

United States Court of Appeals for the Federal Circuit

03-1160, -1161

THE TORO COMPANY,

Plaintiff-Cross Appellant,

v.

DEERE & COMPANY,

Defendant-Appellant.

Earl D. Reiland, Merchant & Gould P.C., of Minneapolis, Minnesota, argued for plaintiff-cross appellant. With him on the brief were Alan W. Kowalchyk and Anthony R. Zeuli.

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Appealed from: United States District Court for the District of Minnesota

Judge David S. Doty

United States Court of Appeals for the Federal Circuit

03-1160, -1161

THE TORO COMPANY,

Plaintiff-Cross Appellant,

v.

DEERE & COMPANY,

Defendant-Appellant.

DECIDED: January 20, 2004

Before MICHEL, LOURIE, and LINN, Circuit Judges.

MICHEL, Circuit Judge.

Toro Co. brought suit against Deere & Co., alleging infringement by Deere's RZI 700 machine of three Toro patents: U.S. Patent Nos. 5,119,744 ("744 patent"), 5,101,745 ("745 patent"), and 5,207,168 ("168 patent"). The three patents, which share a common written description, are directed at technology for lifting and fracturing soil to decrease subsurface soil density and thereby encourage turf growth. The technology involves using an apparatus with a row of adjacent nozzles that sporadically shoot concentrated jets of pressurized water or other liquid into the turf and top soil.

On various cross-motions for summary judgment, the United States District Court for the District

of Minnesota (1) granted Deere's motion for summary judgment of noninfringement of the '744 and '745 product patents, (2) granted Toro's motion for summary judgment of infringement of the '168 process patent, (3) denied Deere's motion for summary judgment of invalidity of the '168 patent, and (4) held the '168 patent "valid." The parties filed cross-appeals, and we heard argument on December 2, 2003.

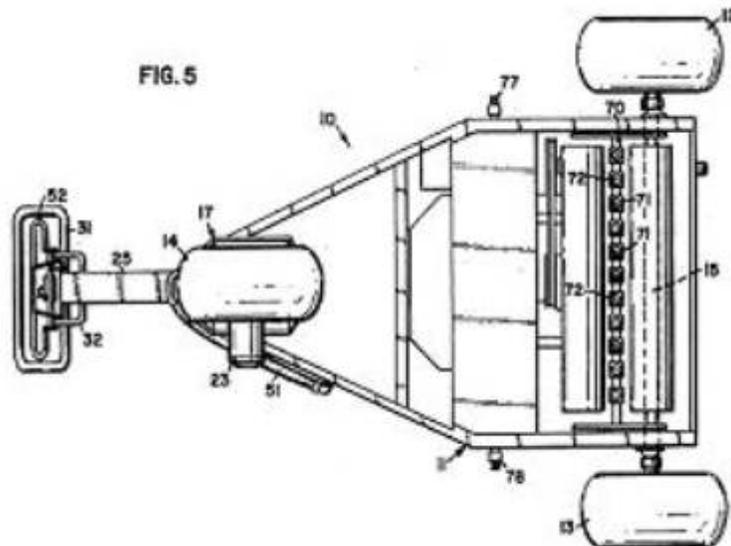
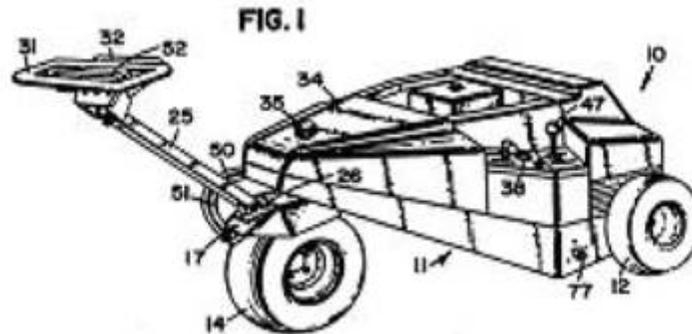
Because the district court did not construe the '168 patent and did not properly analyze inherent anticipation, and because the district court improperly foreclosed Deere from litigating its other invalidity defenses, we vacate the district court's holding that the '168 patent is "valid" and the stipulated final judgment of validity of the '168 patent. We do, however, affirm the denial of summary judgment of invalidity for anticipation and the grant of summary judgment of infringement of the '168 patent. On Toro's cross-appeal, we affirm the district court's summary judgments of noninfringement of the '744 and '745 patents. We remand for further proceedings on claim construction, anticipation, and Deere's other invalidity defenses with respect to the '168 patent.

