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**Datasheet for the decision  
of 8 May 2014**

**Case Number:** T 1553/11 - 3.2.07

**Application Number:** 02722313.0

**Publication Number:** 1399298

**IPC:** B25D9/26

**Language of the proceedings:** EN

**Title of invention:**

METHOD FOR CONTROLLING OPERATING CYCLE OF IMPACT DEVICE, AND  
IMPACT DEVICE

**Patent Proprietor:**

Sandvik Mining and Construction Oy

**Opponent:**

Atlas Copco Construction Tools GmbH

**Headword:**

**Relevant legal provisions:**

EPC Art. 54, 56  
RPBA Art. 13(1)

**Keyword:**

Admissibility of D11/D11' -  
yes; different circumstances in the appeal proceedings to be  
considered  
Inventive step - no, to solve the problem starting from D11/  
D11' it is evident that only a part of the disclosure of D3 is  
relevant

**Decisions cited:**

**Catchword:**



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Case Number: T 1553/11 - 3.2.07

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.07**  
**of 8 May 2014**

**Appellant:** Sandvik Mining and Construction Oy  
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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
9 May 2011 concerning maintenance of the  
European Patent No. 1399298 in amended form.**

**Composition of the Board:**

**Chairman** H. Meinders  
**Members:** H.-P. Felgenhauer  
E. Kossonakou

## Summary of Facts and Submissions

- I. The patent proprietor (appellant I) and the opponent (appellant II) each filed an appeal against the decision of the opposition division maintaining the European patent No. 1 399 298 as amended.

Appellant I requested with its statement setting out the grounds of appeal dated 29 August 2011 that the decision under appeal be set aside and the opposed patent maintained either as granted (main request) or in accordance with either the first or the second auxiliary request annexed to the said statement. With letter dated 28 March 2013 (*sic*, correct presumably 2014) and received per fax on 31 March 2014, appellant I filed a fourth and fifth auxiliary request while as third auxiliary request was submitted the dismissal of the appeal of appellant II and maintenance of the patent in the form as per the impugned decision.

Appellant II requested that the decision under appeal be set aside and that the patent No. 1 399 298 be revoked.

- II. Claims 1 according to the requests of appellant I read as follows:

Claim 1 of the **main request** (patent as granted)

"1. A method for controlling the operating cycle of an impact device, the impact device designed for breaking rock and comprising a frame (1), a percussion piston (2), working pressure surfaces (4a - 4f) formed on the percussion piston and acting both in the impact direction and in the return direction, working pressure ducts (3b, 3d) and discharge ducts (3a, 3c)

for guiding pressure medium to act on the working pressure surfaces, and at least one control valve (10)

the method comprising

varying the pressure medium flows acting on the working pressure surfaces of the percussion piston by means of the control valves, so as to produce a reciprocating impact and return motion according to the operating cycle of the percussion piston, and for delivering impacts on a tool (7) arranged in the impact direction of the percussion piston,

characterized in that the method comprises the steps of

measuring the position of the percussion piston (2) by means of at least one sensor (11) during an operating cycle and transmitting the measurement data to a control unit (12) of the impact device;

generating an electric control signal in the control unit (12), on the basis of the position of the percussion piston and on the control parameters supplied to the control unit for controlling an electrically driven control valve (10); and

guiding the pressure medium, under the control of the electrically driven control valve (10), to act on the working pressure surfaces (4f) of the percussion piston, and away from them for controlling the operating cycle of the impact device".

Claim 1 according to the **first auxiliary request** differs from claim 1 according to the main request in that in the preamble following the wording "at least

one control valve 10," the expression "and a tool," has been added.

Claim 1 according to the **second auxiliary request** differs from claim 1 according to the main request in that in the preamble following the wording "working pressure ducts (3b, 3d) and discharge ducts (3a, 3c)," the expression "which are in continuous connection to a tank," has been added.

