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Datasheet for the decision of 28 February 2023

Case Number: T 2762/19 - 3.2.01

Application Number: 08724171.7

Publication Number: 2140105

IPC: E21B44/00, E21B44/02

Language of the proceedings: EN

Title of invention:
METHOD AND DEVICE FOR CONTROLLING AT LEAST ONE DRILLING PARAMETER FOR ROCK DRILLING.

Patent Proprietor:
Epiroc Rock Drills Aktiebolag

Opponent:
Sandvik Mining and Construction Oy

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - closest prior art - common general knowledge - (no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 2762/19 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 28 February 2023

Respondent: (Patent Proprietor)	Epiroc Rock Drills Aktiebolag 701 91 Örebro (SE)
Representative:	Ehrner & Delmar Patentbyrå AB Götgatan 78 118 30 Stockholm (SE)
Appellant: (Opponent)	Sandvik Mining and Construction Oy Pihtisulunkatu 9 33330 Tampere (FI)
Representative:	Papula Oy P.O. Box 981 00101 Helsinki (FI)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 7 August 2019 concerning maintenance of the European Patent No. 2140105 in amended form.**

Composition of the Board:

Chairwoman	O. Loizou
Members:	M. Geisenhofer
	V. Vinci

Summary of Facts and Submissions

I. Appeals were filed by both the patent proprietor and by the opponent against the interlocutory decision of the opposition division finding that, on the basis of the second auxiliary request, the patent in suit met the requirements of the EPC.

II. The opposition division decided that the subject-matter of this request was novel and involved an inventive step, *inter alia* starting from document

D4 JP 41 62 942 (with translation T4)

as closest prior art.

III. Oral proceedings were held before the board.

(a) The patent proprietor withdrew their appeal during oral proceedings such that the opponent is the sole appellant.

(b) The appellant (opponent) requested that the decision under appeal be set aside and the patent in suit be revoked in its entirety.

(c) The respondent (patent proprietor) requested that the appeal be dismissed.

IV. Independent claim 1 of the second auxiliary request reads as follows:

"*Method for controlling at least one drilling parameter when drilling into rock, where an impulse-generating device (14) using an impact means (32) is arranged to*

induce shock waves in a tool (18) held against the rock, the said impulse-generating device (14) being displaceable in the drilling direction relative to a supporting means (13), wherein a pressure level of a shock-wave-generating pressure is controlled during the drilling operation, wherein the method comprises the following steps:

- *determining an actual drilling speed for the said drilling operation by determining a movement of the impulse-generating device (14) with respect to the said supporting means (13),*
- *controlling the said shock-wave-generating pressure as a function of the said drilling speed that has been determined, where the shock-wave-generating pressure is reduced at an increase in the said drilling speed, and where the shock-wave-generating pressure is increased at a decrease in the said drilling speed,*

characterized in that it comprises the following steps:

- *setting a maximum feed rate (drilling speed) of the impulse-generating device (14) at a predetermined speed when said drilling speed exceeds a first cavity speed, where the said first cavity speed represents a speed at which it is found that the drilling has reached a cavity, and*
- *after the detection of the said first cavity speed - increasing the said shock-wave-generating pressure to a normal drilling pressure when the drilling speed drops below a second, lower cavity speed, representing a speed at which the drilling has reached the end of the said cavity."*

Further independent claim 6 of the second auxiliary request is directed to the corresponding device.

V. The appellant-patent proprietor's arguments can be summarized as follows:

The subject-matter of claim 1 of the second auxiliary request was inventive.

(i) Document D4 was not a suitable starting point for arguing inventive step because it concerned a different technical field.

(ii) D4 lacked limiting the drilling speed when the drilling bit falls into a cavity. Furthermore, D4 did not disclose that, at the opposite side of the cavity, drilling was resumed with similar drilling parameters as before the cavity.

(iii) Limiting the drilling speed when falling into a cavity was not obvious for the skilled person.

(iv) It was not obvious either to restart drilling with the same drilling speed and the same pressure level of the impulse generating device at the opposite side of the cavity.

VI. The appellant-opponent's arguments can be summarized as follows:

The subject-matter of claim 1 of the second auxiliary request was not inventive over a combination of D4 with the common general knowledge of the skilled person.

(i) Document D4 was a suitable closest prior art.

(ii) D4 concerned the case in which the soil comprised a cavity whereby the drilling parameters were adapted.

(iii) When falling into the cavity, it was obvious for the skilled person to limit the drilling speed to a preset value such that the drilling bit did not crash into the opposite side of the cavity after having traversed it.

(iv) As soon as the drilling bit has traversed the cavity, it was obvious to resume drilling operation with the drilling parameters also used before the cavity.

Reasons for the Decision

Second auxiliary request

Inventive step

1. The subject-matter of claim 1 of the main request is not inventive in the sense of Article 56 EPC.

1.1 Document D4 is a suitable starting point for an argumentation on the issue of inventive step.

1.1.1 The respondent argues that D4 concerned a method of mapping the soil behind a structural object, whereas the patent in suit concerns a method of drilling holes in rock.

1.1.2 Since claim 1 of the patent in suit concerns a method for controlling parameters of a drilling operation, the board is not aware of a limitation of the claimed method to a particular drilling operation or a particular use of the drilled hole. On the contrary, claim 1 refers to any drilling operation.