BACKGROUND

The abstract of the written description common to the three patents-in-suit summarizes the disclosed technology:

A method and apparatus for treating turf to reduce the general soil density in which turfgrass grow and thus promote turf growth and turf drainage which includes injecting through the turf into the soil a pattern of jets of generally incompressible liquid at a jet pressure and jet spacing to provide a lateral dispersion of the liquid within the soil such that the liquid dispersion from adjacent jets coact with one another to lift and fracture the soil. A plurality of small diameter nozzles are mounted on a movable frame generally traverse to the direction of travel of the frame. A pressurized fluid source is mounted on the frame and connected through a control device to the nozzles. The control device control [sic] the flow of liquid from the pressure source to the nozzles to produce periodic, relatively small cross-sectional, slugs, or jets, of liquid from the nozzles through the turf into the soil. The pressure on each slug of liquid is such that the liquid penetrates through the turf into the soil and also disperses generally laterally within the soil. The spacing of the nozzles and the speed of travel of the frame are such the lateral dispersion of each slug of liquid coacts with adjacent slugs to lift and fracture the soil, thereby reducing the compaction, or general density, of the soil and promoting turf growth and drainage.

The below diagrams depict side and bottom views of a preferred embodiment, with nozzles at 71 and nozzle output ports at 72:



In describing preferred embodiments, the written description sets out certain numerical ranges for particular operational parameters, including: valve opening and closing times (*i.e.*, the periods in which liquid is fired from the nozzles) of “from 0.007 to 0.065 seconds,” ’168 patent, col. 8, l. 39; [1] lateral spacing between nozzles of “3 inches, 4 inches, 5 inches or any multiples thereof,” *id.* at col. 10,

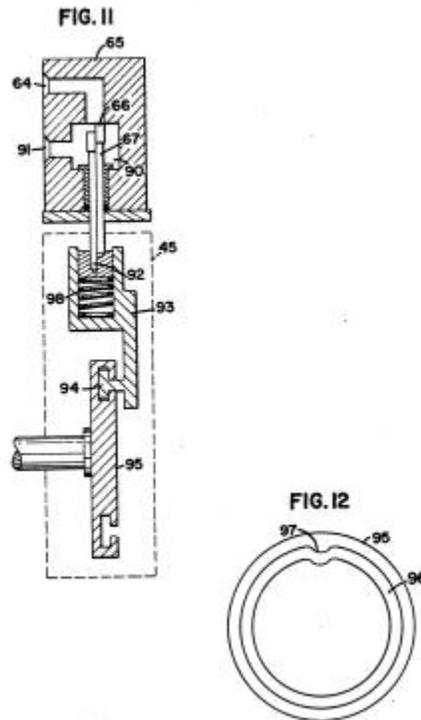
ll. 63-64; liquid pressure of “equal to and preferably greater than 2300 psi with a pressure of approximately 5000 psi being preferred,” id. at col. 10, ll. 45-46; and distance from the nozzles to the surface of the turf of “from .50 to 5 inches with the preferable spacing being between 0.50 and 1.50 inches” when the “system pressure [is at] approximately 5000 psi,” id. at col. 10, ll. 4-8. Precise numerical ranges are only discussed in the written description with respect to particular preferred embodiments; the abstract and summary of the invention describe features of the invention (e.g., pressurized liquid), but do not limit these features to particular numerical ranges.

As for the type of liquid, the written description states:

While I specifically described the use of water in practicing my invention, it will be understood by those skilled in the art that any substantially incompressible liquid, such as incompressible liquid fertilizers or weed killers, may be used. The important factor is that the liquid have sufficient incompressibility so that the injection pressure and jet spacing provides the turf penetration and lateral dispersion necessary to accomplish the lifting and fracturing of the soil to significantly reduce the general soil density.

Id. at col. 11, ll. 18-27 (emphasis added).

The written description details a single mechanism for controlling the opening and closing of the valve: a cam-based system. Figures 11 and 12 depict the control mechanism:



The accompanying text states in part:

Slide mechanism 93 has a cam follower 94 which rides in a cam 95, the track 96 of which is shown in vertical plan view in FIG. 12. As shown, the cam track 96 has a cam follower actuator 97 which moves the slide mechanism in a downward direction (as shown in FIG. 11) with each revolution of the cam 95. The downward movement of the slide mechanism 93 pulls the valve stem 67 away from the output port 66 and allows the high pressure liquid from the fluid conduit 63 to enter the valve chamber 90 and exit out of the output connection 91 into the discharge tube 68 and ultimately through the output ports 72 of the nozzles 71. While only one cam follower actuator 97 is shown in FIG. 11, is [sic] will be understood by those skilled in the art the [sic] several such cam follower actuators can be included in the cam track 96 to provide any desired timing of the metering valve 65 at any rotational speed consistent with value [sic] opening and closing times of from 0.007 to 0.065 seconds.

Id. at col. 8, ll. 21-39.

DISCUSSION

In reviewing the district court's rulings, we divide our analysis by patent.

