs' the valve must be inverted from the illustrated orientation. It follows that the teaching of D3 does not restrict the orientation of the valve. However, if it is orientated with the inlet and outlet ports horizontal fluid will be trapped inside. It has been known for many years that diaphragm valves having concentric inlet and outlet ports when installed in a pipeline having the conventional gradient of 2° to 3° may be rendered self-draining by being rotated about the axis of the ports to an angle chosen by the designer in order to establish a flat drainage path through the valve, see D8 and/or D9. This requires that the fluid be able to

escape not only from the outlet port in the case that the valve is closed but also from the inlet port through the open valve to clear the line. Application of this conventional teaching to the valve of D3 leads directly to the subject-matter of claim 1 according to the main request.

Alternatively it has previously been known to employ two diaphragm-type shut-off valves in parallel with their inlet ports linked by a Y- or T-connection. In accordance with the conventional practice those valves would be arranged in a self-draining orientation. In order to avoid the 'dead leg' created by the Y- or T-connection it would be obvious to follow the teaching of D3 to provide a common inlet chamber, thereby arriving at the subject-matter of claim 1.

VI. The patent proprietor argued essentially as follows:

As regards inventive step of claim 1 according to the main request, D3 sets out to avoid trapped fluid and that is possible only if it passes vertically through the body. Prior to the present invention it was not known to provide a diverter valve for horizontal flow and the inventive concept lies in combining conventional diaphragm-type shut-off valves for that purpose. In order to avoid the problem of 'dead legs' when combining those valves the skilled person would provide a common inlet port which, however, would and could not be concentric with both outlet ports. The skilled person is aware of the practice of orientating conventional diaphragm-type shut-off valves for self-draining as shown in D8 or D9 but would not apply this to the diverter valve because of the non-concentricity

of the common inlet port with the outlet ports. The expression "flat floor" in claim 1 is to be understood as meaning that throughout the valve the lowest level lies in a single plane. The opponent has not shown that the conventional valves exhibit such a flat drainage plane when orientated for self-draining.

As regards the board's objection of a lack of clarity in claims 1 according to the auxiliary requests, the orientation of the housing is defined by the ports and in case of any doubt reference may be made to the description.

Reasons for the Decision

1. The patent relates to a housing for a diaphragm-type diverter valve. Such a valve has a single inlet port and two outlet ports and is used in liquid process piping systems to divert the flow of liquid from one outlet port to the other. Two diaphragms are independently movable to seal against weir faces to enable and interrupt the flow to the respective outlet ports. The present patent addresses the problem that in some systems it is unacceptable that residual liquid can be trapped in the valve. The skilled person is aware that a liquid process system which is arranged with truly horizontal pipework will be difficult to empty and in practice it is common to employ a gradient of 2° to 3° in order to aid the flow of liquid in an un-pressurised state. This essentially horizontal arrangement is designated merely as 'horizontal' hereafter.

2. Claim 1 according to each request specifies that the valve chamber has a "flat floor" which defines a "horizontal drainage plane". The patent proprietor acknowledged during the oral proceedings that this is not intended to signify an extensive planar surface and represents an arrangement in which all ports and flow passages have lowest points throughout their lengths which are co-planar, cf. figures 1 and 4 of the patent.

Main request- inventive step (Article 56 EPC)

3. It is acknowledged in the introduction to D3 that it was previously known to provide a diverter valve system by arranging two diaphragm-type shut-off valves in parallel with their inlet ports connected by a Y- or T-connector. This arrangement, however, suffers from the problem of 'dead legs' whereby fluid may stagnate in the branch of the connector in which the closed valve is located. D3 addresses the problem of 'dead legs' by providing a diverter valve comprising the two diaphragm-type shut-off valves in a common housing with both streams sharing a single inlet port and a single inlet chamber. This overcomes the problem of 'dead legs' and when the valve is used with the ports arranged vertically it appears that the valve also would be self-draining, although D3 is silent on this matter. D3 is also silent as regards whether the valve is intended to be used in any particular orientation and in the absence of any instruction in D3 in this respect the skilled person would feel free to install it with the inlet and outlet ports in a horizontal plane. However, the valve is configured in such a way that if it were used horizontally fluid may be trapped

in the valve and stagnate; D3 does not address this problem.

