United States Court of Appeals for the Federal Circuit

04-1501

SPACE SYSTEMS/LORAL, INC.,

Plaintiff-Appellant,

v.

LOCKHEED MARTIN CORPORATION,

Defendant-Appellee.

Gregory S. Dovel, Dovel & Luner, LLP, of Santa Monica, California, argued for plaintiff-appellant. With him on the brief was Sean A. Luner. Of counsel on the brief was David E. Rosen, Murphy Rosen & Cohen, LLP, of Santa Monica, California.

Edward V. Filardi, Skadden, Arps, Slate, Meagher & Flom LLP, of New York, New York, argued for defendant-appellee. With him on the brief were Robert B. Smith and Douglas R. Nemec. Of counsel was P. Anthony Sammi.

Appealed from: United States District Court for the Northern District of California

Judge Susan Illston

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04-1501

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DECIDED: April 20, 2005

Before MICHEL, Chief Judge, NEWMAN and GAJARSA, Circuit Judges.

NEWMAN, Circuit Judge.

Space Systems/Loral, Inc. ("Loral") appeals the decision of the United States District Court for the Northern District of California,[1] holding that claim 1 of United States Patent

1 Space Systems/Loral, Inc. v. Lockheed Martin Corp., No. C-96-3418 SI (N.D. Cal. Mar. 19, 2003). On remand, see Space Systems/Loral, Inc. v. Lockheed Martin Corp., 271 F.3d 1076, 1077-78 (Fed. Cir. 2001).

No. 4,537,375 ("the '375 patent") is invalid for violating the written description requirement of 35 U.S.C. §112. We reverse the judgment of invalidity.

OPINION

For the grant of summary judgment of invalidity on written description grounds, failure of compliance must be shown as a matter of law, or as a question of ultimate fact even when any disputed facts and factual inferences are resolved against the movant. See Fed. R. Civ. P. 56(c) ("The judgment shall be rendered forthwith if...there is no genuine issue of material fact and...the moving party is entitled to judgment as a matter of law.")

The written description requirement derives from 35 U.S.C. §112 ¶1, which states:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The written description is the technologic disclosure of the invention. It serves the fundamental patent purpose of making known what has been invented, including any variations and alternatives contemplated by the inventor. The descriptive text shows that the inventor possessed the technologic information for which exclusivity is claimed, and discloses the invention to the public. Purdue Pharma L.P. v. Faulding, Inc., 230 F.3d 1320, 1323 (Fed. Cir. 2000); Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991). The written description, although it need not include information that is already known and available to the experienced public, must be in sufficient detail to satisfy the statutory requirements, employing "[w]ords, structures, figures, diagrams, formulas, etc., that fully set

forth the claimed invention." Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1572 (Fed. Cir. 1997).

Loral is the owner of the '375 patent for an improved method of maintaining the orientation and attitude of a satellite in space. Satellites in orbit around the earth tend to be pulled out of their proper position by the gravitational effects of the sun, earth, and moon. To maintain the requisite position the satellite conducts "station-keeping maneuvers" by firing its thrusters, based upon measurements of its position. However, the station-keeping maneuvers may over-correct or may introduce new errors in position and orientation, and the general procedure has been to conduct a second firing to correct the errors of the first firing. These procedures require fuel, the on-board supply of which is limited, and limits the useful life of the satellite. The '375 patent is directed to a method of reducing the fuel consumption during station-keeping, by enhancing the efficiency of the corrective procedure.

According to the '375 patent, the satellite first estimates the probable correction based on historical data from prior station-keeping maneuvers, and conducts a first firing of the thrusters based on the estimated correction. This is called the "prebias" step of the modulating response. After the prebias firing, the satellite measures the remaining actual error in its position, adds the actual error to the historical error, and conducts a second firing. This procedure overall uses less fuel than the prior method whereby a first firing was calculated to attempt full correction, followed by a second firing. The fuel saving that is achieved extends the life of the satellite. This two-step maneuver is set forth in claim 1 as follows:

> 1. For use in a spacecraft during a change in velocity maneuver, the spacecraft employing a plurality of thrusters, at least a first thruster and a second thruster being disposed to develop mutually counteractive moment arms of thrust relative to at least one axis through a center of mass of the spacecraft, said first thruster and said second thruster being capable of developing unequal moment arms of force, a method for counteracting disturbance transients comprising the steps of:
>
> storing prior to said maneuver a value representative of an estimated disturbance torque; thereafter
>
> modulating in response to said stored value one of said first and second thrusters during said maneuver to counteract an actual disturbance torque a sufficient amount to compensate for said actual disturbance torque in order to minimize a net position error without initially detecting said net position error; thereafter
>
> detecting said net position error, said net position error being indicative of a difference between said estimated disturbance torque and said actual disturbance torque with respect to said axis; and thereafter modulating in response to a sum of said stored value and said net position error one of said first and second thrusters during said maneuver to counteract said actual disturbance torque to further minimize said net position error.

Loral brought suit against Lockheed for infringement of claim 1. Lockheed moved for summary judgment that the patent is invalid for failure to comply with the written description requirement of 35 U.S.C. §112, arguing that the specification does not adequately describe the second step in which the satellite calculates the position after the first firing and performs the second firing of the thrusters. The district court adopted Lockheed's position. We conclude that this was error. Indeed, even Lockheed's expert conceded that the second step was shown in the specification.