I. '168 Patent

Toro asserted only claim 1 of the '168 patent, which states:

1. A turf treating method comprising:
 - (a) creating a source of relatively high pressure incompressible liquid,
 - (b) periodically injecting jets of said incompressible liquid from above said turf through the turf into soil below the turf at a pressure that will cause a lateral dispersion of the liquid within said soil,
 - (c) moving said source of incompressible liquid over the surface of said turf in a pattern such that the lateral dispersion from adjacent jets coact with one another to lift and fracture the soil and reduce the general soil density.

Id. at col. 12, ll. 4-15.

A. Invalidity

1. Deere's Arguments and the District Court's Analysis

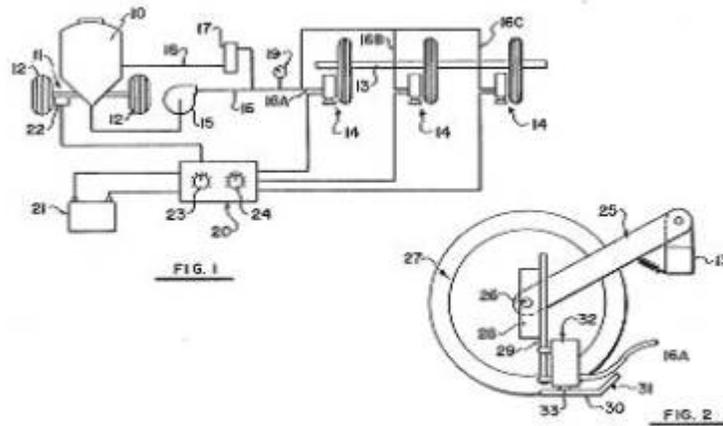
Deere moved for summary judgment that claim 1 of the '168 patent is invalid as anticipated by U.S. Patent No. 4,907,516 ("516 patent"), issued in 1990 to Ramon B. Rogers (who later designed the RZI 700, the accused device). The '516 patent claims both a method and a product for "pulsed injection into the ground of liquid fertilizer." According to the written description, the invention

provide[s] a method of applying a crop treatment liquid into the ground for accessibility by a crop on the ground, the method comprising supplying the liquid in a container, transporting the container across the ground, pumping liquid from the container to an injection nozzle under high pressure, mounting the nozzle for movement across the ground at a substantially constant height closely adjacent the ground with the nozzle arranged in a direction to inject the liquid downwardly into the ground, passing the liquid through an orifice in the nozzle to generate a high velocity solid stream jet of the liquid such that the liquid is driven into the ground to a depth below the surface of the ground, and controlling the flow of liquid from the pump to the nozzle such that the liquid flow is cyclically halted and restarted to generate spaced pulses of the liquid.

'516 patent, col. 2, ll. 9-25.

Although this passage speaks of a singular "injection nozzle," the written description elsewhere describes a preferred embodiment with a row of adjacent injector heads, similar to the row of nozzles disclosed in the preferred embodiment of the '168 patent. See, e.g., id. at fig. 1 and col. 3, ll. 45-47 (depicting and describing "a tool bar 13 upon which is mounted a plurality of injector heads"). Figure 1 below is a schematic illustration of a preferred embodiment of the '516 patent, with injector heads at 14;

figure 2 is a “side elevational view of one of the injecting heads” of figure 1. Id. at col. 3, ll. 31-32.



In describing preferred embodiments, the '516 written description sets out certain numerical ranges for particular operational parameters, including: valve opening times of “less than 5.7 milliseconds,” id. at col. 5, l. 55; lateral spacing between nozzles of “4 to 30 inches,” id. at col. 5, l. 49; liquid pressure “on the order of 6000 psi,” id. at col. 3, l. 52; and distance from the nozzles to the surface of the ground of “approximately 1/4 inch,” id. at col. 5, l. 21. Precise numerical ranges are only discussed in the written description with respect to particular preferred embodiments; the abstract and summary of the invention describe features of the invention (e.g., pressurized liquid), but do not limit these features to particular numerical ranges.

Toro concedes that the '516 patent expressly discloses limitations (a), “creating a source of relatively high pressure incompressible liquid,” and (b), “periodically injecting jets of said incompressible liquid from above said turf,” of claim 1 in the '168 patent. At summary judgment, Deere did not argue that the '516 patent expressly discloses limitation (c), “moving said source of incompressible liquid over the surface of said turf in a pattern such that the lateral dispersion from adjacent jets coact with one another to lift and fracture the soil and reduce the general soil density.” Instead, Deere contended -- and continues to argue on appeal -- that the '516 patent inherently discloses limitation (c).