Claim 1 according to the **third auxiliary request** (which corresponds to claim 1 as maintained by the impugned decision) differs from claim 1 according to the main request in that the following additional features have been added at the end of claim 1 of the main request

"by means of a control slide (6) which is arranged to reciprocate and by guiding the control pressure, by means of the electrically driven control valve (10) to and from the working pressure surfaces (6a, 6b) of the control slide to move the control slide".

Claim 1 of the **fourth auxiliary request** differs from claim 1 of the third auxiliary request by the addition of the features

"by measuring the pressure acting in the working pressure duct (3b) and transmitting the measurement result to the control unit (12), and by timing the operating cycle of the percussion piston (2) on the basis of the pressure acting in the working pressure duct (3b)."

at the end of this claim.

Claim 1 of the **fifth auxiliary request** differs from claim 1 of the fourth auxiliary request by the addition of the feature

"such that the impact velocity of the percussion piston is substantially constant."

at the end of this claim.

III. The following documents referred to in the decision under appeal are taken into consideration:

D1                    DE-A-30 38 835

D3                    EP-A-0 847 836

D5                    DE-C-196 36 659

D11/D11'          JP A 62-9878 and its English translation.

IV. Impugned decision

According to the impugned decision the method of claim 1 of the main request lacks novelty over e.g. D1. The method of a claim 1 corresponding to claim 1 according to the third auxiliary request has been found to involve an inventive step. D3 has been considered as disclosing, corresponding to the distinguishing features of this claim 1, a control slide. Starting from the method according to D1 as representing the closest prior art no reason has been seen "why the skilled person would necessarily amend the device according to D1 to include a control slide according to the wording of the independent claims of the patent-in-suit".

V. The submissions of appellant I can be summarised as follows:

D11/D11' are not to be admitted for the reasons given in the impugned decision and since no proper justification for their late filing has been given.

In case D11/D11' are admitted the question whether the methods of the claims 1 according to the main request and the first auxiliary request are novel over the method of D11/D11' depends on the understanding of the plural form in the term "working pressure ducts and discharge ducts".

In case D11/D11' is considered as closest prior art in the examination of inventive step of claim 1 according to the third auxiliary request, the skilled person would not take D3 into account since its teaching is not compatible with the teaching of D11/D11'. For that reason, even combined consideration of the teachings of D11/D11' and D3, the disclosure of which needs to be taken into account in its entirety, would not render the method of claim 1 obvious.

Taking the entire teaching of D3 into account as required, the skilled person immediately would have realised that the use of a control slide without any further valve as suggested by D3 would require the valve according to D11/D11' to be disregarded. This, however, would have resulted in a control valve - by means of which the measured position of the percussion piston could be utilised to control the operating cycle of the impact device according to D11/D11' - no longer being available.



Since D3 thus suggests the use of a control slide only it cannot be considered as such prior art which, combined with the teaching of D11/D11' would be taken into account in an attempt to improve or simply to modify the method of D11/D11'. The skilled person starting from the method of D11/D11' would thus only have the choice either to replace the control valve by a control slide or to disregard D3. Neither choice leads to the subject-matter of claim 1.

The additional features of the claims 1 of the fourth and fifth auxiliary requests are neither disclosed nor suggested by any of the available prior art documents. Consequently, the methods according to these claims involve an inventive step. This holds true even more considering, as required, not only the additional features of the claims 1 concerned but the combination of all features of these claims 1.

VI. The submissions of appellant II can be summarised as follows:

D11/D11' are to be admitted in the appeal proceedings since they disclose the most relevant prior art and can, without causing any delay in the proceedings, easily be taken into account.

It is evident that, when properly construed, the methods of the claims 1 according to the main request and the first auxiliary request lack novelty over the method of D11/D11'.

Starting from D11/D11' as closest prior art in the examination of inventive step of claim 1 according to the third auxiliary request the skilled person would take D3 into account. It is apparent for the skilled

person that, in view of the problem to be solved starting from the method of D11/D11', only that part of D3 needs to be considered for which it is evident that it contributes to the finding of a solution. The solution of the problem arrived at starting from the teaching of D11/D11' and taking that part of D3 into consideration renders the subject-matter of claim 1 obvious.

