BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

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A		B		C	X

File Number: T 286/90 - 3.2.1

Application No.: 84 112 569.3

Publication No.: 0 178 344

Title of invention: Ball valve

Classification: F16K 5/20, F16K 5/06, F16K 27/06

D E C I S I O N
of 21 January 1993

Applicant: SEKISUI KAGAKU KOGYO KABUSHIKI KAISHA

Headword:

EPC Article 56

Keyword: "Inventive step (after amendment, yes)"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 286/90 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 21 January 1993

Appellant : SEKISUI KAGAKU KOGYO KABUISHIKI KAISHA
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Decision under appeal : Decision of the Examining Division 2.3.07.118 of the European Patent Office dated 18 December 1989 refusing European patent application No. 84 112 569.3 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : F. Gumbel
Members : M. Ceyte
F. Benussi

Summary of Facts and Submissions

I. European patent application No. 84 112 569.3 (publication No. 0 178 344) was refused by a decision of the Examining Division dated 18 December 1989.

II. The reason for the refusal was that the subject-matter of Claim 1 filed on 23 March 1989 did not involve an inventive step having regard to the disclosure in:

D1: US-A-4 023 773
D2: US-A-4 099 705
D3: US-A-3 550 902.

III. An appeal was lodged against this decision on 18 January 1990 and the prescribed fee paid at the same time. The Statement of Grounds of Appeal was filed on 21 March 1990.

During oral proceedings held on 21 January 1993 the Board cited the further document:

D4: CH-A-572 588.

Document D4 was dealt with during the examining proceedings and its family member US-A-4 059 250 was acknowledged as prior art in the patent application in suit.

IV. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the following single claim submitted during the oral proceedings.

"A ball valve comprising a valve body (1) having a continuous axial chamber, a rotatable valve ball (2')

arranged in the axial chamber, a spindle (5') for rotating said valve ball between open and closed positions; annular seals (34, 43) which abut against said valve ball (2') from both sides in the axial chamber, seal carriers (3, 4) which push the annular seals (34, 43) towards the valve ball (2') and connecting sleeves (6) which are disposed at each end face of the valve body, wherein in one end portion of the axial chamber the inside diameter thereof is reduced to form a step (12) and the seal carrier which is positioned in this end portion is provided with a peripherial flange (32) which co-operates with the step (12) to lock the seal carrier in the valve body, c h a r a c t e r i s e d in that each connecting sleeve (6) abuts against the corresponding seal carrier (3, 4), a gap being provided between each end face of the valve body (1) and the associated connecting sleeve (6), and in that a pin is positioned in said valve body at a position opposite the spindle (5') and coaxial therewith, the spindle and the pin being fitted in respective grooves (22', 24) provided in the valve ball, each groove having an abutting wall for the spindle or the pin, respectively, said abutting wall being positioned, in the closed position of the valve, on the side of the seal carrier (3) which co-operates with said step (12)."

This claim corresponds essentially to the claim of the subsidiary request which was considered patentable by the Examining Division.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC; it is admissible.

2. The features stated in the present single claim were in essence subject-matter of original Claims 1 to 3.

The subject-matter of the single claim therefore does not extend beyond the content of the application as originally filed (Article 123(2) EPC).

3. In the prior art part of the single claim are stated all those features of the claimed subject-matter which are, in combination, disclosed in document D2. None of the further citations comes closer to the claimed subject-matter than this prior art.

The single claim thus meets the formal requirements of Rule 29(1) EPC.

4. It is desirable in conventional ball valves to provide means for locking the seal carriers to the valve body, so that the valve will operate and stay closed even if only one end is connected to a pipe. For achieving this, one of the seal carriers is, in the ball valve of document D2, provided in a step of the valve body. One problem with this known valve arrangement is that only if the valve arrangement is correctly positioned in the piping, i.e. with the step in the valve body being placed opposite the side to which pressure is applied, may the ball valve be disconnected from the downstream branch of the piping system without the risk of having the ball and the seal carriers blown out of the valve body.

Although in D2 a simple assembling is achieved, such a ball valve by being unsymmetrical has the further disadvantage that the adjustment to compensate for wear of the annular seals is not carried out symmetrically, so that if compensation is repeatedly carried out the centre of the ball can be significantly displaced from the centre

axis of the spindle and the valve does not remain smoothly operable.