In support of its inherent anticipation argument, Deere points to the overlap of ranges for liquid pressure and lateral spacing between nozzles in '516 and '168 preferred embodiments. Compare '516 patent, col. 3, l. 52, col. 5, l. 49 (describing embodiments with liquid pressure “of the order of 6000 PSI” and lateral spacing between nozzles of “in the range of 4 to 30 inches”), with '168 patent, col. 10, ll. 45, 63-64 (describing embodiments with liquid pressure of “equal to and preferably greater than 2300 psi” and lateral spacing between nozzles of “3 inches, 4 inches, 5 inches or any multiples thereof”). Deere asserts that the '168 patent's written description teaches that an apparatus whose operational parameters for pressure and spacing fall within the specified ranges will necessarily result in lifting and fracturing of soil and reduction of soil density, and that therefore the invention of the '516 patent inherently results in lifting and fracturing of soil and reduction of soil density.

Toro responds that the '516 patent does not teach, recognize, or even suggest lifting and fracturing of soil -- to the contrary, certain statements in the written description indicate that the inventor believed the '516 apparatus would avoid or at least minimize soil disturbance. See, e.g., '516 patent, col. 2, ll. 47-49 (stating that the advantages of the '516 invention include “[n]o soil disturbance”). Moreover, Toro contends that Deere fails to recognize certain operational parameters that play a key role in lifting and fracturing soil and reducing soil density, such as the duration of the period in which the valve is open and liquid is projected from the nozzles. As to these other features, Toro argues, the stated ranges of the parameters for embodiments in the two patents do not overlap, and therefore inherent anticipation cannot be shown. Compare '516 patent, col. 5, l. 55 (describing embodiments with valve openings of “less than 5.7 milliseconds,” i.e., less than 0.0057 seconds), with '168 patent, col. 8, ll. 38-39 (describing embodiments with valve openings of “from 0.007 to 0.065 seconds”).

The district court rejected Deere's inherent-anticipation argument, stating:

The court concludes that no reasonable factfinder could find that one of skill in the art would discern from the '516 patent the unique combination of all of the necessary parameters to produce the aeration method claimed in the '168 patent. In other words, the '516 patent does not inherently “read on” or teach the parameters necessary to produce the pattern needed to create the method of aeration claimed in the '168 patent. The '516 patent does not thus anticipate the '168 patent. The '168 patent is valid.

Toro Co. v. Deere & Co., No. 99-725, slip op. at 11 (D. Minn. June 12, 2001).

2. Our Review of the District Court's Analysis

We discern several errors in the district court's analysis:

First, the district court never expressly construed limitation (c) of the '168 patent. The analysis of anticipation should have begun by construing limitation (c), to guide the analysis of the allegedly anticipating prior-art reference. See, e.g., Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc., 344 F.3d 1186, 1195 n.4 (Fed Cir. 2003) ("Before the factual question of anticipation may be addressed, a court must first properly construe the claims before it."). The lack of claim construction leaves unclear the precise scope of limitation (c), and as a result, it is impossible to know exactly what the '516 patent must disclose if it is to anticipate inherently limitation (c).

Indeed, the district court seems to have suggested contradictory constructions for claim 1. At one point in its opinion, the district court stated that "[t]he parties concede that the '168 patent raises no real claim construction issues and as such the terms and phrases should be given their ordinary meaning," without defining these ordinary meanings. Toro Co., No. 99-725, slip op. at 7. Later in its opinion, the district court stated that the accused device "uses all of the requisite parameters taught by claim 1 of the '168 patent. In particular, the undisputed record indicates that defendant's device copies the nozzle spacing, height of the nozzles, system pressure, duration of shot times, speed of machine, and use of an accumulator." Id. at 11. This apparent incorporation of specific operational features runs counter to the district court's purported "ordinary meaning" approach to claim 1, as there is no evidence that one ordinarily skilled in the art would interpret the ordinary meaning of the claim language as requiring all of these features. Moreover, to the extent the district court implicitly incorporated specific numerical parameters from the preferred embodiments -- and thereby effectively limited the claim to the preferred embodiments -- the district court failed to articulate a justification for such a narrow construction. See, e.g., Vulcan Eng'g Co., Inc. v. FATA Aluminum, Inc., 278 F.3d 1366, 1376 (Fed. Cir. 2002) ("This court has often explained that the claims are construed in light of the specification, and

are not limited to a designated ‘preferred embodiment’ unless the embodiment is in fact the entire invention presented by the patentee.”).

While it seems likely to us that at least some operational features must be considered part of limitation (c), we cannot on this record provide a definitive list of such features for purposes of claim construction; for example, it is unclear whether an accumulator is technically necessary to perform the claimed soil-fracturing function. Nor can we say on this record that one of ordinary skill would regard the ’168 preferred embodiments as the entire invention, such that numerical parameters from the preferred embodiments must be incorporated into the claims. Where, as here, claim construction cannot be resolved on the appellate record, we must remand claim construction to the district court, which can receive additional evidence to guide the claim-construction analysis.

