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Datasheet for the decision of 11 October 2010

Case Number: T 1996/08 - 3.2.07

Application Number: 98907069.3

Publication Number: 0963255

IPC: B05B 1/04

Language of the proceedings: EN

Title of invention:
Spray nozzle arrangement

Patentee:
MICRON SPRAYERS LIMITED

Opponent:
Amazonen-Werke H. Dreyer GmbH & Co. KG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step (all requests): no"

Decisions cited:
-

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1996/08 **-** 3.2.07

D E C I S I O N
of the Technical Board of Appeal 3.2.07
of 11 October 2010

Appellant: (Patent Proprietor)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 4 August 2008 revoking European patent No. 0963255 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: H. Meinders
Members: K. Poalas
E. Dufrasne

Summary of Facts and Submissions

I. The appellant (patent proprietor) lodged an appeal against the decision of the Opposition Division revoking the European patent No. 0 963 255.

II. The opposition had been filed against the patent as a whole based on Article 100(a) EPC on the grounds of lack of novelty (Article 54 EPC) and lack of inventive step (Article 56 EPC), and on Article 100(c) EPC (unallowable amendments; Article 123(2) EPC).

III. The Opposition Division found that the subject-matter of claim 1 of the patent as granted as well as according to the auxiliary request is not novel over D2 (US-A-3 782 634).

IV. Oral proceedings before the Board took place on 11 October 2010. Although having been duly summoned, the appellant did not attend the oral proceedings, as announced with letter dated 2 September 2010. According to 115(2) EPC and Article 15(3) RPBA, the proceedings were continued without the appellant.

The appellant requested in writing that the decision under appeal be set aside and that the patent be maintained as granted or, in the alternative, on the basis of the first auxiliary request filed with letter of 12 December 2008.

The respondent (opponent) requested that the appeal be dismissed.

V. Independent claim 1 of the patent as granted reads as follows (feature's numbering according to the respondent):

"1.1 Agricultural spraying apparatus for the precision application of liquid agricultural chemicals, comprising:
1.2 (a) a plurality of
1.3 differently sized
1.4 agricultural spray nozzles (11, 12, 13)
1.5 which are separately or groupwise controlled,
1.6 each nozzle being capable of producing spray of substantially consistent droplet size
1.7 over a predetermined range of volume flow rates
1.8 at a corresponding predetermined range of supply pressures;
1.9 (b) a common feed (2) of liquid to be sprayed,
1.10 said feed being connected to said nozzles via valves (21, 22, 23) which are remotely switchable;
1.11 (c) a control system (C) operable for controlling both switching of said nozzles (11, 12, 13)
1.12 and pressure of said common feed (2)
1.13 such that each of said nozzles receives liquid at pressures only within said predetermined range of supply pressures appropriate to that nozzle,
1.14 said control system being pre-programmed with said ranges;
1.15 (d) whereby the apparatus is capable of providing at least a fourfold change in volume flow rate of its total spray output at consistent droplet size".

Independent claim 1 according to the first auxiliary request corresponds to claim 1 of the patent as granted with the additional feature that the control system is

"responsive to variations in a required spraying rate to vary an amount of liquid sprayed from place to place as the apparatus is moved".

VI. The appellant argued in the written proceedings, in particular its letter of 2 September 2010, essentially as follows:

Main request - Inventive step, Article 56 EPC

It is not disputed that the nozzles in D2 may be capable of creating an essentially uniform droplet size over a prescribed range of pressures. The appellant's contention is, however, that D2 does not disclose a system that controls the pressures at the nozzles within those limits of pressure in which **droplet size is maintained substantially consistent**. Maintaining consistency in droplet size is not an issue that is considered in D2.

Contrary to the respondent's assertion that the creation of a spray of substantially uniform droplet size is always to be guaranteed, by remaining within a suitable range of flow rates and supply pressures, D2 does not achieve this. In D2 the objective is to maintain a uniform spread **density** which is different from spray quality, said last being dependent on droplet size and in maintaining a consistent droplet size. The passage at column 4, lines 4 to 14 of D2 deals in any case with problems at much higher and lower pressures, and is not concerned with consistency of droplet size.

The passage bridging columns 4 and 5 of D2 refers to a

range of pressures between a maximum and a minimum pressure but does not say anything about what criteria these relate to. This passage makes no mention of droplet size or consistency of droplet size.