The additional features of the claims 1 of the fourth and fifth auxiliary request relate to the working pressure as a parameter, the timing of the operating cycle and the velocity of the percussion piston as control variables all of which are commonly used in the relevant methods as can be derived from D11/D11'. Since moreover the use of measured pressure data is known from D5 and the state of the velocity defined as "substantially constant" comes within common design practice, these features considered by themselves as well as with the remainder of the features of the respective claims 1 do not lead to subject-matter involving inventive step.

VII. In the annex to the summons for oral proceedings (in the following: the annex) the Board gave its preliminary opinion i.a. with respect to the admissibility of D11/D11', the understanding of the subject-matter of claim 1 (main request), the disclosures of prior art documents, novelty and inventive step.

VIII. Oral proceedings before the Board, at the end of which the decision was announced, took place on 8 May 2014.

## Reasons for the Decision

### 1. Procedural aspects

#### 1.1 Admissibility of D11/D11'

The Board considers that although the exercise of the discretion by the opposition division to not admit D11/D11' according to Article 114(2) EPC appears to be correct, this result needs to be seen as being based on the particular circumstances at the time (impugned decision, reasons, point 7.2). In the opposition proceedings only the English translation D11' and not the document D11 itself had been filed. Moreover D11' was not considered to be *prima facie* relevant.

Different circumstances have to be considered in the appeal proceedings, since D11 is available as well as the translation D11'. Amended claims 1 have been filed in relation to which the *prima facie* relevance needs to be assessed, which, as can be derived from the following, is given already due to the fact that D11/D11' discloses a hydraulic percussion device dedicated to the use referred to in the claims 1 of all requests: "the impact device designed for breaking rock". Furthermore, the Board took into consideration that the admittance of D11/D11' did not substantially increase the complexity of the case and that for that reason also the efficiency of the proceedings was not impaired. Finally, contrary to the opinion expressed by appellant I the Board did not see any evidence that D11/D11' were late filed on purpose, despite the fact that no particular justification (beyond the argument that D11/D11' has been found by chance) for the late filing was given. For these reasons the Board exercised

- its discretion according to Article 13(1) RPBA to admit D11 into the proceedings.
- 1.2 The parties had consented to the approach suggested by the Board during the oral proceedings to start the discussion with the subject-matter of claim 1 of the first auxiliary request in view of the fact that the subject-matters of claims 1 of both the main and the first auxiliary request differ only in that claim 1 of the first auxiliary request comprises, by reference to "a tool (7)" in the pre-characterizing portion, a clarification concerning the impact device, in particular in view of the feature of claim 1 relating to the intended use of the impact device: "impact device designed for breaking rock".
- 1.3 Appellant I withdrew its second auxiliary request after the Board announced its conclusion during the oral proceedings that the methods of the claims 1 of the main and the first auxiliary requests lack novelty over D11/D11'.
2. *Subject-matter of claim 1 according to the first auxiliary request*
- 2.1 As referred to in the annex (points 7.1.1 to 7.1.4) and as indicated during the oral proceedings claim 1 is directed to a method for controlling the operating cycle of an impact device.
- 2.2 Concerning the **use** of the **impact device**, it is defined that it is designed for breaking rock.
- 2.3 Concerning the **structure of the impact device**, claim 1 defines that it comprises a frame, a **percussion piston** with working pressure surfaces formed on it acting both

in the **impact direction** and in the **return direction**.  
Furthermore working pressure ducts and discharge ducts for guiding pressure medium to act on the working pressure surfaces and at least one **control valve** and a tool are provided.

2.4 The **method** comprises the steps of

- (a) **varying the pressure medium flows** acting on the working pressure surfaces of the percussion piston, by means of the control valves,
- (b) so as to produce a **reciprocating impact and return motion** according to the **operating cycle of the percussion piston**, and for **delivering impacts on the tool** arranged in the impact direction of the percussion piston.

