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Datasheet for the decision of 20 September 2016

Case Number: T 1110/11 - 3.2.08

Application Number: 02762966.6

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IPC: B23Q1/00, B23B19/02

Language of the proceedings: EN

Title of invention:
SPINDLE DEVICE OF MACHINE TOOL AND METHOD OF REPLACING SPINDLE

Patent Proprietor:
MAKINO MILLING MACHINE CO., LTD.

Opponent:
Kieninger Technologie GmbH

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (yes)

Decisions cited:

Catchword:

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Case Number: T 1110/11 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 20 September 2016

Appellant: (Opponent)	Kieninger Technologie GmbH Industriegebiet West Tullastr. 4/3 77933 LAHR (DE)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Respondent: (Patent Proprietor)	MAKINO MILLING MACHINE CO., LTD. 3-19 Nakane 2-chome Meguro-ku, Tokyo 152-8578 (JP)
Representative:	Foster, Mark Charles Mathisen & Macara LLP Communications House South Street Staines-upon-Thames Middlesex, TW18 4PR (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 9 March 2011 concerning maintenance of the European Patent No. 1449612 in amended form.**

Composition of the Board:

Chairwoman	P. Acton
Members:	M. Foulger
	P. Schmitz

Summary of Facts and Submissions

I. With the decision dated 9 March 2011 the opposition division decided that the opposed patent could be maintained in amended form on the basis of the then valid auxiliary request. The opposition division found that the subject-matter of independent claims 1 and 4 was new and involved an inventive step.

II. The appellant (opponent) filed an appeal against this decision. The notice of appeal and the statement setting out the grounds of appeal were filed in due form and within the given time limits.

III. Oral proceedings took place before the Board of Appeal on 20 September 2016. The appellant did not attend the oral proceedings and in accordance with Rule 115(2) EPC and Article 15(3) RPBA these were conducted in the appellant's absence.

IV. The appellant requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed, alternatively that the decision under appeal be set aside and the patent be maintained on the basis of one of the auxiliary requests 1 to 6 filed with letter of 18 August 2016.

V. The independent claims according to the respondent's main request read as follows:

Claim 1:

"A spindle device of a machine tool with a spindle which is rotationally supported by a housing,

comprising:
a spindle (7);
a housing for enclosing at least a part of the spindle (7), the housing including a front housing (23) and a rear housing (25) which is detachably coupled to the front housing (23);
a front bearing part, incorporated in the front housing (23), for rotationally supporting the front part of the spindle (7), the inner race of the forward one of front bearings (9) of the front bearing part abutting a shoulder of the spindle (7), the inner race of the rearward one of the front bearings (9) being secured to the spindle (7) by a nut (29) with an inner race collar clamped between the front bearings, the outer race of the rearward one of the front bearings (9) abutting a shoulder of the front housing (23), and the outer race of the forward one of the front bearings being fixed by a bearing retainer (31) with an outer race collar clamped between the front bearings;
a bearing case (33) accommodating a rear bearing part, incorporated in the rear housing (25) by fitting the bearing case into the rear housing (25), for rotationally supporting the rear part of the spindle (7), that the inner race of the forward one of rear bearings (11) of the rear bearing part abutting a shoulder of the spindle (7), the inner race of the rearward one of the rear bearings (11) being secured to the spindle (7) by a nut (37) with an inner race collar clamped between the rear bearings, the outer race of the forward one of the rear bearings (11) abutting a shoulder of the bearing case (33), and the outer race of the rearward one of the rear bearings (11) being fixed by a bearing retainer (39) with an outer race collar clamped between the rear bearings; and
the front bearing part, the spindle (7) and the bearing case (33) accommodating the rear bearing part being

removed as a whole from the rear housing (25) along with the front housing (23) when the front housing is removed from the rear housing (25)."

Claim 4 reads:

"A method of replacing a spindle of a machine tool which comprises a spindle device having a spindle (7), a housing for enclosing a [*sic*] least a part of the spindle (7), the housing including a front housing (23) and a rear housing (25) which is detachably coupled to front housing (23), a front bearing part, incorporated in the front housing (23), for rotationally supporting the front part of the spindle (7) and a bearing case (33) accommodating a rear bearing part, incorporated in the rear housing (25) for rotationally supporting the rear part of the spindle (7), the method comprising the steps of:
mounting a spindle replacing device (97) to a table (19) of the machine tool;
coupling the spindle replacing device (97) and the front housing (23);
removing a fastener member (27) for fastening the front housing (23) to the rear housing (25);
moving the front housing (23) away from the rear housing (25) in the axial direction of the spindle (7) to remove the front bearing part, the spindle (7) and the bearing case (33) accommodating the rear bearing part, which are incorporated in the front housing (23), as a front housing unit (93) from the rear housing (25) while the inner race of the forward one of front bearings (9) of the front bearing part abuts a shoulder of the spindle (7), the inner race of the rearward one of the front bearings is secured to the spindle by a nut (29) with an inner race collar clamped between the front bearings, the outer race of the rearward one of

