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Datasheet for the decision of 13 January 2023

Case Number: T 0245/22 - 3.2.04

Application Number: 15169698.6

Publication Number: 2949199

IPC: A01F12/44, A01D75/28

Language of the proceedings: EN

Title of invention:
COMBINE HARVESTER CLEANING SYSTEM DRIVE ASSEMBLY

Patent Proprietor:
CNH Industrial Belgium nv

Opponent:
Deere & Company/John Deere GmbH & Co. KG

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

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Case Number: T 0245/22 - 3.2.04

D E C I S I O N
of Technical Board of Appeal 3.2.04
of 13 January 2023

Appellant: (Opponent)	Deere & Company/John Deere GmbH & Co. KG One John Deere Place/John-Deere-Str. 70 Moline, Il 61265/US/68163 Mannheim/DE (US)
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Respondent: (Patent Proprietor)	CNH Industrial Belgium nv Leon Claeysstraat 3A 8210 Zedelgem (BE)
Representative:	Caspary, Karsten Kroher-Strobel Rechts- und Patentanwälte PartmbB Bavariaring 20 80336 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 20 December 2021 rejecting the opposition filed against European patent No. 2949199 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	A. de Vries
Members:	S. Oechsner de Coninck
	C. Heath

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the decision of the Opposition Division rejecting the opposition filed against European patent No. 2949199 pursuant to Article 101(2) EPC.

II. The Opposition Division had held that the grounds for opposition mentioned in Article 100(a) EPC did not prejudice the maintenance of the granted patent, having regard to the following documents in particular:

D1: EP 2510777 A1
D3: DE 102005050751 A1

III. In a communication in preparation for oral proceedings the Board gave its preliminary opinion on the relevant issues.

IV. Oral proceedings were held on 13 January 2023 by videoconference.

V. The appellant requests that the decision under appeal be set aside and the patent be revoked.

VI. The respondent requests that the appeal be dismissed, in the auxiliary that the decision under appeal be set aside and the patent be maintained on the basis of one of auxiliary requests 1 or 2 as before the opposition division and re-filed with the reply to the grounds of appeal.

VII. The independent claims of the relevant requests read as follows:

- Main request (as granted)

"A combine harvester comprising:
- a cleaning system (100, 200) configured to receive a flow of harvested and threshed crop, the cleaning system comprising at least one cleaner assembly (105, 110, 210) to clean the harvested and threshed crop;
- a drive assembly connected to the cleaning system, the drive assembly being configured to drive the cleaning system, thereby driving the at least one cleaner assembly to perform a reciprocating cleaner movement, wherein
- the drive assembly comprises a variable speed drive assembly, the variable speed drive assembly comprising:
a rotary drive comprising a rotatable output shaft (175) for driving the cleaning system;
a transmission (176, 177, 178) configured to connect the rotatable output shaft (175) to the at least one cleaner assembly of the cleaning system (100, 200); the transmission being configured to convert an angular movement of the rotatable output shaft (175) to the reciprocating cleaner movement;
and
a control unit (190) configured to control an angular velocity of the rotatable output shaft (175) based on an input signal (192) received at an input terminal (194) of the control unit (190),

characterized in that the rotary drive comprises a rotatable input shaft and a variator connecting the rotatable input shaft and the rotatable output shaft; the control unit being configured to control a gear ratio of the variator based on the input signal,

thereby controlling the angular velocity of the rotatable output shaft."

- *Claim 1 of the first auxiliary request adds to granted claim 1 the following last features:*
"the combine harvester further comprises a load sensor configured to provide a load sensor signal representing a load of the cleaning system;
wherein the input signal comprises the load sensor signal and wherein the control unit is configured to control the angular velocity of the rotatable output shaft based on the load sensor signal."

- *Claim 1 of the second auxiliary request further adds to claim 1 of the first auxiliary request following last features:*

"the combine harvester according to claim 1, further comprising a transport assembly for transporting cleaned crop such as clean grain, as received from the cleaning system, to an on-board storage tank,
wherein the rotatable input shaft is configured to operate at a substantially constant angular velocity during use, the rotary drive further comprises a fixed transmission connecting the rotatable input shaft and the transport assembly, the fixed transmission having a fixed gear ratio for driving the transport assembly at a substantially constant speed, irrespective of the angular velocity of the rotatable output shaft."

VIII. The appellant argues as follows:

The combine harvester defined in claim 1 of the main request and first and second auxiliary request lacks an inventive step.

IX. The respondent argues as follows:

Starting from D1 the skilled person would not consider controlling the speed of the cleaner system with the belt variator of D3, because D1 rather teaches away from such solution and D3 drives a straw walker, different from a cleaning system.
The subject-matter of claim 1 of the first and second auxiliary request also involves an inventive step in view of D1 and D3.

