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D E C I S I O N
of 26 February 1998

Case Number: T 0445/96 - 3.2.4

Application Number: 90109540.6

Publication Number: 0401581

IPC: A01F 15/07

Language of the proceedings: EN

Title of invention:

Machine for forming cylindrical bales of crop

Patentee:

Deere & Company

Opponent:

Greenland Geldrop B.V.

Headword:

Baler/DEERE

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0445/96 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 26 February 1998

Appellant: Greenland Geldrop B.V.
(Opponent) Postbus 9
5660 AA Geldrop (NL)

Representative: Grünecker, Kinkeldey
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Respondent: Deere & Company
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Representative: Feldmann, Bernhard
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted on 6 March 1996
rejecting the opposition filed against European
patent No. 0 401 581 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: C. A. J. Andries

Members: P. Petti
J. P. B. Seitz
R. E. Gryc
M. Lewenton

Summary of Facts and Submissions

- I. The opposition filed against the European patent No. 401 581 was rejected by the decision of the opposition division dispatched on 6 March 1996.

The independent Claim 1 of the patent as granted reads as follows:

- "1. A machine for forming cylindrical bales of crop having a variable volume baling chamber (54) and a hydraulic system which includes a piston and cylinder unit (80) which is arranged so that a first end thereof can provide resistance to increase in the said volume and which is connected to a first line (94) which is connectible to a source of pressurised hydraulic fluid, valve means (96) in the first line (94) allowing one-way flow to the first end of the unit (80) and a first relief valve (104) disposed at the unit side of the valve means (96) between the ends of the unit (80) to open at a predetermined first pressure in the first end of the cylinder unit (80) characterised in that the valve means (96) is movable between a position allowing the said one-way flow and a position allowing free flow to and from the first end, a second line connects the source side of the valve means (96) to the second end of the unit (80), and a second relief valve (102) is disposed in the second line to open at a predetermined second pressure in the first line (94) when the valve means (96) is brought in the free flow position, the first pressure being

substantially greater than the second pressure."

- II. On 15 May 1996 the appellant (opponent) lodged an appeal against this decision and simultaneously paid the appeal fee. A statement setting out the grounds of appeal was received on 5 July 1996.
- III. Oral proceedings were held on 26 February 1998.
- IV. The appellant based its arguments upon the European patent application EP-A-130 258 (D1), which was considered as being the closest prior art, and upon an alleged public prior use concerning a baling machine of the type ROBALL[®] 1512 of the firm P.J. Zweegers en Zonen Landbouwmachinefabrieken b.v. (NL).

With respect to the alleged prior use, the appellant referred inter alia to the following documents:

Annex 3: MFA Dealer Service Bulletin dated November 1987 concerning MF1455E/1512 round balers;

Annex 3a: Bulletin "PZ Service" No. 97 dated November 1987 concerning hydraulic components of round balers.

The appellant essentially argued that the subject-matter of Claim 1 of the patent, starting from the prior art known from document D1, did not involve an inventive step having regard to the information concerning the hydraulic circuit of the baling machine ROBALL 1512 as described in Annex 3 or 3a.

- V. The respondent (proprietor of the patent), on the one hand, asserted that there was no evidence that the information relating to the hydraulic circuit of the baling machine ROBALL 1512 derivable from Annex 3 or Annex 3a was made available to the public before the priority date of the patent and, on the other hand, argued that this information - even if it had been made available to the public - could not lead to the claimed solution.
- VI. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. *The claimed subject-matter*

Claim 1 clearly specifies a piston and cylinder unit arranged to provide resistance to increase in the volume of the baling chamber. Moreover, Claim 1 also specifies first and second relief valves arranged to open, respectively, at first and second predetermined pressures in the first end of the cylinder and piston unit, the first pressure being substantially greater than the second pressure. It is also clear from Claim 1 that the relief valves permit the pressure in the cylinder and piston unit to be set at two substantially different values so that bales or parts of bales having

substantially different densities can be produced.