Second, the district court did not address a critical question for inherent anticipation: whether, as a matter of fact, practicing the ’516 invention necessarily featured or resulted in limitation (c) of the ’168 patent. See, e.g., Schering Corp. v. Geneva Pharm., Inc., 339 F.3d 1373, 1377 (Fed. Cir. 2003) (“[A] prior art reference may anticipate without disclosing a feature of the claimed invention if that characteristic is necessarily present, or inherent, in the single anticipating reference.”). Given that inherent anticipation of limitation (c) was before the court on Deere’s motion for summary judgment, the district court should have determined whether Deere had demonstrated that no genuine issue exists as to the ’516 invention necessarily featuring or resulting in the properly-construed limitation (c).

Although the district court did not address this issue, and although the district court did not properly construe limitation (c), we nonetheless hold that Deere failed to make the requisite factual showing for summary judgment of inherent anticipation. Deere did not present any direct evidence of the necessary features or results of ’516 embodiments, such as testing results. Instead, Deere argued that if ’168 embodiments necessarily performed the function of limitation (c), then at least some ’516 embodiments must also necessarily perform that function, given the partial overlap in the numerical ranges of the parameters for liquid pressure and lateral nozzle spacing. But several other parameters besides liquid pressure and lateral nozzle spacing are recited in the two patents, such that on this record

the numerical overlaps identified by Deere fail to demonstrate that no genuine issue exists as to '516 embodiments necessarily performing the function of limitation (c). For that reason, we affirm the denial of summary judgment of invalidity.

Third, the district court stated that “[t]o prove anticipation when the prior art reference is silent about the asserted inherent characteristic, it must be clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by one of ordinary skill in the art.” Toro Co., No. 99-725, slip op. at 10 (emphasis added). If the district court meant that Rogers or other artisans at the time of invention of the '516 patent must have recognized that practicing the invention would not only fertilize but lift and fracture the soil so as to reduce soil density, then the district court was incorrect. The district court cited certain of our cases, including Continental Can Co. USA, Inc. v. Monsanto Co., 948 F.2d 1264 (Fed. Cir. 1991), that may have been read to suggest otherwise, but our recent decision in Schering Corp. v. Geneva Pharmaceuticals, Inc., 339 F.3d at 1377-78, has clarified any confusion on this score. Simply put, the fact that a characteristic is a necessary feature or result of a prior-art embodiment (that is itself sufficiently described and enabled) is enough for inherent anticipation, even if that fact was unknown at the time of the prior invention. See, e.g., id. at 1378; Atlas Powder Co. v. Ireco Inc., 190 F.3d 1342, 1347 (Fed. Cir. 1999) (“[T]he discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art’s functioning, does not render the old composition patentably new to the discoverer.”).

Fourth, the district court stated that “no reasonable factfinder could find that one of skill in the art would discern from the '516 patent the unique combination of all of the necessary parameters to produce the aeration method claimed in the '168 patent.” Toro Co., No. 99-725, slip op. at 11. This statement suffers from several flaws. Most important, it was made without a proper construction of limitation (c) and a corresponding factual analysis of '516 patent embodiments. As we note above, it is possible that, properly construed, limitation (c) is not restricted to the precise numerical ranges of the parameters of the '168 preferred embodiments. If so, that the '516 patent does not disclose an overlapping range for every parameter in the '168 preferred embodiments will be irrelevant; the critical question will be whether the '516 patent sufficiently describes and enables one or more embodiments --

whatever the settings of their operational features -- that necessarily include or result in the subject matter of limitation (c). The district court also seems to presuppose that the numerical ranges of the parameters of the '168 preferred embodiments are "unique" in their ability to perform the soil-fracturing function recited by limitation (c), but the current record does not suffice to demonstrate this. Finally, we stress that to the extent the district court's statement meant that one of ordinary skill needed to recognize at the time of the '516 patent the inherent characteristics or results of '516 embodiments, it was incorrect. For inherent anticipation, the '516 patent must have sufficiently described and enabled at least one embodiment that necessarily featured or resulted in the subject matter embraced by limitation (c), but neither description nor contemporaneous recognition of these necessary features or results was required.

3. Conclusion

We affirm the denial of summary judgment of invalidity based on anticipation, but vacate the court's holding that the '168 patent was "valid" and remand for further analysis of anticipation in accordance with this opinion. On remand, the district court must first construe limitation (c), to set with clarity the scope of subject matter that the '516 patent must expressly or inherently anticipate. If, after construction, inherent anticipation remains a live issue, the questions will include whether, as a matter of fact, any '516 embodiment necessarily features or results in the subject matter at issue -- notwithstanding the '516 written description listing "[n]o soil disturbance" as an advantage of the invention -- and whether the '516 patent sufficiently describes and enables such embodiment to one of skill in the art.