Reasons for the Decision

1. The appeal is admissible.

2. Technical background of the patent

2.1 The patent concerns improvements to a combine harvester and seeks to better regulate the operation of the cleaning system, paragraph 007. The cleaning system, in which the threshed seeds are separated from the by-products, comprises superposed sieves that are generally arranged at an angle relative to the horizontal, paragraph 005. The reciprocating movement of the grain pan and sieve makes that the seeds and by-products are thrown upwards and backwards by the movement of the sieves. The sieves are connected to a rotatable drive shaft through a transmission comprising mechanical elements such as eccentric drives and linkages.

2.2 A fan blows air through the sieves so as to catch the lighter particles of the by-products and keep them airborne until they are blown out of the combine harvester. Operating conditions of the harvester, such

as the inclination of the field on which it operates affects the cleaning system by changing the angular position of the sieves. To address that problem and provide a harvester less affected by these operating conditions, the harvester is inter alia provided with a control unit that is configured to control a gear ratio of the variator to vary the angular velocity of the shaft acting on the sieves.

3. Main request - inventive step

3.1 D1 discloses a combine harvester with a cleaning system ("Reinigungseinrichtung") 30 comprising at least one cleaner assembly ("Siebe") 82, 40, 42 to clean the harvested and threshed crop (paragraph 031). D1 seeks to adjust operation of the cleaner assembly when the combine harvester operates on an inclined ground, for example in the mountains (paragraph 003 last sentence, 004 first sentence), and is thus concerned with the same problem as the patent.

For operating the cleaner assembly, D1 further discloses a drive assembly ("Antrieb") in paragraph 031, which is however not depicted in the figures but explained in the text as being either the combustion engine of the harvester, an electric motor or an hydraulic motor (column 8, lines 2-5: "Verbrennungsmotor", "Hydraulik- oder Electromotor"). The drive assembly is configured to drive the cleaning system, thereby driving the at least one cleaner assembly to perform a reciprocating cleaner movement (paragraph 031, column 8, lines 6-9:"Die Siebe 82, 40, 42 vollführen somit eine Kreisbahn mit einer Hin- und Herbewegung in Vorwärtsrichtung...").

It appears undisputed that in order to impart an oscillating movement to the cleaner assembly, the undisclosed drive assembly has to further comprise the following main components of claim 1: a rotary drive comprising a rotatable output shaft for driving the cleaning system and a transmission to convert angular movement of the rotatable output shaft to reciprocating movement of the cleaner attached to the frame, realized in D1 by oscillating arms ("Kurbelarme") 46 (column 7, lines 55-57).

3.2 In order to reduce the effect of sloping terrain on cleaning, D1 focuses on automatically varying fan speed in response to harvester inclination, and thus pursues a different path than that followed in the patent, which is to vary rotation speed of the drive that produces the reciprocal movement or oscillation of the sieves. This is expressed in the features of the rotary drive and its control in claim 1. Thus, the claimed harvester differs from the harvester known from D1 in the following features: :
- the rotary drive comprises a rotatable input shaft and a variator connecting the rotatable input shaft and the rotatable output shaft;
- the control unit being configured to control a gear ratio of the variator based on an input signal received at an input terminal of the control unit, thereby controlling the angular velocity of the rotatable output shaft.

3.3 These differing features provide an alternative to the solution to the problem of slopes pursued in D1. The objective technical problem can be formulated accordingly as finding an alternative solution to the problem posed by slope inclination for the effectiveness of cleaning by the harvester.

3.4 D1 itself in paragraph 0022 already suggests the "automatic variation of oscillation frequency ... based on slope inclination" as a possible alternative to fan speed variation ("eine selbsttätige Veränderung ... möglich wäre").

The decision under appeal on page 5, fourth paragraph had taken the view that paragraph 0022 of D1, because it pursued fan speed variation as simpler in realization (last sentence of paragraph 0022), would discourage the skilled person from the alternatives mentioned in its firsts sentence, as also submitted by the respondent (page 2/5, paragraph 8 of their reply).

The Board sees this differently. The statement in the last sentence paragraph 022 of the patent that it would be less simple to carry out, i.e. that it might be more complicated to realize, does not mean that the skilled person would therefore not consider it as a viable, possible alternative solution. On the contrary, the first sentence of this paragraph explicitly and unequivocally states that it would be *possible* ("möglich wäre"), while the second sentence states that the two approaches would even have similar effects ("ähnliche Wirkungen"). That D1 then decides to pursue the path of fan speed variation reflects the particular weight that the author of D1 gave to simplicity of design. A skilled reader motivated by different considerations would certainly not see themselves barred from trying an option stated to be possible, simply because the alternative is said to be simpler. Stating that one option is simpler than another therefore does not teach away from, much less express a technical prejudice against that other option.