2.5 The method is characterised in that it further comprises the steps of

- (c) **measuring the position of the percussion piston** by means of at least one **sensor** during an operating cycle and transmitting the measurement data to a control unit of the impact device;
- (d) **generating an electric control signal** in the control unit **on the basis of the position of the percussion piston and on the control parameters** supplied to the control unit **for controlling an electrically driven control valve**; and
- (e) **guiding the pressure medium, under the control of the electrically driven control valve, to act on the working pressure surfaces of the percussion**

**piston, and away from them for controlling the operating cycle** of the impact device.

A particular point of discussion concerning the subject-matter of claim 1 during the oral proceedings concerned the understanding of the feature of the pre-characterising portion of claim 1 referring to "working pressure **ducts** (3b, 3d) and discharge **ducts** (3a, 3c) for guiding pressure medium to act on the working pressure surfaces ..." (emphasis added). In this respect the key issue was the question how the reference to working pressure ducts and discharge ducts in the plural form needs to be understood.

The Board considers this feature, as indicated during the oral proceedings, to define that a **plurality of ducts** (i.e. at least two, as referred to by appellant I) is **provided**, which are **able to function as working pressure ducts as well as discharge ducts**.

This result is based on the understanding that this feature relates to the functionality of ducts - instead of their actual presence as structural elements: a plurality of working pressure ducts and a plurality of discharge ducts. This understanding, according to which ducts are provided which can function as working pressure and/or discharge ducts is in line with the wording of the part of the feature relating to the ducts and supported by the part of this feature referring to the function of the ducts: "for guiding pressure medium ...". This understanding is furthermore not in contradiction with the description according to which reference to a plurality of ducts can be understood as one to a plurality of structural elements (cf. paragraph 0016: "the impact device comprises a first discharge duct 3a, a first working pressure duct

3b, a second discharge duct 3c, and a second working pressure duct 3d") but also, with respect to the discharge duct, to only one duct (cf. paragraph 0020: "the second discharge duct can be disposed of").

3. *Novelty of the subject-matter of claim 1 of the first auxiliary request*

Appellant I, which solely relied on the feature that the impact device comprises working pressure **ducts** and discharge **ducts** (cf. points 2.5.1 and 2.5.2 above) as the feature distinguishing the method of claim 1 over the method of D11/D11', conceded that with the interpretation of this feature as indicated above (cf. point 2.5.2) the subject-matter of claim 1 of the first auxiliary request lacks novelty over the method of D11/D11' (Article 54 EPC).

3.1 For the Board no reason is apparent to depart from this position, which was also the one of appellant II.

D11/D11' discloses as indicated during the oral proceedings and corresponding to the features of the claim 1 of the first auxiliary request, a method for controlling the operating cycle of an impact device, the impact device being designed for breaking rock (cf. D11', page 2, lines 6 - 34; figure 1).

The impact device comprises, corresponding to the one referred to in claim 1, a frame, a percussion piston 5, working pressure surfaces formed on the percussion piston and acting both in the impact direction and in the return direction, working pressure ducts and discharge ducts (cf. figure 1: the two ducts shown as structural components as leading from the cylinder / frame to a pump supplying pressure medium and to a

discharge tank are, depending on the position of the electrically driven control valve 7, reversible such that either one of these ducts can function as pressure duct and as discharge duct) for guiding pressure medium to act on the working pressure surfaces, and at least one control valve 7, and a tool 6 (cf. page 5, line 24 - page 6, line 3; figure 1).

The method comprises, corresponding to the features of claim 1,

varying the pressure medium flows acting on the working pressure surfaces of the percussion piston by means of the control valves (feature (a)),

so as to produce a reciprocating impact and return motion according to the operating cycle of the percussion piston, and for delivering impacts on the tool arranged in the impact direction of the percussion piston (feature (b)); cf. D11', page 8, line 23 - page 9, line 9.