The control system in D2 is not capable of adjusting the spray rate dynamically, on demand, to increase or decrease the localised spread density. To do this requires that the necessary pressure ranges are pre-programmed into a controller so that the controller can automatically adjust the spray rate to respond to a change in demand for increased or decreased spread density. In D2 there are various settings (a to k as given in the example at column 3, lines 45 to 54). As stated at lines 42 to 44 of column 3 the spread density can be set to one of the plurality of settings a to k. But, as stated at lines 55 to 57 of the same column, once set, the control apparatus maintains the spread density. There is nothing in D2 that describes or suggests that the spread density may be automatically adjusted.

Although it may seem obvious that in D2 each nozzle receives liquid only within the appropriate range for that nozzle, it remains that D2 does not disclose that the pressure ranges are pre-programmed in the control system.

A product flow meter is only a device that can measure or monitor a flow but is not capable of controlling anything.

In D2 is not disclosed a system that allows for a fourfold change in flow rate to be provided

automatically so that the spread density can be varied while the spray system is being driven around a field, while at the same time maintaining a desired consistency of droplet size.

As D2 is concerned only with a system of providing uniform spray rates, and does not address the issues of maintaining consistent droplet size while at the same time varying a spraying rate, then the subject-matter of claim 1 related to that issue must be considered as involving an inventive step, none of the prior art documents providing an indication in that direction.

First auxiliary request - Inventive step, Article 56 EPC

D2 does not disclose the feature that the spray density is adjusted as the vehicle moves. The passages in column 3, lines 35 to 57 do not indicate that D2 discloses a system in which the spread density is dynamically adjustable as the vehicle moves from location to location. In D2, the preset value of the spread density may be adjusted from one preset value to another, but, once set, the spread density is maintained at that setting. The spray rate is adjusted as the vehicle's speed changes in order to maintain the preset spread density. The apparatus of D2 is specifically designed to maintain the amount of liquid sprayed (i.e. the spread density) from place to place as the apparatus is moved, whereas the present invention aims to vary the spread density from place to place as the apparatus is moved.

VII. The respondent argued in the written and oral proceedings essentially as follows:

Main request - Inventive step, Article 56 EPC

Even supposing, with the appellant, that the claimed apparatus distinguishes itself from the one disclosed in D2 by the fact that it is the pressure which is controlled, such that it is held within a pre-programmed range, the following is to be taken into account. According to column 9, line 66 to column 10, line 5 the control system of D2 operates to vary the speed of the product pump and change the rate of flow and pressure on the liquid product supplied by the pump to the spray bar system, and according to column 10, line 64 to column 11, line 2 of D2 the spray bar system utilises plural spray bars. The flow of liquid product to the several spray bars is controlled by the product flow meter in a manner to maintain the spray bar pressure generally within a preselected pressure range at which the spray nozzles are operative to uniformly spread the product over the spread width.

The person skilled in the art knows that there is a specific pressure range within which each nozzle works properly, i.e. with consistent droplet size. Therefore, it is self-evident to the person skilled in the art to use as control parameter the pressure, especially due to the information in column 5, lines 56 to 59, where it is stated that overspraying or underspraying has to be avoided, i.e. it has to be avoided that a single spray bar is working close to the minimum or maximum pressure limits P1, P2. According to the above-mentioned passage of D2 liquid product is allowed into

an additional spray bar so that the working pressure within each single spray bar remains within an optimum subrange, said last having its limits lying far enough from the above-mentioned limits P1, P2.

In order to improve control, a pressure control system is not only the more accurate one but also the easiest way of doing so, by using simple pressure sensors at the main line and the spray bars. It follows automatically that in that case appropriate pressure limit values have to be pre-programmed in the control system in order to allow the controlling of the pressure within the spray bars so that a spray of substantially consistent droplet size is produced.

First auxiliary request - Inventive step, Article 56 EPC

In column 3, lines 38 to 57 of D2 it is not only described, that the spray density is held constant as velocity changes, but also that the required spray density can be adjusted in many ways. Thus the control system of D2 responds to the changes of the required spray density. If the device is moved, then it is compelled that the output quantity of the fluid has to vary depending on location. Therefore, the additional feature of claim 1 is also known from D2.