It can implicitly be derived from Claim 1 that when the piston and cylinder unit provides resistance to increase in the volume of the baling chamber, the hydraulic system works "in closed circuit", i.e. it is not connected to the pressure source. However, according to Claim 1, "[the] first line (94) ... is connectible to a source of pressurised hydraulic fluid". This means that the hydraulic system referred to in Claim 1 can also work "in open circuit".

In the pre-characterising portion of Claim 1 a valve means is defined as being disposed in the first line and as allowing one-way flow to the first end of the cylinder unit. This valve means is further specified in the characterising portion as being movable between two positions, the first position allowing the one way flow defined in the precharacterising portion of the claim and the second position allowing free flow from and to the first end of the cylinder unit. The shifting of the movable valve means from the first to the second position permits the first relief valve controlling the pressure in the first end of the cylinder and piston unit to be by-passed so that the control of the pressure is taken over by the second relief valve, due to its lower relief pressure. Thus, it is clear from Claim 1 that the valve means can move from the first to the second position even when the cylinder and piston unit is not connected to the source of pressurised fluid (i.e. when the hydraulic system works "in closed circuit"). In other words, it is clear from the context of Claim 1 that the **valve means (96) is movable** between

the position allowing one-way flow and the position allowing free flow **when the piston and cylinder unit (80) provides resistance** to the increase in volume of the baling chamber.

3. *Novelty*

The subject-matter of Claim 1 is novel (Article 54 EPC) with respect to the cited prior art. Novelty was not disputed.

4. *Problem and solution*

4.1 Both parties consider the machine described in document D1 as being the closest prior art.

4.2 Document D1 discloses a machine for forming cylindrical bales of crop having a variable volume baling chamber and a hydraulic system which includes piston and cylinder units 17/17a, each of which is arranged so that a first end thereof can provide resistance to increase in said volume and is connected to a first line 24 connectible to a source of pressurised hydraulic fluid (for closing the tailgate), valve means 25 in the first line 24 allowing one way flow to the first end of the unit 17/17a (during closing of the tailgate) and a first adjustable relief valve 27 disposed at the unit side of the valve means 25 between the ends of the unit 17/17a to open at a first pressure in the first end of the cylinder unit 17/17a creating thereby a resistance during bale formation.

In the machine according to document D1, the cylinder

unit 17/17a not only provides resistance to increase in volume of the baling chamber (when the hydraulic circuit is not connected to the source of pressurised fluid, i.e when it is "closed") but also is employed for opening and closing the tailgate of the machine (when the hydraulic circuit is connected to the source of pressurised fluid, i.e. when it is "open"). The valve means 25 of the hydraulic system comprises therefor a pilot-operated check valve which can be positively opened (and held open) when the second end of the cylinder unit is connected to the source of pressurised fluid (thereby opening the tailgate) such that this pilot-operated check valve allows free flow from the first end of the cylinder unit, due to the movement of the piston towards the first end of the unit 17/17a. When, on the other hand, the first end of the cylinder unit is connected to the source of pressurised fluid the piston moves towards the second end of unit 17/17a so that the tailgate is closed. However, when neither the first nor the second end of the cylinder unit is connected to the source of pressurised fluid (the hydraulic system forming a closed circuit), the check valve 25 cannot move from the position allowing one-way flow to the position allowing free flow under all circumstances. In other words, **when the piston and cylinder unit 17/17a provides resistance** to increase in the volume of the baling chamber, **the check valve 25 is not movable** between the position allowing one-way flow and the position allowing free flow, since a pressure is generated in the first line 24 but not in line 22.

The hydraulic system also includes a second relief

valve 29 disposed in a second line connecting the source side of the check valve 25 to the second end of the piston and cylinder unit. This second relief valve 29, which is arranged to open when the pressure in the first line exceeds a predetermined value (a safety valve during closing of the tailgate), does not provide any resistance to the increase in volume of the baling chamber. In any case, this second relief valve 29 does not function when the check valve 25 is in its forced open position, since the fluid pressure in the line 22 is greater than the fluid pressure in the line 24. In other words, the second relief valve 29 **cannot open when the check valve is in its free flow position** (i.e. opened by the pressure in line 22).