The method according to D11/D11' further comprises the steps of

measuring the position of the percussion piston 5 by means of at least one sensor 14 during an operating cycle and transmitting the measurement data to a control unit of the impact device (feature (c); cf. D11' page 7, line 20 - page 8, line 16: electrical circuit 3 provided with hydraulic pressure / cycle setter 11, converter 16 and amplifiers 12, 13);

generating an electric control signal in the control unit 11, on the basis of the position of the percussion piston and on the control parameters



supplied to the control unit for controlling an electrically driven control valve 7 (feature (d)); and

guiding the pressure medium, under the control of the electrically driven control valve 7, to act on the working pressure surfaces of the percussion piston 5, and away from them for controlling the operating cycle of the impact device (feature (e)); cf. D11', page 9, line 36 - page 10, line 8; figure 1.

3.2 For the reasons given above claim 1 of the main request (cf. point 1.3 above) likewise is not novel over D11/D11'.

4. *Subject-matter of claim 1 according to the third auxiliary request*

The claim 1 concerned differs from claim 1 of the main request in that it comprises at its end the following additional features according to which the control of the operating cycle is:

(f) by means of a control slide which is arranged to reciprocate and

(g) by guiding the control pressure by means of the electrically driven control valve to and from the working pressure surfaces of the control slide to move the control slide.

5. *Novelty*

Although appellant II argued that the method of claim 1 lacks novelty (Article 54 EPC) with respect to the method of D1 it did not give a conclusive analysis as to where a method disclosing directly and

unambiguously, as referred to by appellant I, the features of claim 1 is to be found in D1.

This aspect, however, needs no further discussion in view of the result given in the following, that the method of claim 1 lacks inventive step over the combined consideration of the teachings of D11/D11' and D3.

6. *Inventive step*

6.1 *Distinguishing features of claim 1 according to the third auxiliary request over D11/D11', effect and problem to be solved*

6.1.1 It remained undisputed that the additional features (f) and (g) are also the features distinguishing the method of claim 1 over the one of D11/D11', which is the closest prior art.

6.1.2 It further remained undisputed that features (f) and (g) have the effect that the operating cycle of the impact device is no longer directly controlled by the control valve guiding the pressure medium. Instead, the operating cycle is controlled by the control slide which is reciprocated via a control pressure acting on the working pressure surfaces of the control slide by means of the control valve.

The control pressure is, as referred to by the Board during the oral proceedings, not further defined in claim 1.

According to the description of the patent in suit "... the **electrically driven control valve** is used to provide an **indirect control** of the movements of the

percussion piston because it is used as a pilot control valve to control the actual control element, i.e. the control slide. An advantage of this embodiment over direct control is that there are no great pressure medium **flows** to be guided through the electrically driven control valve, but only the control pressure flow needed for moving the control slide" (paragraph [0011]).

According to the description of the patent in suit the **direct control** of the percussion piston **by means of the electrically driven control valve** has the advantage that "This allows the structure of the impact device to be significantly simplified compared to the constructions shown in Figures 1 to 3b, which facilitates the manufacture of the impact device" (paragraph [0024]).

This implies that the provision of a control slide according to features (f) and (g) leads to the structure of the impact device being simpler or less complicated.

6.1.3 Based on the above effects the **problem** solved by the method of claim 1 over the one of D11/D11' can be seen as to provide a method for controlling the operating cycle of an impact device such that the electrically driven control valve needs not cope with great pressure medium flows.

## 6.2 *Disclosure of D3*

6.2.1 **D3** discloses, as referred to in the annex (point 7.2.5) and as indicated during the oral proceedings, a **method for controlling the operating cycle of an impact device** comprising a percussion piston 3 designed to deliver

impacts on a tool (cf. e.g. claim 1; paragraph [0001]; figure 1).