Finally, we reverse the district court's apparent preclusion of Deere litigating other invalidity defenses. In its opinion, the district court concluded its analysis of anticipation by stating, "The '516 patent does not thus anticipate the '168 patent. The '168 patent is valid." Toro Co., No. 99-725, slip op. at 11. This last sentence apparently foreclosed any further litigation on invalidity, despite Deere having also pled in its answer other invalidity defenses -- including obviousness and prior public use -- that it did not raise in its summary-judgment motion, and despite Toro not having moved for summary

judgment as to these other defenses. On appeal, Toro argues that Deere waived all invalidity defenses save anticipation by the '516 patent when it stipulated to final judgment to facilitate and expedite an appeal, but we have examined the stipulation and find no such waiver. To the contrary, the stipulation states that Deere “intends to appeal the decision contained in the June 12, 2001 Order that the asserted claims of the '168 patent are not anticipated under 35 U.S.C. § 102 and the Court’s holding that the claims of the '168 patent are valid.” (Emphasis added.) The district court erred by precluding Deere from litigating its other invalidity defenses. On remand, Deere may pursue all of the invalidity defenses that Deere pled in its answer.

B. Infringement

Toro moved for summary judgment that Deere’s “RZI 700” product infringed claim 1 of the '168 patent. The district court granted Toro’s motion, stating that

the undisputed record indicates that defendant’s device copies the nozzle spacing, height of the nozzles, system pressure, duration of shot times, speed of machine, and use of an accumulator [disclosed in the '168 patent]. Defendant’s own counsel acknowledges that the RZI 700 infringes the '168 patent as do defendant’s employees. The designer of the RZI 700 also directly acknowledges that the RZI 700 produces coaction that lifts and fractures the soil.

The court thus determines that the RZI literally infringes claim 1. Plaintiff is entitled to summary judgment on the infringement of the '168 patent as a matter of law.

Toro Co., No. 99-725, slip op. at 11-12 (citations omitted).

As discussed above, the district court did not construe claim 1 of the '168 patent. Although the “omission of a claim construction analysis . . . [can] provide an independent basis for remand,” Graco, Inc. v. Binks Mfg. Co., 60 F.3d 785, 791 (Fed. Cir. 1995), and although our remand on invalidity of the '168 patent will require construction of claim 1, we affirm the district court’s infringement ruling. Deere has not even attempted to show that claim 1 could be construed in a way that would exclude the '168 embodiments, and Deere has not demonstrated a genuine issue of material fact as to whether the RZI 700 practiced all of the relevant features of the '168 embodiments.

The only evidence of noninfringement Deere points to is an early draft of a report of a Toro expert, which indicated that the RZI 700 did not lift and fracture soil, at least in particular testing conducted by the expert. But even if this draft report undercut the final report of this expert, the district court did not rely on this final report. Where defendant's employees, defendant's counsel, and the designer of the RZI 700 all acknowledged infringement, and where Deere does not dispute that the accused device is in all material respects a '168 embodiment, the district court properly determined that Toro infringed claim 1 as a matter of law.

II. '744 Patent

Toro asserted two independent claims of the '744 patent: claim 1 and claim 17. We address each in turn.

A. Claim 1

Claim 1 states:

1. A turf treating machine comprising:
 - (a) a frame;
 - (b) means connected to said frame for propelling said frame over the turf to be treated;
 - (c) a plurality of fluid nozzles mounted on said frame, each of said fluid nozzles being a specified distance apart from adjacent nozzles and having an input port and an output port, the output port of each nozzle being a specified distance above said turf;
 - (d) pressurized fluid generating means mounted on said frame;
 - (e) control means connecting said pressurized fluid generating means to the input ports of each said nozzles so as to produce periodic fluid injections from the output port of each said nozzle at a system pressure sufficient, commensurate with the spacing of said nozzles, to cause said fluid to penetrate through said turf into the soil in a first direction and at the same time create a dispersion of said fluid in a direction generally outward from said first direction of penetration sufficient to coact with dispersion patterns from adjacent nozzles to lift and fracture the soil so as to reduce the general turf and turf subsoil density.

'744 patent, col. 11, ll. 42-65 (emphasis added).

Only clause (e) is at issue, in particular the language "control means connecting said pressurized fluid generating means to the input ports of each said nozzles so as to produce periodic fluid injections from the output port of each said nozzle." The district court concluded that this clause was written in means-plus-function format pursuant to 35 U.S.C. § 112 ¶ 6, with the function "involving the controlled

production of periodic fluid injections to the input ports of the individual nozzles so as to produce the periodic fluid dispersions from the output port of each nozzle.” Toro Co., No. 99-725, slip op. at 16.

