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D E C I S I O N
of 9 December 2003

Case Number: T 1133/01 - 3.2.1

Application Number: 92112085.3

Publication Number: 0523663

IPC: F16D 33/16

Language of the proceedings: EN

Title of invention:
Quick acceleration fluid coupling

Patentee:
EBARA CORPORATION

Opponent:
Voith Turbo GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1133/01 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 9 December 2003

Appellant: (Proprietor of the patent)
EBARA CORPORATION
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Representative:
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Respondent: (Opponent)
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Representative:
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 17 August 2001 revoking European patent No. 0523663 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: S. Crane
Members: F. J. Pröls
H. Preglau

Summary of Facts and Submissions

I. European patent No. 0 523 663 granted on the basis of the European patent application 92 112 085.3 was opposed by the respondents on the grounds that its subject-matter lacked novelty and inventive step (Article 100(a) EPC) and that the claimed invention was insufficiently disclosed (Article 100(b) EPC). Of the evidence relied upon in the opposition proceedings only the following documents have played any role on appeal:

D5: Einbau- Betriebsanweisung zur Voith-Turbokupplung -Typ 487 DTP

D5/1: Annexe "Pohang 3", "Kupplungskarte", Invoice, Dispatch note (filed as evidence that the device described in D5 has been sold and shipped on 4 October 1990 to Pohang Iron & Steel Company Ltd. in Seoul/Korea and has been made available to the public)

D6: JP-A 3-140 633

II. The Opposition Division revoked the patent with its decision posted on 17 August 2001, the subject-matter of claim 1 under consideration being held to lack novelty with respect to the coupling disclosed in D5.

III. A notice of appeal against that decision was filed on 15 October 2001 and the fee for appeal paid at the same time. The statement of grounds of appeal was received on 14 December 2001.

IV. Oral proceedings before the Board were held on 9 December 2003.

At the oral proceedings the appellants (proprietors of the patent) submitted a new set of claims 1 to 5 and a revised description columns 1 to 8. Previous requests were withdrawn. They requested that the decision under appeal be set aside and the patent be maintained on the basis of the documents submitted at the oral proceedings and the drawings as granted.

Claim 1 reads as follows:

"A fluid coupling comprising a fluid coupling working chamber (C) including

- an impeller (2) attached to a driving shaft (1),
- a runner (3) attached to a driven shaft (4),
- an impeller casing (5) attached to said impeller (2) and surrounding said runner (3), wherein said impeller casing (5) includes a discharge nozzle (k) for discharging hydraulic oil from said fluid coupling working chamber (C) freely to the outside thereof, and
- a passage (l_1) for supplying the hydraulic oil into said fluid coupling working chamber (C), and control means disposed in said passage (1_1) and including a valve (f) selectably operable so as to be fully opened and closed for changing the rotational speed of said driven shaft between a highest and lowest rotational speed,

characterized in that
said control means includes further

– a bypass passage (l_2) having an oil control orifice (h), which bypasses said control valve (f), the control being arranged to selectively and rapidly change the rotational speed of said driven shaft (4) from a lowest rotational speed of the running driven shaft, wherein the control valve (f) is fully closed and the quantity of oil supplied to the working chamber (C) is determined by said oil control orifice (h), to a highest rotational speed, wherein the quantity of the oil supplied to the working chamber (C) is determined by the fully opened control valve (f) and said oil control orifice (h), or vice versa according to the operation of said control valve (f) and a dam (D) is provided on an inner surface of said impeller casing (5) inwardly of said oil discharge nozzle (k) for setting the lowest rotational speed of said driven shaft (4)."

Dependant claims 2 to 5 relate to preferred embodiments of the fluid coupling according to claim 1.

The arguments of the appellants in support of their request were essentially as follows:

None of the cited documents disclosed a fluid coupling with control means in combination with a dam provided on the inner surface on the impeller casing as set out in the characterizing part of present claim 1. Thus the prior art could not lead the person skilled in the art to the claimed invention.