6.2.2 To guide a pressure medium to act on working pressure surfaces of the piston via working pressure ducts and discharge ducts, a sleeve-like **control slide 9** is provided as **control valve** (in so far corresponding to the prior art referred to in the patent in suit, cf. figures 1, 2a and 2b) which, dependent on the position of the piston, is movable by fluid pressure applied to it. Depending on the position of the control slide, it opens or closes pressure fluid ducts connected to the working pressure spaces of the piston (cf. D3, e.g. paragraphs [0022], [0026], figures 1, 2a, 2b).

6.2.3 As referred to during the oral proceedings, the control slide according to D3 thus is, in the wording of claim 1 of the patent in suit as amended, provided within an impact device according to which the control of the operating cycle is:

by means of a control slide 9 which is arranged to reciprocate (feature (f)) and

by guiding the control pressure ... to and from the working pressure surfaces of the control slide to move the control slide (feature (g)).

Different to feature (g) the control slide according to D3 is directly charged and moved by working pressure acting on it as control pressure and not via a control pressure which is controlled by an electrically driven control valve.

6.2.4 The problem underlying the teaching of D3 concerns, as referred to during the oral proceedings, the

development of a hydraulic impact device which is, with respect to the control, formed in an alternative manner. The control device shall be able to function without being permanently charged with the working pressure and without mechanical forces, in particular ones initiated by the percussion piston, applied to it (D3, paragraph [0006]).

### 6.3 *Obviousness*

6.3.1 The parties were of different opinion whether the skilled person would take the method according to D3 into account (cf. points 6.2.1 - 6.2.3 above) in an attempt to solve the problem (cf. point 6.1.3) starting from the method of D11/D11'.

6.3.2 According to appellant I the person skilled in the art starting from the method of D11/D11' would completely ignore the teaching of D3 since it is not compatible with the one of D11/D11'. The reason is that according to D3 no electrically driven control valve is foreseen, which according to D11/D11' is required in order to allow the measured position of the percussion piston to be considered in the control of the operating cycle of the impact device. Consequently, consideration of D3 can only be seen as leading to the replacement of the control valve used according to D11/D11' by a control slide as known from D3, which is explicitly suggested by the problem to be solved according to D3 (cf. point 6.2.4 above). Since it is apparent that such an approach is not compatible with the approach according to D11/D11', it cannot be considered that the skilled person would take the method of D3 further into account.

6.3.3 According to appellant II the skilled person starting from the method according to D11/D11' would, in order to solve the problem (cf. point 6.1.3), take the relevant part of D3 into consideration. Acting in this manner, he would immediately recognise that combining the approach according to D3, namely to control the percussion piston via a control slide, with the one of D11/D11' namely to control the percussion piston via an electrically driven control valve controlled via a control unit, would solve the problem in that the percussion piston would be indirectly controlled by the control valve, which itself directly controls the control slide. Combined consideration of the teachings of D11/D11' and D3 would thus render the solution according to claim 1 obvious.

6.3.4 The Board considers the argument of appellant II to be more convincing.

It is true that, as argued by appellant I, D3 discloses as only means for controlling the operating cycle of the impact device a control slide connected to working pressure and discharge ducts of the impact device.

Starting from the method of D11/D11' the skilled person would, however, immediately realise that the **part of the disclosure of D3 relating to the control of the working pressure and discharge ducts for the percussion piston via a control slide** (cf. D3, paragraph [0021], figures 1, 2a, 2b) can be considered separately from the remainder of the disclosure of this document.

Taking this part of the disclosure into account it is evident that proper functioning of the control slide does not require its reciprocation directly by the working pressure foreseen for the percussion piston and that any other pressure which, as stated by a part of

feature (g), is able to move the control slide, suffices.

Thus for the skilled person starting from D11/D11' it is **immediately apparent** that **in order to solve the problem** (cf. point 6.1.3 above) **while accepting the resulting increased complexity of the control** (cf. point 6.1.2 above) **the approach according to D11/D11'** that the pressure for the percussion piston is controlled by the control valve **can be combined with the one of D3** that the pressure for the percussion piston is controlled via a control slide.