The drilling operation of D4 is not different to the claimed drilling operation, but falls under the scope of claim 1. Document D4 hence is a suitable starting point for an argument on inventive step.

1.2 D4 discloses a method for controlling at least one drilling parameter when drilling into rock (see translation T4 of document D4, paragraph [0007]: "*keeping a feed pressure and a striking pressure at constant values*", "*changes in drilling speed of the bit and a torque load applied on the bit*"), where an impulse-generating device (see paragraph [0022]: "*striking mechanism*") using an impact means is arranged to induce shock waves in a tool (drilling bit *2*) held against the rock.

The impulse-generating device can be displaced in the drilling direction relative to a supporting means (transfer mechanism 7 between guide shell 5 and rock drill 4), wherein a pressure level of a shock-wave-generating pressure is controlled during the drilling operation (see paragraph [0027] of T4).

The method comprises the following steps:

- determining an actual drilling speed for the drilling operation by determining a movement of the impulse-generating device with respect to the supporting means (see page 12 of T4, lines 1 - 3).

- controlling the said shock-wave-generating pressure as a function of the said drilling speed that has been determined, where the shock-wave-generating pressure is reduced at an increase in the said drilling speed, and where the shock-wave-generating pressure is increased at a decrease in the said drilling speed (see paragraph [0036] of T4).

1.2.1 The method disclosed in D4 comprises the following further steps:

(a) setting a feed pressure of the impulse-generating device at a predetermined pressure when said drilling speed exceeds a first cavity speed, where the first cavity speed represents a speed at which it is found that the drilling has reached a cavity (see paragraph [0037] of T4), and

after the detection of the said first cavity speed

(b) increasing the shock-wave-generating pressure to a normal drilling pressure when the drilling speed drops below a second, lower cavity speed, representing a speed at which the drilling has reached the end of the cavity (see paragraph [0038] of T4).

1.2.2 Steps (a) and (b) can also be derived from both figure 3 and flow diagram 2 of D4:

The cavity is shown in the middle part of figure 3 where the drilling speed (line with alternating dash and double points) increases significantly. At the same time, the shock-wave-generating pressure (line with alternating dash and point) decreases to nearly zero.

When the drilling bit reaches the opposite side of the cavity, the drilling speed decreases and drops below a second, lower cavity speed due to the contact with the

rock. The shock-wave-generating pressure is at the same time increased to the normal drilling pressure such that the drilling speed remains at the level before falling into the cavity.

1.2.3 The respondent alleged that resuming drilling at the opposite side of the cavity would imply ramping up the drilling parameters. D4 would hence not disclose that the shock-wave-generating pressure is set to normal drilling pressure.

This is however not supported by figure 4 which clearly shows a jump in the shock-waver-generating pressure when the drilling bit arrives at the opposite side of the cavity. A ramping up of the pressure is hence not disclosed in figure 4.

On the contrary, figure 2 discloses - after realizing a change in the measured parameters in step S6 and deducing therefore the presence of a new physical object in step S7 - that the drilling parameters are set in step S2 to a minimum striking pressure and a constant feed pressure being identical to those parameters at the beginning of the drilling operation after step S1.

1.2.4 The opposition division held that D4 only disclosed a first cavity speed but not a second lower cavity speed.

However, the two cavity speeds being different are implicitly disclosed in D4.

The actual speed must be compared to a threshold both when falling into the cavity and when arriving at the opposite side of the cavity. When the drilling bit falls into the cavity, there remains only a reduced

resistance such that the drilling speed increases. When the drilling speed exceeds the first cavity speed, the control intervenes and sets the drilling speed to a preset value which necessarily must be lower than the first cavity speed. After traversing the cavity, the drilling bit is decelerated due to the contact with the opposite side of the cavity. When the drilling speed falls below the second cavity speed (which hence must necessarily be lower than the set drilling speed when traversing the cavity) drilling is resumed.

The second cavity speed thus must be always lower than the first cavity speed such that also D4 implicitly discloses these two different cavity speeds.

1.3 The subject-matter of claim 1 thus differs from the method of D4 only in that in step (a) it is not the feed pressure that is set to a predetermined value but the drilling speed is limited.

1.4 Setting the feed pressure to a particular value as in D4 does not allow to avoid the drilling bit to crash into the opposite side of the cavity since, if the cavity is entirely void, even a small feed pressure will accelerate the drilling bit and hence can harm both the drilling bit and the machine.

1.5 The skilled person directly realizes that avoiding the bit crashing into the opposite side of the cavity can only be ensured when the velocity of the movement as such is controlled. He/she would hence control the drilling operation by measuring the drilling speed and - if it exceeds the first cavity speed - set it to a predetermined value.

1.6 The skilled person would thus arrive at the subject-matter of claim 1 without any inventive step, claim 1 of the second auxiliary request hence not complying with Article 56 EPC.

2. As the patent proprietor withdrew its appeal before the decision was announced their appeal fee is to be reimbursed at 25% under Rule 103(4)(a) EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside and the patent is revoked.

2. The appeal fee of the patent proprietor is reimbursed at 25%.

The Registrar: The Chairwoman:

A. Vottner O. Loizou

Decision electronically authenticated