5. Thus, starting from the closest prior art document D2, the technical problem underlying the patent application in suit may be seen in providing an improved ball valve of this known type which is inexpensive to manufacture and which overcomes the above-mentioned drawbacks, that is to say, which permits a symmetrical adjustment and thus a permanent smooth operation and prevents the ball from blowing out in both flow directions.

6. This technical problem is in essence solved by the characterising features stated in the single claim:

(a) both connecting sleeves abut against the corresponding seal carriers, a gap being provided between both sleeves and the valve body;

(b) means are provided for locking the ball to the valve body, which means include the spindle for rotating the valve ball and a coaxial pin, both co-operating with an abutting wall of a respective groove in the valve ball when the latter is in the closed position.

Hence a symmetrical tightening adjustment is possible when wear occurs upon the annular seals. Since both seal carriers are displaceable by the union nuts the pressure exerted on the ball valve can be adjusted through both seal carriers by further tightening or loosening the union nuts. Therefore, when the annular seals are worn, displacement of the centre of the valve ball can be minimised by tightening the two union nuts equally, so that the valve can be operated smoothly at all times.

Since means are provided for locking either seal carrier to the valve body either end of the valve may be disconnected from a piping system, the valve yet remaining in a shut-off or sealed condition; accordingly there is no tendency for the seal carriers to be expelled from the valve body, regardless of the arrangement of the valve in respect of the piping branch under pressure.

7. It is evident from the statement in sections 3 and 4 above that the device according to the claim differs from that of the nearest prior art document D2 by the features stated in its characterising part.

The subject-matter of the claim is likewise novel regarding each of the other available prior art documents, since none of them discloses inter alia the aforementioned feature (b).

Hence, the subject-matter of the single claim is novel.

8. It remains to be examined whether the requirement of inventive step is met by the subject-matter of the claim.

8.1 The lack of inventive step objection raised by the Examining Division was based on the combined teaching of prior art documents D1, D2 or D3.

8.1.1 Document D1 leads away from the teaching of the claimed subject-matter since the object to be achieved in this prior art document is to provide a ball valve which is symmetrical (cf. column 3, line 17). In contrast thereto the claimed ball valve is necessarily unsymmetrical, since both means for locking the seal carriers to the valve body are of different design: one of said means is formed by the co-operation of a step protruding in the axial chamber of the valve body with a flange provided on the

corresponding seal carrier. The other locking means includes the spindle for rotating the valve ball and a coaxial pin (feature (b) above).

Furthermore, there is no disclosure or suggestion in this citation of said feature (b). Therefore, even if the skilled person had considered to apply the teaching given in document D1 to a ball valve of the type disclosed in the closest prior art document D2, he would not have arrived at the claimed solution.

8.1.2 Document D3 teaches a ball valve arrangement in which one of the seal carriers is made integral with the valve body. Only one seal carrier is displaceable against the valve ball by screwing the union nut. Hence, the adjustment to compensate the wear of the annular seals cannot be carried out symmetrically, so that the centre of the valve ball can be significantly shifted from the centre axis of the spindle.

Furthermore, no means is provided for locking the displaceable seal carrier to the valve body and therefore only one end of the valve may be disconnected from a piping system.

Thus, the valve arrangement proposed in document D3 does not solve at all the problem of the claimed invention referred to in section 5 above.

8.2 Document D4 teaches a symmetrical ball valve arrangement where the valve body and the seal carriers are provided with a bayonet-type connection. The seal carriers may be freely inserted into the ends of the valve body and then rotated through a given angle to lock the seal carriers relative to the body.

While this design is intended to solve the same problem as that underlying the subject-matter of the claim, the patent application in suit proposes a very different solution. Thus, there is no disclosure or suggestion in this citation of the claimed unsymmetrical arrangement for locking either seal carrier to the valve body.

8.3 Therefore, the Board comes to the conclusion that the subject-matter of the single claim involves an inventive step (Article 56 EPC). This claim is thus allowable in accordance with Article 52(1) EPC and can form the basis for the grant of a patent.

9. The description and the drawings also meet the requirements of the Convention.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant the European patent on the basis of the single claim and the description submitted at the oral proceedings, drawings as originally filed.

The Registrar: The Chairman:

S. Fabiani F. Gumbel

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