Combining these two approaches thus leads to the control slide being arranged between the control valve and the working pressure and discharge ducts for the percussion piston. This allows on the one hand that by means of the control valve the measurement of the position can continue to be used as known from D11/D11' and on the other hand that the control valve needs only to guide a control pressure which is able to move the control slide and not the working pressure required to reciprocate the percussion piston.

As can be concluded from the absence in claim 1 of features concerning the cooperation of the control valve and the control slide, apart from features (f) and (g), the combination referred to above does not require an essential modification concerning the use of either the control valve or the control slide which goes beyond constructional adaptations coming within regular design practice.

The subject-matter of claim 1 thus lacks inventive step (Article 56 EPC) considering the method of D11/D11' as

closest prior art and the method of D3 as further prior art.

6.3.5 The above reasoning holds true considering the argument of appellant I that the skilled person is bound to utilize the entire method disclosed by D3 and not only a part of it. As indicated above starting from the method of D11/D11' and considering D3 it is evident that in order to solve the problem the control slide can be used isolated from the remainder of the teaching of this document concerning the pressure (working pressure) by which it is reciprocated. The reason is that as indicated above the skilled person immediately realises that the pressure by which the control slide is reciprocated must only satisfy one criterion: namely to be high enough to just do that.

Likewise as indicated above the skilled person realises immediately that, in case the advantage (cf. point 6.1.3 above) of combining the approach resulting from the control via the control valve according to D11/D11' with the one of D3 where the control of the percussion piston is via a control slide outweighs its disadvantage (cf. point 6.1.2 above), this combination can be achieved within the framework of regular design practice.

Therefore in the present case the skilled person can be expected to neglect information given by D3, namely that the control of the percussion piston is solely via the control slide, since it is immediately apparent from D3 alone and even more in case the problem starting from D11/D11' is taken into account, that a control slide can be used as an additional control means irrespective of the manner in which it is moved



by a pressurized medium as long as this medium allows the control slide to be reciprocated.

For that reason also the argument of appellant I fails that the teachings of D11/D11' and D3 are incompatible since according to the method of D11/D11' a control valve is required which, as position measurements need to be considered, cannot be abandoned as would be required by the teaching of D3.

Moreover, in this context it also is apparent that the examination of inventive step is solely based on the teachings of D11/D11' and D3 in combination with the problem (cf. point 6.1.3 above) to be solved. Since knowledge of the method of claim 1 plays a role only in connection with the formulation of the problem to be solved based on the distinguishing features of the method of D11/D11' and not with respect to the solution to be achieved considering the teachings of D11/D11' and D3, the concern expressed by appellant I with respect to the application of an inadmissible *ex post facto* analysis lacks a factual basis.

6.4 In view of the considerations given above it was not necessary to take the argument of appellant II into account that the method of claim 1 likewise lacks inventive step if instead of D3 the prior art referred to in the patent in suit itself (cf. paragraphs [0014] to [0017], figures 1, 2a, 2b) is considered in combination with the method of D11/D11'.

7. *Claim 1 according to the fourth auxiliary request*

Claim 1 of the fourth auxiliary request differs from claim 1 of the third auxiliary request by the addition of the features

(h) by measuring the pressure acting in the working pressure duct and transmitting the measurement result to the control unit, and

(i) by timing the operating cycle of the percussion piston on the basis of the pressure acting in the working pressure duct.

7.1 Features (h) and (i) define that on the one hand the pressure acting on the working pressure duct, i.e. the working pressure, is measured and used for the control of the operating cycle. Considering the relationship between the working pressure and the impact force according to fluid mechanics it is evident that the working pressure is proportional to the impact force exerted via the percussion piston.

7.2 D11/D11' discloses, concerning the parameters referred to in features (h) and (i), that the impact cycle and the impact force are set or stored in the hydraulic pressure/cycle setter 11 (cf. e.g. page 7, lines 20 - 30; page 8, lines 18 - 31).