Consequently, the skilled person searching for an alternative to fan speed variation would, on the basis of D1 itself and as a matter of course, consider variation by oscillation frequency in response to slope inclination. As oscillation of the sieves is realized in D1 by converting the rotary movement of the drive shaft to reciprocating movement of the sieves, see above, varying oscillation frequency corresponds to varying the rotation speed of the drive. Indeed, in paragraph 0031, column 8, lines 5 and 6, D1 makes allowance for a drive that may rotate at *variable* speed.

3.5 Other than stating that the drive may rotate at variable speed, D1 does not give any detail as to how such a variable speed is realized. Various options will be known to the person skilled in the field of agriculture, an agricultural engineer designing combine harvesters and with extensive knowledge of drive transmission arrangements used in agricultural machines.

As acknowledged by all parties, a belt variator is one well-known way of realizing variable rotary speed from a constant speed drive in agricultural machines. D3, for example, in the same type of harvester as the patent in figure 2 shows two belt variators 88 and 100 driven, respectively, from the common output shaft of a combustion engine 58 or a threshing drum 22. D1 itself, in the final sentence of paragraph 0032, suggests, though without further detail, the alternative use of a belt variator to vary fan speed.

3.6 Naturally, when applying a belt variator, the transmission ratio and range of speeds will need to be adapted to the requirements, here to ensure that the sieves oscillate within the desired frequency range. That is, however, a matter of routine workshop skill. Thus, the different nature and operating conditions of a straw walker 32 and threshing drum 22 in D3, or the fan in D1 are no impediment to the skilled person when adopting a belt variator to realize rotary shaft variation. The basic layout and operation of a belt variator remains the same.

By adopting the belt variator arrangement such as known from D3 or D1 itself, the skilled person would realize in an obvious manner a drive of the sieves of the cleaning system of D1 with variable speed as suggested in column 8, lines 5-6. The control in response to inclination that is already present in D1 for fan speed variation would be adapted accordingly to change the relevant control parameter to vary the (output) rotational speed, namely the gearing ratio of the belt variator, again using routine skill for the skilled person familiar with belt variators.

3.7 The Board thus finds, contrary to the decision under appeal, that the subject-matter of claim 1 does not involve an inventive step.

4. First and second auxiliary requests - inventive step

4.1 Claim 1 of the f*irst auxiliary request* adds to granted claim 1 the features of dependent claims 8 and 9 concerning the load sensor of the cleaning system and its use to control the angular velocity of the rotatable output. Paragraph 018 of D1 already

contemplates the use of various sensor signals to control the cleaning system, including a signal relating to the load which represents a throughput through the cleaning system (column 5, line 5: "Durchsatz der Reinigung").

The respondent submits that the throughput mentioned in paragraph 018 of D1 is different from the load and cannot thus suggest to the skilled person to provide control of the angular velocity based on the load sensor signal as now required by claim 1.

The Board disagrees, because what exactly is meant by "load" of a cleaning system is not clear in itself. The only relevant passage in the patent, paragraph 0043 states that the one or more load sensors are "configured to provide a signal representative of the capacity or load, i.e. the amount of harvested and threshed crop that is processed" and can for example be a "grain fall through sensor". The Board understands this to be the same as the sensor sensing throughput ("Durchsatz") in paragraph 0018 of D1. As the feature is thus already known from the starting document, it cannot contribute to inventive step.

4.2 Claim 1 of the *second auxiliary request* adds to granted claim 1 the features of dependent claims 2 and 3 relating to the transport assembly for cleaned crop driven by a fixed transmission ratio from the same input shaft. It is undisputed that such transport assemblies have always been provided in harvesters, for example as the elevator 34 in D1 (see figure 1). As stated earlier, it is also well-known in combine harvesters (and other agricultural machines) to drive the various subsystems individually and independently from a common drive off the combustion engine of the

harvester via separate transmissions and gearing to input shafts of the respective subsystems; see figure 2 of D3 as an example with belt variators 88 and 100 driving threshing drum 22 and straw walker 32 from common engine 58. It would thus be obvious to also drive the transport system, elevator 34, from a common drive. Whether the transmission from the drive is then variable speed (via belt variators say) or constant speed (via gearing of constant gear ratio) depends on the requirements. Choosing one or the other is then a matter of obviousness.

4.3 It follows from the above that the subject-matter of claim 1 of the first or second auxiliary request lacks inventive step.

5. The Board finds that the decision under appeal wrongly affirmed inventive step for claim 1 as granted and must therefore be put aside. As the patent as amended according to either auxiliary request does not meet the requirements of the EPC, the Board must revoke the patent pursuant to Article 101(2) and (3)(b) EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

G. Magouliotis A. de Vries

Decision electronically authenticated