4.3 The subject-matter of the Claim 1 essentially differs from the machine according to document D1 in that

(a) the **valve means (96) is movable** between the position allowing one-way flow and the position allowing free flow **when the piston and cylinder unit (80) provides resistance to the increase in volume of the baling chamber,**

(b) the second relief valve (102) is suitable **to open at a predetermined second pressure in the first line when the valve means (96) is brought in the free flow position.**

These features result in the provision of a machine capable of producing a bale having different densities, for instance a bale with a low density core, if the movable valve means is in the free flow position during

the first phase of the bale formation, and a high density shell, if the movable valve means is in the one-way flow position during the subsequent phase of the bale formation.

4.4 Therefore, the problem to be solved is to provide a machine capable of producing a bale having different densities.

5. *Inventive step*

5.1 The claimed invention is based upon the idea of arranging in the hydraulic system two relief valves which permit the pressure in the cylinder and piston unit to be set at two substantially different values so that the cylinder and piston unit can provide "hydraulic" resistance at two different values.

5.2 The round baler referred to either in Annex 3 or in Annex 3a has a variable volume baling chamber provided with tensioning springs providing "mechanical" resistance to increase in the volume of the baling chamber and with a hydraulic bale density control system including an hydraulic tension unit (piston and cylinder unit) which unit provides additional "hydraulic" resistance to increase in the volume of the baling chamber.

Figure 1 of Annex 3 or Annex 3a represents a hydraulic diagram of a bale density control system. It is clear from Figure 1 that the hydraulic tension unit (piston and cylinder unit 1) has a first end connected to a first line which is connected to a gauge 2 and a second end connected to a second line which is connected to a refill pipe 'X'. An adjustable relief valve 3 is disposed between the first and second lines to open at an adjustable predetermined pressure in the first end of the hydraulic tension unit 1. Moreover, a check valve 4 is disposed between the first and second lines allowing one way flow from the first line to the second line. This check valve can be actuated (i.e. opened to allow flow in both directions) by a lift plunger controlled via a cable by a roller on a cam bracket. If the cam is set so as not to actuate the check valve 4, the pressure in the first end of the hydraulic tension unit is set via the adjustable relief valve 3 so that high density bales may be produced due to the fact that both spring tension and hydraulic tension are applied to the belts of the baling chamber. If the cam is set so as to activate the check valve 4 (i.e. to open it), the bale density will remain low (spring tension) until the check valve is released due to the fact that the relief valve, capable of setting the pressure in the first end of the hydraulic tension unit, is by-passed (see Annex 3: page 3, section 1(b)). In order to decrease the bale density, only this actuated check valve is used, without there being an additional relief valve.

When the check valve 4 is "open", i.e. in the position allowing free flow **from** the first end of the cylinder

unit, resistance to the increase in volume of the baling chamber is provided by the tensioning springs. When the check valve is "closed", i.e. in the position allowing only a one-way flow to the first end of the cylinder unit, resistance is provided not only by the tensioning springs but also by the piston and cylinder unit (i.e. the hydraulic tension unit).

- 5.3 The appellant pointed out that the check valve 25 of the hydraulic system of the baler known from document D1 is a valve means movable between a position allowing one-way flow and a position allowing free flow and that the (second) relief valve 29 is suitable to open at a second pressure in the first line, said second pressure being substantially less than the pressure at which the (first) relief valve 27 opens.

The appellant asserted that the difference between the claimed subject-matter and the prior art according to document D1 can be seen only in the actuation mode of the movable valve means. This would imply that the valve means is movable between the one-way flow position and the free flow position also when the piston and cylinder unit (80) provides resistance to the increase in volume of the baling chamber.