It is thus evident that the parameters referred to by features (h) and (i) are ones which according to D11/D11' have to be set to vary the impact cycle and the impact force of a tool applied depending on the particular use foreseen for the impact device (cf. page 8, lines 18 - 31).

Although in this connection it is also indicated that "the required impact cycle and impact force are independently and freely set and changed" (page 7, lines 26 - 30) it is evident that such a general reference does not exclude that the operating cycle is

timed dependent on the working pressure as defined by features (h) and (i). This holds true all the more considering that, as referred to during the oral proceedings, the relationship defined by features (h) and (i) is defined only in general terms.

7.3 The method of claim 1 thus differs from the method of D11/D11' as outlined above essentially with respect to the control variables that the **working pressure is measured and the measurement result is entered into the control unit** according to a part of feature (h) whereas according to D11/D11' a **corresponding predetermined value is entered into the hydraulic pressure/cycle setter**.

7.4 The **effect resulting from this distinguishing feature** can be seen as lying in the use of a measurement of the working pressure as an essential control parameter in the control of the timing of the operating cycle. For completeness' sake the Board wishes to indicate that neither the working pressure nor the timing of the operating cycle are referred to in claim 1 as one of the "control parameters supplied to the control unit for controlling the electrically driven control valve" (feature (d)).

7.5 D5 discloses as referred to by appellant II for a method of the kind concerned (cf. claim 1) that the working pressure is measured and the measurement result is used as a basis for the timing of the operating cycle (cf. column 4, lines 52 - 63; column 9, lines 9 - 21).

7.6 It is apparent that, as argued by appellant II, within the method of D11/D11' in addition to the use of the measured position of the percussion piston and the use

of set or stored values in the method for controlling the operating cycle (cf. e.g page 8, lines 23 - 31; page 9, lines 9 - 14), the measurement of the working pressure as referred to in D5 will further be taken into account by the skilled person without inventive skills being required.

This also holds true considering features (h) and (i) in combination with the remaining features of claim 1 since, as indicated during the oral proceedings, combined consideration of these features does not require features (h) and (i) to be considered in a manner differing from the one as given above.

The method of claim 1 according to the fourth auxiliary request thus does not involve an inventive step (Article 56 EPC).

8. *Claim 1 according to the fifth auxiliary requests*

Claim 1 of the fifth auxiliary request differs from claim 1 of the fourth auxiliary request by the addition of the feature

(j) such that the impact velocity of the percussion piston is substantially constant.

8.1 Feature (j) defines an effect to be obtained by the timing of the operating cycle resulting from features (h) and (i) as referred to above.

It thus relates to a further control variable to be obtained (impact velocity) at a qualitatively defined state (substantially constant).

- 8.2 As indicated during the oral proceedings such a control variable is inherent to the method for controlling the operating cycle concerned. It thus belongs to the impact cycle to be set according to D11/D11' (cf. e.g. page 7, lines 20 - 30).
- 8.3 Concerning the additional feature (j) the method of claim 1 thus differs from the one of D11/D11' in that a state for the velocity as a control variable is defined. The effect of this distinguishing feature can be seen in explicitly defining a particular state for the velocity of the percussion piston as a control variable.
- 8.4 Considering this state it has neither been alleged nor shown that the state of the impact velocity defined as "substantially constant" concerns a state lying outside the states for the impact velocity which, depending on circumstances, can be foreseen within customary design practice.
- 8.5 Consequently feature (j) cannot be considered as leading to subject-matter involving inventive step.

This holds also true considering feature (j) in combination with features (h) and (i) or the remaining features of claim 1 since, as indicated during the oral proceedings, combined consideration of these features does not require feature (j) to be considered in a manner differing from the one as given above.

The method of claim 1 according to the fifth auxiliary request thus lacks inventive step (Article 56 EPC).

## Order

### For these reasons it is decided that:

1. The appeal of the patent proprietor is dismissed.
2. The decision under appeal is set aside.
3. The patent is revoked.

The Registrar:

The Chairman:



G. Nachtigall

H. Meinders

Decision electronically authenticated