V. The reply of the respondents requesting dismissal of the appeal can be summarized as follows:

Document D5 as well as document D6 taught a fluid coupling comprising control means for changing the speed of the driven shaft between a highest and a lowest value which in principle correspond to the control means set out in claim 1 submitted at the oral proceedings. The further feature in claim 1 as concern the provision of a dam on the inner surface of the impeller caring for setting the lowest rotational speed of the driven shaft made no inventive contribution to the claimed control means of the fluid coupling, since it was obvious for the skilled person to provide a dam on the inner surface of the impeller casing to prevent the complete emptying of the fluid coupling and to allow a high acceleration of the driven shaft when hydraulic oil is supplied at a high rate to the coupling.

Reasons for the Decision

1. The appeal complies with the formal requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. It is therefore admissible.

2. Claim 1 represents a combination of the wording of claims 1 and 2 as granted and the Board is satisfied that it corresponds to the requirements Article 123(2), (3) EPC.

Since novelty of the device according to present claim 1 has not been challenged by the respondents in

the appeal proceeding it remains only to consider the question of inventive step.

3. As explained in the introductory description of the patent in suit a conventional charge-discharge type fluid coupling according to the precharacterising portion of claim 1 and shown in Figure 10(b) of the patent specification allows the rotational speed to be changed between the highest and the lowest speed value by opening and closing the oil charge-discharge switching valve and is therefore suitable for on-off operation of a driven machine. However, the acceleration-deceleration response speed is slow. Therefore, this type of fluid coupling cannot be applied to uses where a fast acceleration-deceleration response speed is required. Accordingly, if such a fluid coupling is applied to an intermittently operating apparatus there is a practical difficulty involved because the response to the speed change is slow.

An object of the present invention is to solve the above-described problem and markedly improve on the response time to a change in rotational speed from its lowest to highest values and vice versa, whereby the lowest rotational speed of the runner of the coupling can be set as desired.

This object is realized by

(a) the charge-discharge control means of the fluid coupling as described in claim 1

in combination with

(b) a dam on an inner surface of the impeller casing inwardly of the oil discharge nozzle as set out in the last lines of claim 1.

The claimed charge-discharge control enables the fluid coupling to be filled within a short time limit and the dam which enables the fluid coupling to be filled with fluid at a predetermined minimum level guarantees that the lowest speed of the runner of the coupling is high enough to avoid that the driving machine exceeds its load carrying capacity limit as a result of the acceleration torque.

4. As evidence of the obviousness of the control means according to part (a) of claim 1 the respondents rely in particular on the device according to D5 which clearly has been made available to the public before the priority date of the patent in suit as proved by the invoice and dispatch note according to the paper D5/1.

As concerns the dam according to part (b) of claim 1 no evidence has been put forward to show this construction. The respondents arguments are simply based on the alleged general knowledge of the person skilled in the art.

But even if it were true that the fluid coupling with its control means according to D5 suggests to the skilled person to use the known control principle as a starting point for the solution of the above cited object of the invention the Board can see nothing in the cited evidence or in the common general knowledge

of the person skilled in the art which could suggest to him the reorganization of a fluid coupling control system disclosed in D5 such that it functioned in the manner claimed. Particularly the provision of the dam which in an *ex post facto* view appears to be a simple structural modification of the casing of a fluid coupling has clearly simplified the setting of the minimum runner speed in comparison to a method for minutely setting this speed by adjusting the fluid stream delivered through a control orifice to the fluid coupling itself and discharged by a discharge nozzle in the impeller casing. This decisive step to obtain such an advantageous solution of the object of the invention had neither been proved to be known from the prior art nor demonstrated as deriving from the application of common general knowledge. In the view of the Board simplicity of the solution can be considered in the present case as an indicator of the presence of inventiveness.

Having regard to the above the Board comes to the conclusion that the subject-matter of claim 1 involves an inventive step (Article 56 EPC).

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 maintain the patent on the basis of the following documents:

   – Claims 1 to 15 and revised description submitted at the oral proceedings,

   – drawings as granted.

The Registrar: The Chairman:

S. Fabiani S. Crane