the front bearings abuts a shoulder of the front housing (23), and the outer race of the forward one of the front bearings is fixed by a bearing retainer (31) with an outer race collar clamped between the front bearings, and while the inner race of the forward one of rear bearings (11) of the rear bearing part abuts a shoulder of the spindle (7), the inner race of the rearward one of the rear bearings (11) is secured to the spindle (7) by a nut (37) with an inner race collar clamped between the rear bearings, the outer race of the forward one of the rear bearings (11) abuts a shoulder of the bearing case (33), and the outer race of the rearward one of the rear bearings (11) is fixed by a bearing retainer (39) with an outer race collar clamped between the rear bearings;
replacing the removed front housing unit (93) with a new front housing unit (93);
inserting the new front housing unit (93) into the rear housing (25);
coupling the new front housing (23) and rear housing (25) to each other by a fastener member (27); and
removing the spindle replacing device (97) from the front housing (23)."

The remaining requests are not relevant for this decision.

VI. The following documents are mentioned in this decision:

E1 - JP 63-25883 Y2
E2 - JP 62-96120 U
E3 - JP 3-103102 U
E11 - JP 11-99403 A
E16 - JP 64-87130 A
E17 - JP 2000-263364 A

E18 - JP 2001-74045 A

VII. The appellant argued essentially the following:

The subject-matter of claims 1 and 4 did not involve an inventive step considering either E1 or E2 as closest prior art.

i) Starting from E1 as closest prior art:

The difference between the subject-matter of claim 1 and the spindle disclosed in Fig. 1 of E1 was:
"the inner race of the **forward** one of front bearings (9) of the front bearing part abutting a shoulder of the spindle (7), the inner race of the **rearward** one of the front bearings being secured to the spindle by a nut (29) with an inner race collar clamped between the front bearings" (bold by the appellant).
This difference was merely due to the spindle of E1 having its largest diameter in the central portion rather than at its front end as in the patent-in-suit. As this difference did not provide any particular advantage, the problem to be solved was merely to seek an alternative fixing configuration.

As the alternative was well known from documents E2, E11, E16 - E18, the skilled person would apply it to the spindle known from E1 without the exercise of inventive skill in order to solve the above problem.

ii) Starting from E2 as closest prior art:

E2 disclosed a spindle wherein a single front and a single rear bearing were provided.

The subject-matter of claim 1 essentially differed from

the spindle known from E2 in that two front bearings and two rear bearings with race collars between the two bearings were provided.

The objective technical problem to be solved was to improve the rotational stability of the spindle at high rotational speeds.

Faced with this technical problem, the skilled person would look to either E1 or E3 for the solution because they would immediately recognise that the arrangements with two bearings disclosed in these documents provided better rotational stability. In applying this solution to the spindle known from E2 the skilled person would arrive at the subject-matter of claim 1 without the exercise of inventive skill.

Therefore the subject-matter of claim 1 did not involve an inventive step in the light of either E1 or E2 as closest prior art. The above arguments applied equally to independent method claim 4.

VIII. The respondent argued essentially the following:

i) Starting from E1 as closest prior art

E1 could not be regarded as the closest prior art because it related to a different kind of spindle with the widest part in the centre. Moreover Fig. 1 chosen by the appellant as closest prior art in relation to the patent-in-suit showed the prior art which E1 sought to improve. To do this E1 taught the use of air bearings as shown in Fig. 2, hence teaching away from the invention as claimed. The combination of the teachings of this document with any of the other documents cited was not an obvious measure for the

skilled person because there was no apparent motivation for the skilled person to do so. Furthermore, in considering such a combination there was no clear teaching as to which features of which document should be combined. Consequently the skilled person would only have arrived at the subject-matter of claim 1 with the use of hindsight.

The subject-matter of claim 1 therefore involved an inventive step when considering E1 as closest prior art.

ii) Starting from E2 as closest prior art

E2 did not disclose a spindle having two front and two rear bearings. Moreover E2 did not disclose the feature of claim 1 whereby the outer race of the forward one of the rear bearings abutted a shoulder of the bearing case, and the outer race of the rearward one of the rear bearings is fixed by a bearing retainer with an outer race collar clamped between the rear bearings. Because the bearing case of E2 was closed at the rearward side, the bearing must be mounted from the forward side. This precluded a shoulder on the forward side of the bearing case. Therefore the forward side of the outer race of the bearing could not abut a shoulder of the bearing case. Consequently, even if an arrangement with two bearings, shown for example in E3, were to be considered then this would still not lead to the subject-matter of claim 1.