4. D8 and D9 both are commercial brochures relating to diaphragm-type shut-off valves having concentric inlet and outlet ports. Such valves are inherently self-draining when used with the ports in a vertical plane. With the ports horizontal, however, the configuration of the valves is such that they may create traps for liquid and therefore may not be self-draining. The designers of the valves of D8 and D9 have addressed this problem and the patent proprietor acknowledges that the solution offered, to indicate an angle for the orientation of the valve around the horizontal axis of the ports at which the valve will be self-draining, is widely known.
5. Given that a solution to the problem of stagnation of liquid in horizontally arranged diaphragm-type shut-off valves is known it would be an obvious act for the skilled person to correspondingly adapt the diverter valve of D3. However, the question remains whether in so doing the skilled person would arrive at the feature in claim 1 of the flat floor, cf. also point 2 above. In particular, the patent proprietor argues that the opponent has not shown that orientating diaphragm-type shut-off valves for self-draining as represented by D8 and D9 results in a horizontal drainage plane.
 - 5.1 As the opponent convincingly argues, there are two aspects to self-draining. The first aspect concerns the drainage of liquid downstream of a closed diaphragm-type valve to the outlet through the horizontal pipeline (see also point 1 above). This would be

possible both with a floor which is flat and with one which is not flat by virtue of the weir forming a high point. The second aspect concerns emptying the pipeline including the valve, for which it should be possible for all of the liquid to pass through the valve to the outlet. This would only be the case if the valve exhibited no high point at the weir. In both cases the presence of a trough would prevent self-draining. It follows that a valve can be considered as being self-draining only when the liquid is able to follow a flat path from the inlet port to the outlet port. For these reasons the board is satisfied that the skilled person understands from D8 and D9 that the self-draining condition implies a flat floor within the meaning of present claim 1.

5.2 The skilled person would not have difficulty in adapting the D3 valve in accordance with the conventional self-draining teaching. The shut-off valves according to D8 and D9 exhibit similarly shaped chambers upstream and downstream of the weir and are orientated by rotation about the common axis of the inlet and outlet ports in order to provide a flat surface. However, the skilled person would not rely on that same technique when adapting the valve housing according to D3 since the inlet and outlet chambers are differently shaped. Unlike the conventional diaphragm-type shut-off valves the valve according to D3 has a fixed orientation determined by the pipeline into which it is fitted. Adaptation of the valve according to D3 therefore would involve the construction of surfaces in the respective chambers of the housing which in the fixed orientation would form a flat floor within the

meaning of the claim. Such a task would fall within the ability of the person skilled in the art.

6. The board concludes from the above that it would be obvious for the skilled person to combine the teaching of D3 with the known provision of a flat surface in the interior of diaphragm-type shut-off valves to provide a self-draining condition in their operating position. As a result he would arrive at the subject-matter of present claim 1 which therefore does not involve an inventive step. It follows that the main request is not allowable.

Auxiliary requests

7. Claim 1 according to the first auxiliary request specifies that the flat floor defines a horizontal drainage plane within the body "when the latter is disposed horizontally". Since this claim has been amended in comparison with claim 1 as granted the amendment must be examined for compliance with all relevant requirements of the EPC (G 0009/91, OJ EPO 1993, 408, reasons 19).
 - 7.1 The "body" is defined in claim 1 as having a chamber having a flat floor and a partition subdividing the chamber into compartments, a substantially flat base and spaced apart front, rear and side walls rising from the base. The body therefore is a three-dimensional object of which the various walls are of unspecified orientation both relative to each other and relative to the base. The front and rear walls comprise ports which open into the compartments and have lowermost portions which are contiguous with and fair into the flat floor

but otherwise are of unspecified orientation. From all of these features it is not clear which datum should be used to determine that the body is "disposed horizontally" (Article 84 EPC).

- 7.2 The patent proprietor argues that the orientation of the housing is determined by the ports but that in the event of any lack of clarity in the claim the description may be used to interpret the intended meaning. However, whilst the orientation of the ports may be used as a general indicator of the attitude of the valve, this is not a sufficiently accurate basis for the definition of the body in the claims. Moreover, Article 84 EPC requires that "The claims ... shall be clear and concise and supported by the description." This requirement of the EPC cannot be circumvented by providing claims which require reference to the description in order to determine their intended meaning.
8. The specification in claim 1 according to the first auxiliary request that the flat floor defines a horizontal drainage plane when the valve body is disposed horizontally is present also in claims 1 according to the second and third auxiliary requests. These claims therefore fail to satisfy the requirement of Article 84 EPC in respect of clarity for the same reasons as are set out above in respect of the first auxiliary request.
9. On the basis of the foregoing the board finds that none of the auxiliary requests is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

A. Vottner

S. Crane