Reasons for the Decision

1. *Main request - Inventive step, Article 56 EPC*

1.1 It is uncontested that features 1.1 to 1.5 and 1.9 to 1.12 are known from D2.

1.2 In column 4, lines 4 to 14 of D2 it is stated that when the nozzle pressure is less than about 5 to 10 psi the liquid product tends to merely run out of the nozzle without producing a satisfactory spray pattern for uniformly distributing the product across the spread width. At high pressures problems by atomizing of the liquid product occur, i.e. the production of a spray having too fine particles. In order to provide the capability of working within a very wide range of flow rates and at the same time to avoid the above mentioned problems due to the production of either too big or too small droplet size a minimum and maximum pressure limits P1 and P2 for the pressures within each one of the spray bars 20, 21, 22 have been predetermined, i.e. preset in D2, see the paragraph bridging columns 4 and 5. This means that due to the fact that the pressure of each individual spray bar 20, 21, 22 provided at the corresponding nozzles 23, 24, 25 varies within the predetermined range of P1 and P2. Thus droplets which are neither too large (simply running out without producing a satisfactory spray pattern) nor too small (atomizing the liquid product) are produced. This means that the size of droplets produced by each nozzle varies also within predetermined limits as far as the pressure applied to the individual spray bar varies within said predetermined limits, i.e. the droplet size is neither too big nor too small.

In claim 1 neither a specific (average) droplet size nor a deviation factor from such average droplet size are mentioned. Therefore, also the spray of droplets

produced at the nozzles of the apparatus of D2, kept between the two extremes (too large or too small) can be considered to cover the droplet size variation allowed by the expression used in claim 1 of a "substantially consistent droplet size".
Therefore, each normal functioning nozzle in D2 is capable of producing spray of substantially consistent droplet size over a predetermined range of volume flow rates at a corresponding predetermined range (P1-P2) of supply pressures.

For that reason the Board finds that features 1.6 to 1.8 of claim 1 are also known from D2.

1.3 As far as it concerns the feature 1.15 the appellant argues that it is "not contested that it is possible to provide an arrangement of nozzles and an associated control system that will provide a fourfold change in volumetric flow rate. What is not disclosed in D2 or elsewhere is a system that allows for a fourfold change in flow rate to be provided automatically so that the spread density can be varied while the spray system is being driven around a field, while at the same time maintaining a desired consistency of droplet size".

1.4 Firstly, a system that allows for a fourfold change in flow rate **to be provided automatically** so that **the spread density can be varied while the spray system is being driven around a field**, while at the same time maintaining a **desired** consistency of droplet size, is as such not claimed in claim 1. Secondly, according to column 4, line 4 to column 5, line 4 of D2 and as it is discussed under point 1.2 above, the nozzles of the apparatus known from D2 and accordingly the apparatus

itself working within a predetermined range of volume flow rates and thus operating within the corresponding predetermined range of supply pressures (P1, P2) are capable of providing a spray of (substantially) consistent droplet size. In column 7, lines 33 to 38 it is described that the spray bar 20 sprays liquid at flow rates in a range for R1 from about 7 GPM up to about 28 GPM. This means that by using the spray bar 20 once at 7 GPM and once at 28 GPM the apparatus is capable of providing a fourfold change in volume flow rate of its total spray output at consistent droplet size.

Feature 1.15 is therefore also known from D2.

1.5 The appellant does not dispute that the nozzles in D2 are capable of creating an essentially uniform droplet size over a prescribed range of pressures. Its contention is that D2 does not disclose a system that **controls the pressures** at the nozzles within those limits of pressure in which droplet size is maintained substantially consistent, see appellant's letter dated 2 September 2010, page 2.

1.6 The Board notes that the control system in D2 does not consist only of the flow meter 33 but that according to column 7, line 56 to column 9, line 1 it is the positive displacement type flow meter 33 which firstly measures the rate of flow of liquid product to the spray bars substantially independent of the pressure in the spray bar or the viscosity of liquid product being spread. Said flow meter operates then a flow rate sensor 34. When the flow rate measured by the flow meter is below the rate R1, an electroresponsive

actuator opens valve 32a and passes liquid product to spray bar 20, when the flow rate measured by the meter 33 is between R1 and R2 valve 32b is opened to pass liquid product to spray bar 21 and when the flow rate measured by the meter 33 is above R2 valve 32c is opened to pass liquid product to spray bar 22.

The Board finds therefore that the control variable used in D2 is the flow rate of the liquid product and not the pressure. Thus, the apparatus according to claim 1 differs from the one known from D2 in that the control system is capable of controlling **pressure** of the common feed such that each of the nozzles receives liquid at pressures only within the predetermined range of supply pressures appropriate to that nozzle, said control system being pre-programmed with said ranges (features 1.12 to 1.14). In this respect the decision under appeal is not correct.

1.7 The above mentioned differentiating features allow a more sensitive control of the liquid product feeding process within the spray bars. Even taking account of the appellant's limited interpretation of "substantially consistent droplet size", such consistent droplet size will follow from such more sensitive process control.