Moreover, the skilled person would not have looked to E1, Fig. 1 to solve the problem of providing an improved bearing arrangement because this example is described in E1 as being unsatisfactory. If the skilled person were to have considered E1, the obvious course

of action would have been to use the improved spindle arrangement shown in Fig. 2 of E1. This arrangement however used air bearings so that the combination of these teachings would not have led to the subject-matter of claim 1.

Therefore the subject-matter of claim 1 involved an inventive step in the light of either E1 or E2 as closest prior art. The above arguments applied equally to independent method claim 4.

Reasons for the Decision

1. Starting from E1, Fig. 1 as closest prior art

1.1 Contrary to the respondent's submissions there is no reason to disregard the spindle shown in Fig. 1 of E1 as closest prior art simply because it relates to the prior art which the invention of E1 seeks to improve. The question to be answered is rather whether it was obvious for the skilled person to have arrived at the spindle defined in claim 1 starting from the spindle shown in Fig. 1 of E1 as closest prior art.

1.2 E1, Fig. 1 discloses a spindle with forward and rearward bearings.

At least the following features of claim 1 are not known from E1:

the inner race of the forward one of front bearings of the front bearing part abutting a shoulder of the spindle, the inner race of the rearward one of the front bearings being secured to the spindle by a nut with an inner race collar clamped between the front bearings.

The appellant argues that this difference was merely due to the spindle of E1 having its largest diameter in the central portion rather than at its front end as in the patent-in-suit. Hence the objective technical problem should be regarded as being to provide an alternative fixing configuration for the bearings. Alternative fixing configurations were disclosed in E2, E11, E16-E18 and the skilled person would apply them to the spindle shown in Fig. 1 of E1 without the exercise of inventive activity.

This is however not persuasive because the bearing configuration follows from the spindle design which is related to the connection with the machine tool (see for example E11, Fig. 1). In the current case, the skilled person might consider alternative bearing arrangements but would keep the spindle design of E1, especially because there is no hint in the prior art to suggest that any benefit would be obtained in changing the connection with the machine tool. There was therefore no teaching that would incite the skilled person to modify the spindle design of E1.

Moreover, even if the skilled person were to apply the teaching of E2, E11 or E16-E18 to the spindle of Fig. 1 of E1 it would not be obvious which features to take from these prior art spindles and apply to the spindle of Fig. 1 of E1.

The subject-matter of claim 1 therefore involves an inventive step when considering E1 as closest prior art.

2. Starting from E2 as closest prior art

E2 discloses a spindle device of a machine tool. The spindle is supported by a single forward bearing and a single rearward bearing. The rearward bearing is contained within a bearing case which is closed to the rearward side.

The subject-matter of claim 1 differs from the spindle known from E2 indisputably in that there are two forward and two rearward bearings with race collars between the bearings. Moreover the feature whereby the outer race of the forward one of the rear bearings abuts a shoulder of the bearing case, and the outer race of the rearward one of the rear bearings is fixed by a bearing retainer with an outer race collar clamped between the rear bearings is also not known from E2.

As put forward by the appellant, the problem to be solved may be regarded as being to improve the support and the rotational stability of the spindle.

Although Fig. 1 of E1 does indeed disclose the use of two bearings to support both the forward and rearward ends of the spindle, the skilled person would not apply this teaching to the spindle of E2 because E1 teaches the use of air bearings (see E1, Fig. 2) to overcome these problems. The skilled person, if they were to consult E1, would therefore use air bearings in the spindle arrangement known from E2 and in doing so would not arrive at the subject-matter of claim 1.

Furthermore, since the bearing case of E2 is closed at the rearward side, the bearings must be inserted from the front side. It is therefore not possible for a shoulder of the bearing case to be present which abuts

the forward outer race of the bearing as this would impede the insertion of the bearings. Thus replacing the single rear bearing of E2 with two bearings would not result in the outer race of the forward one of the rear bearings abutting a shoulder of the bearing case as required by claim 1. For the same reasons the combination of the teachings of E2 and E3 also does not lead to the claimed subject-matter.

Therefore, the subject-matter of claim 1 involves an inventive step when considering E2 as closest prior art.

3. The above reasoning applies equally to the independent method claim 4 whose subject-matter consequently also involves an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairwoman:

B. Atienza Vivancos P. Acton

Decision electronically authenticated