The specification describes that preparatory to correction the satellite first measures its orientation with a roll earth sensor and a pitch earth sensor. '375 Patent, col. 4, lines 49-53. The roll and pitch sensors provide position and rate information. Id. This information is passed through a lowpass filter to minimize noise in the signal. Col. 5, lines 32-36. The

filtered position and rate information are summed and passed through compensation networks which compensate for the delay between the sensing of the error and the correction of the error. Col. 5, lines 45-55. This information is then filtered to determine if it falls outside of acceptable limits of position error, col. 5, lines 55-58, and then is amplified. Col. 5, lines 62-65. This is the actual error after it has been filtered. The roll sensor information is also fed through a roll error detector, Item 108 of Figure 2A, which is transformed through bias memory into prebias or historical error. Col. 6, lines 4-13, 28-30.

The actual error information and the prebias or historical error information are both fed into the summer, Item 96 of Figure 2B, where they are added together or summed. Col. 5, lines 61-64; col. 6, lines 31-35. These are the two outputs of the error detection system used to modulate the thrusters; the prebias information is fed directly into the pulse-width, pulse frequency (PWPF) modulating devices, col. 6, lines 30-35, and the sum of the actual and historical error from Item 96 is also fed into the PWPF modulating devices. Id. Thus the thrusters are modulated by both the historical (prebias) information and by the sum of the actual and historical information.

It is not disputed that the first modulating step is described. In addition, the experts for both sides testified that Figure 2B describes the second modulating step. Loral's expert, Dr. Kaplan, testified that

> the control loop diagrams of Figures 2A and 2B of the '375 Patent would make it clear to one of ordinary skill that the disclosed invention incorporates two modulating steps, one with the prebias value but without net position error as an input, and a second where detected net position error would be fed through the feedback network for summing with the prebias value.

Lockheed's expert, Dr. Alfriend, when asked to identify where the second step was depicted on Figure 2A and 2B, answered over his counsel's objection,

> Well, its -- I sort of look at it as the whole system, but if you look at summer 96 . . . that's where the stored value and the position error are being summed to go into the PWPF which then sends the commands to the thrusters.

The deposition shows that Dr. Alfriend was referring to Item 96 ("summer 96") of Figure 2B. Item 96 takes the sum of Item 134, the historical error or pre-bias command, col. 6, lines 31-35, and Item 90, at col. 5, lines 61-64, which represents the actual error of the satellite position, Item 36, col. 4, lines 49-53, after it has been filtered at Items 48, 72, 78, and 84. Col. 5, lines 33, 45-60; Figures 2A, 2B (mapping sequence).

Lockheed criticizes Dr. Kaplan's testimony as "conclusory." However, Dr. Kaplan not only gave his expert opinion, but also was quite specific in pointing to the "control loop diagrams of Figures 2A and 2B" as showing two modulating steps. He explained that only after the firing maneuver starts does net position error exist. Dr. Kaplan explained in laymen's terms that net position error is summed with the prebias error and then taken into account in the modulation of the thrusters for firing. He pointed to the control loop diagrams, and explained that the actual error is added to the historical error for modulation of thruster firing. See col. 5, lines 61-64; col. 6, lines 31-35; Figure 2B (demonstrating summation of actual and historical error at item 96).

Dr. Alfriend in cross-examination had admitted that a person of ordinary skill in this field of science would locate the second step at Item 96 on Figure 2B. As discussed supra, Figure 2B graphically shows the summation of actual and historical error at Item 96, as is described in the patent. Item 96 represents the sum of the historical error or prebias command of Item 134, col. 6, lines 31-35, and the actual error of Item 36, col. 4, lines 49-53, upon filtration, col. 5, lines 33, 45-60, into Item 90. Col. 5, lines 61-64; col. 6, lines 31-35.

Lockheed objects to Loral's use of Dr. Alfriend's deposition to support Loral's argument. First, Lockheed points out that it objected to the question that asked Dr. Alfriend for the location in the specification of the second modulating step. However, Dr. Alfriend in his answer not only admitted that a second step was shown but identified it as Item 96. Second, Lockheed objects that Loral did not offer this part of the Alfriend deposition into evidence on Loral's behalf until Loral's motion for reconsideration, and that it was an improper new issue. Loral responds that the district court specifically allowed Loral to refer to the deposition, and that the entire deposition was already before the court. This was a matter of district court discretion, and cannot be faulted.

Lockheed further argues that the second modulating step of claim 1 is not "inherent" in the written description because the specification does not state that the second step is necessarily used. To the extent that Lockheed is arguing that the second step need not always be performed, Loral agrees that there may be occasions when the second step need not be performed because the prebias correction was adequate and no actual error remained after the first firing. According to the '375 patent the actual error and historical error are compared after the thrusters have been fired in the prebias correction; it is only after this comparison that the second modulating step is employed. This does not diminish the descriptive content of the specification. The evidence established, on undisputed facts, that the specification describes the two modulating steps of the claim. The holding of invalidity on this ground is reversed, and the case is remanded for further proceedings.

REVERSED AND REMANDED