1.8 The Board follows the respondent's argument that in order to provide the apparatus known from D2 with a more accurate control system the person skilled in the art would use pressure control, i.e. sensors in order to measure the pressure situation within the common feed and the spray bars without exercising any inventive activity, instead of volume flow control.

As a pointer towards such a solution the skilled person finds in D2 not only the information that the spray bar pressures generally vary within a preselected pressure range, namely between a minimum pressure P1 and a maximum pressure P2, see the paragraph bridging columns 4 and 5, but also the more specific information in column 5, lines 56 to 59, that in order to avoid overspraying or underspraying at the time of transition, i.e. in order to avoid that a single spray bar has to work too close to the minimum or maximum pressure limits (P1, P2), instead one or even two additional spray bars is/are added to/shut-off from the system. The result is that the working pressure within each single spray bar lies within a more optimum subrange, said last having limits lying far enough from the above-mentioned limits P1, P2. The result is that the undesired effects of overspraying (atomizing) or underspraying (run out) are even better prevented, thus approaching in any case a more "consistent" droplet size. According to D2 the critical situation, especially in respect of the maximum limit P2, is avoided by switching on, at an early operational stage, an additional spray bar.

It is, however, obvious to the skilled person that the optimal way of controlling this is by direct controlling of the pressure instead of using the flow rate as control parameter. In order to control the pressure it is evident that a sensor in the common feed is to be installed and that the system takes account of the predetermined pressure ranges at which the different lines of nozzles operate, i.e. they have to be defined and fed (= pre-programmed) into the control

system so that it will become able to perform its control function. This is application of normal design skills in the control of spraying apparatus. In this manner the skilled person will arrive at an apparatus also including features 1.12 to 1.14 without the need of exercising an inventive activity.

1.9 Therefore, the subject-matter of said claim does not involve an inventive step and the requirements of Article 56 EPC are not met.

2. *Auxiliary request - Inventive step, Article 56 EPC*

2.1 Claim 1 according to the first auxiliary request has the additional feature that the control system is "responsive to variations in a required spraying rate to vary an amount of liquid sprayed from place to place as the apparatus is moved".

2.2 The Board agrees with the appellant that in D2, the preset value of the spread density may be adjusted from one preset value to another, but, once set, the spread density is maintained at that setting. The flow rate and thus the spray rate is adjusted as the vehicle's speed changes in order to maintain the pre-set spread density.

2.3 The Board considers, however, that the expression used in claim 1 "from place to place" encompasses at least two different situations. According to the first situation, the spraying vehicle known from D2 moves from one location to a different one within the same field. Depending on the morphology of the field, i.e. having steep or flat areas, there may be the need of a

variation of the velocity of the vehicle causing automatically an adaptation, i.e. a variation of the spraying rate in order to maintain the pre-set spread density for the field to be treated. Accordingly, the control system of the spraying vehicle of D2 is responsive to variations in a required spraying rate to vary an amount of liquid sprayed from place to place as the apparatus is moved within such a field in order to maintain the pre-set spread density.

According to a second situation, the spraying vehicle known from D2 is spraying first in one field (first place) having a first agricultural product and then in another field (second place) having a second, different agricultural product. For the first field a first specific spread density for the first product and a first substantially constant vehicle velocity are set. For the second field a different, second specific spread density for that product and a second substantially constant vehicle velocity will have to be set. This means that when the vehicle changes from the first field to the second, with the control system working first at the first spraying rate and later at the second spraying rate, the control system has again to be responsive to variations of the required spraying rate varying an amount of liquid sprayed from place to place as the apparatus is moved.

Accordingly, the additional feature of claim 1 of the first auxiliary request is present in the apparatus of D2 in each one of the above mentioned situations usual for its use.

2.4 The Board cannot follow the appellant's argument that the control system of D2 does not mention a system in which the spread density is **dynamically** adjustable as the vehicle moves from location to location, since the additional feature of claim 1 according to the first auxiliary request is directed to the spraying rate, i.e. to the flow rate of the liquid product and not to the spread density. Furthermore, a **dynamic** adjustability is not required according to said claim.

From the above the Board finds that the additional feature of claim 1 according to the first auxiliary request is known from D2 and thus it cannot provide any contribution to inventive step. Therefore, the subject-matter of said claim does not involve an inventive step and the requirements of Article 56 EPC are not met for the same reasons as for claim 1 of the main request.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

G. Nachtigall H. Meinders