The appellant put forward the following argumentation:

The skilled person, when confronted with the problem of producing a bale having different densities, would turn to the hydraulic system of the baler ROBALL 1512 as known from Annex 3 or Annex 3a. The skilled person would derive from this hydraulic system, which always works "in closed circuit", the teaching that a valve means (i.e. the check valve 4) is movable between a one-way flow position which does not allow flow from the first end of the cylinder unit (so that the piston and cylinder unit 1 working in closed circuit with the relief valve 3 provides "hydraulic" resistance to the increase in volume of the baling chamber in addition to the "mechanical" resistance provided by the tensioning springs) and a free flow position permitting the relief valve 3 to be by-passed (so that no additional "hydraulic" resistance is provided). The skilled person, when applying this teaching to the hydraulic system of the baler according to document D1, would retain the first and second relief valves 27 and 29 and modify the check valve 25 with respect to its actuation mode as suggested by Annex 3 or 3a. In this manner the skilled person would arrive at the claimed subject-matter without exercising any inventive skill.

5.4 The board cannot accept the argumentation of the appellant for the following reasons:

- (i) It is clear from the disclosure of document D1 that the second relief valve 29 of the hydraulic system of the baler - which valve, isolated from the hydraulic circuit, could be considered as

structurally equivalent to the second relief valve according to the claimed invention - and the pilot-operating mode of the check valve 25 have absolutely no function when the hydraulic system works "in closed circuit", their function being only in relationship respectively to the closing and opening of the tailgate when the system works in "open circuit" (see above section 4.2). In other words, the relief valve 29 and the piloted opening of the check valve 25 do not form part of the bale density control of the baler according to document D1.

It must be considered that the function performed by a component of a hydraulic system depends not only on its structure itself but also on its position in the hydraulic circuit, i.e. on its relationship to the other components. A skilled person analysing a technical entity, such as a hydraulic system, has to consider this entity in the light of the technical results obtained which primarily depend on the **functions** performed by the components of the hydraulic system.

Therefore, the skilled person starting from the baler according to document D1 and confronted with the above mentioned problem to be solved, which relates to the density of the bale, would try to modify only that part of the hydraulic system of the baler according to document D1 which is responsible for the bale density control without considering the structural components of the hydraulic system which have no relationship

to the bale density control.

- (ii) In the present case, the skilled person would derive from the hydraulic system according to Annex 3 or 3a the teaching that the relief valve (3) setting the pressure in the first end of cylinder and piston unit so as to permit "hydraulic" resistance to be provided (in addition to the "mechanical" resistance provided by the tensioning springs) is by-passed - if desired - so that "hydraulic" resistance is eliminated and only "mechanical" resistance is provided.

- (iii) It must be emphasized, firstly, there is no suggestion in document D1 that the relief valve 29 can be used for by-passing the relief valve 27 in order to provide "hydraulic" resistance at a lower pressure level and, secondly, the hydraulic system according to Annex 3 or 3a does not teach the use of a second relief valve for this same purpose.

Therefore, the skilled person - even if the teaching of Annex 3 or 3a were to be applied to the hydraulic system of the baler according to document D1 - would only arrive at a hydraulic system in which the (first) relief valve is by-passed without there being any second relief valve permitting "hydraulic" resistance to be provided with a lower pressure level than said (first) relief valve.

Therefore, this argumentation of the appellant is clearly based on an ex post facto analysis of the prior art.

- 5.4.1 The appellant also alleged that the farmers using baling machines of the type claimed in the patent do not make any difference between round bales formed under "hydraulic" resistance and round bale formed under "mechanical" resistance. Having regard to the comments in above section 5.4, this does not represent a relevant argument.
- 5.5 Therefore, the arguments brought forward by the appellant do not permit the claimed subject-matter to be considered as being obvious.
- 5.6 Having regard to the above comments, the board finds that the subject-matter of the independent Claim 1 of the patent as granted involves an inventive step as required by Article 56 EPC.
6. Having regard to the considerations above, the question of whether the information relating to the hydraulic circuit of the baling machine ROBALL 1512 (as derivable from Annex 3 or Annex 3a) was made available to the public before the priority date of the patent is not relevant for the findings of the present decision. Therefore, the board does not need to decide on this issue.
7. The patent can therefore be maintained as granted.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

N. Maslin

C. Andries