The court determined that the corresponding structure

includes a mechanical cam system. This mechanical cam system drives the valve stem of the metering valve that controls and periodically allows the pressurized liquid to flow from the accumulator through the valve system. (See Patent '744, Col. 9, Lines 40-46.) It is this structure that ultimately produces and controls the dispersion of the pressurized liquid out of the nozzle output ports in a coated dispersion pattern sufficient to effect the lifting and fracturing of the soil so as to reduce sub-soil density of the turf. . . .

Since the cam structure actuates the controlling device, it is an indispensable part of the “control means” structure required by clause (e). Accordingly, the court construes the claim to include the mechanical cam system since it is a part of the structure that controls the fluid flow.

Id. at 17-18.

The district court determined that no reasonable factfinder could find that the RZI 700 infringed clause (e):

Clause (e) of claim 1 as construed includes the mechanically controlled cam system above described. It is undisputed that the RZI 700 uses an electrically operated solenoid system. The accused device therefore does not contain the same structure as disclosed in the '744 patent. The key question then is whether a reasonable trier of fact could find § 112, ¶ 6 equivalency between the mechanically operated cam system and the electrically operated solenoid system. In other words, do the two devices function identically and in a substantially similar structural way to achieve the substantially same result.

After a careful review of the record and the relevant caselaw, the court determines that no reasonable factfinder could find that the defendant’s electrically controlled solenoid system is equivalent, for purposes of a § 112 ¶ 6, to plaintiff’s mechanically controlled cam system. Although the two devices appear to perform an identical function, they do so in substantially dissimilar ways. . . .

[S]ince the court concluded above that there was no substantial similarity in the way these devices function under the § 112, ¶ 6 analysis, there is no equivalency under the doctrine of equivalents.

Id. at 23-24, 27 (citations omitted) (emphasis in original).

On appeal, Toro does not dispute that clause (e) is written in means-plus-function format, nor does it dispute that the structure corresponding to clause (e) includes the cam system. Instead, Toro contends (1) that the district court impermissibly engaged in a component-by-component analysis of

clause (e), (2) that any differences between clause (e)'s cam system and the RZI 700's solenoid system are insubstantial, and (3) that at a minimum, there are triable issues as to the extent of the differences between the cam system and the solenoid system.

The first argument is plainly incorrect. The district court explicitly stated that it had not engaged in a component-by-component analysis, but rather “ha[d] been mindful to construe the relevant claim clause to only include the overall structure corresponding to the claimed function.” *Id.* at 24 n.8. Moreover, the cam was not simply a minor component of clause (e)'s structure -- to the contrary, as the district court noted and as Toro does not dispute, it was an “indispensable” part of the structure. *Id.* at 18. To the extent the district court gave the cam greater weight in considering clause (e)'s structure as a whole, this was appropriate given the cam's central role.

Toro's second and third arguments both go to the nature of the cam and solenoid technologies. Regrettably, the district court did not spell out the differences between these technologies and the resultant differences in the competing structures as a whole; instead, the district court simply stated that the two technologies result in clause (e)'s function being accomplished in a different way.

But Toro likewise fails to articulate the technical similarities between cam and solenoid systems, or why the differences between the two systems are insubstantial, particularly with respect to the way the claimed function is performed. Toro highlights certain statements (e.g., from its expert witnesses) that cams and solenoids can be used interchangeably, but this goes to the function or result of these systems, and begs the issue of the way in which cam systems and solenoid systems actually work.

Deere, in contrast, stresses the basic technical difference between a cam system and a solenoid system: the cam system is mechanical and the solenoid system is electrical. Deere contends that this difference means the two systems accomplish clause (e)'s function in fundamentally different ways. The cam system uses a metal “cam follower” that travels up the slope of the cam, lifting a valve stem to open the liquid valve. The solenoid system uses electricity to create a magnetic force that pulls open the liquid valve.

We agree with Deere that the solenoid system performs the claimed function in a substantially different way than the cam system. For this reason, no reasonable factfinder could find Deere's system equivalent -- either under § 112 ¶ 6 or under the doctrine of equivalents -- to the cam system of clause (e). See Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc., 145 F.3d 1303, 1311 (Fed. Cir. 1998) (finding no infringement under either § 112 ¶ 6 or the doctrine of equivalents because the accused device operated in a "substantially different way").

B. Claim 17

Claim 17 states:

17. A turf treating machine comprising:

(a) a frame;

(b) a drive mechanism connected to said frame for moving said frame in a given direction, and at a controlled speed, over the turf to be treated;

(c) a plurality of fluid nozzles operatively connected to said frame a specified distance apart from adjacent nozzles, each of said nozzles having an input and an output;

(d) a pressurized source of generally incompressible liquid operatively connected to said frame, said pressurized source having an output;

(e) a valve having an input and an output;

(f) a fluid conduit mechanism connected between the output of said pressurized source of generally incompressible liquid and the input of said valve;

(g) a fluid conduit connected between the output of said valve and the inputs of each of said plurality of fluid nozzles;

(h) control mechanism for controlling the operation of said valve and the movement of said frame over the turf to be treated such that the valve periodically releases high pressure jets of generally incompressible liquid from the output of the nozzles at an output pressure commensurate with the speed of the frame over the turf and the spacing of said nozzles so that said jets of liquid penetrate through the turf into the soil such that the dispersion pattern from the output of each nozzle in the soil generally coacts with the dispersion pattern of adjacent nozzles so as to lift and fracture the soil and reduce the general turf and turf subsoil density.

'744 patent, col. 13, ll. 29-60 (emphasis added).

The parties have disagreed as to the proper constructions of multiple clauses of claim 17, both at the district court and on appeal, but we need reach only clause (h). The district court rejected Deere's argument that clause (h) was written in means-plus-function format and should be construed as

corresponding to the same structure as clause (e) of claim 1; the district court stated that “clause (h) does not disclose a function nor fails to disclose sufficient structure.” Toro Co., No. 99-725, slip op. at 20.

We disagree with the district court, as clause (h) discloses a function for a “control mechanism” but does not provide sufficient structural description of this mechanism. We conclude that the “control mechanism,” like the “control means” of claim 1’s clause (e), is subject to § 112 ¶ 6, and must be limited to a structure that includes a cam system. Indeed, while Toro argues clause (h) is not written in means-plus-function format, it does not dispute that were it construed as a means-plus-function clause the corresponding structure would include the cam system. As discussed above with regard to clause (e) of claim 1, no reasonable factfinder could find Deere’s solenoid system equivalent -- either under § 112 ¶ 6 or under the doctrine of equivalents -- to a cam system, and we can thus affirm the district court’s judgment of noninfringement of claim 17 on this ground alone.^[2]

III. ’745 Patent

Only claim 1 of the ’745 patent is at issue. The claim states:

1. An apparatus for cultivating turf by hydraulic action, comprising:

(a) a frame;

(b) means operatively connected to said frame for propelling said apparatus over the turf to be cultivated;

(c) a plurality of fluid nozzles operatively connected to said frame, each of said nozzles having inlet and outlet ports, each of said nozzle outlet ports having a cross-sectional area and said nozzle outlet ports having a diameter of from about 0.033 to about 0.090 inch;

(d) means for pressurizing liquid operatively connected to said frame, said nozzles in fluid communication with said pressurizing means, said pressurizing means, having suitable flow on and flow off duration times, providing a flow of liquid from about 2,300 psi to about 5,500 psi;

(e) means for providing a source of liquid to be in fluid communication with said pressurizing means;

(f) means for controlling flow of the liquid from said pressurizing means to said inlet ports, whereby the liquid exits said outlet ports at a pressure sufficient to cause the liquid to penetrate the turf and create cultivation holes;

(g) a manifold having an elongate bore, said manifold having an inlet in fluid communication with said pressurizing means and said nozzles in fluid communication with said bore; and

(h) the cross-sectional area of the bore is sized in relationship to the pressure and an

accumulation of the cross-sectional area of the nozzle outlet ports, wherein a water hammer effect is created which is sufficient to effect the flow of liquid out of the nozzles more in the order of a square wave pulse and the water hammer effect is not enough to destroy the manifold, wherein the relationship of the pressure in pounds per square inch, cross-sectional area of the bore and the accumulated area of the outlet ports of the of the nozzles is given by the following:

[equation omitted]

wherein the constant K is between 0.2 to 1.4.

'745 patent, col. 17, ll. 36-68, col. 18, ll. 1-12 (emphasis added).

We need reach only clause (d). The district court concluded that this clause was written in means-plus-function format, and determined that the corresponding structure included a cam system. On appeal, Toro concedes that clause (d) is a “means-plus-function clause” and states that “[t]o generate the suitable ‘flow on and flow off duration times’ [recited by clause (d)], Toro agrees that the specification identifies a mechanical cam to perform this function.” Toro argues that “it is still a factual question as to whether the solenoid-actuated valve used by Deere is an equivalent.” We disagree, for the reasons set out above. We affirm the district court’s ruling of noninfringement of the ’745 patent.

AFFIRMED-IN-PART, VACATED-IN-PART, AND REMANDED.

COSTS

No costs.

[1] For simplicity we cite to the ’168 written description column and line numbers, but the identical text can be found in the ’744 and ’745 patents.

[2] We do not reach the district court’s analysis of clause (b), upon which it based its holding of noninfringement of claim 17.