UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GRAEME R. ADDIE, THOMAS MUELLER,
STEPHAN BROSS and JOHN MAFFETT

Appeal 2007-1722
Application 10/212,919
Technology Center 3700

Decided: October 24, 2007

Before JENNIFER D. BAHR, LINDA E. HORNER, and
JOSEPH A. FISCHETTI, *Administrative Patent Judges*.

FISCHETTI, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants seek our review under 35 U.S.C. § 134 of the Examiner's final rejection of claims 21-25. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

This appeal arises from the Examiner's Final Rejection, mailed June 30, 2004. Appellants filed an Appeal Brief in support of the appeal on February 15, 2005. An Examiner's Answer to the Appeal Brief was mailed on June 21, 2006.

SUMMARY OF DECISION

We AFFIRM.

THE INVENTION

Appellants claim a slurry pump having a diverter which is said to direct particles away from a stationary face and impeller nose gap to reduce wear. (Specification 1: 9-11)

Claim 21, reproduced below, is representative of the subject matter on appeal.

> 21. A diverter for reducing particulate wear in a slurry pump having a suction liner, an impeller with a front shroud, and a nose gap between the suction liner and the front shroud of the impeller, the diverter comprising:
>
> (a) a suction liner face having a protrusion formed upstream of the nose gap, the protrusion extending inwardly toward the front shroud of the impeller and terminating in a substantially rounded tip;
>
> (b) an impeller front shroud being operatively opposed to the suction liner face, a rounded relief formed within the front shroud; and
>
> (c) the rounded tip of the protrusion extending into the rounded relief of the front shroud, wherein particulate matter is deflected away from the suction liner face.

REFERENCE

The Examiner relies upon the following as evidence of unpatentability:

Studebaker	US 3,620,642	November 16, 1971

THE REJECTION

The following rejection is before us for review.

Claims 21-25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Studebaker in view of a design choice.

ISSUE

The issue is whether Appellants have sustained their burden of showing that the Examiner erred in rejecting the claims on appeal as being unpatentable under 35 U.S.C. § 103(a) over Studebaker. In particular, Appellants assert that: 1) the rejection under 35 U.S.C. § 103(a) is improper because the prior art fails to teach or suggest the claimed rounded shape of the protrusion and corresponding recess, and the claimed angle of the surface connecting the protrusion to the liner surface (Br. 3-4); and, 2) even if so disclosed, the Examiner has not found sufficient suggestion or motivation to change the reference as proposed such that it would have led one having ordinary skill in the art at the time of the invention to make the change (Br. 4-5).

FINDINGS OF FACT

We find the following facts by a preponderance of the evidence:

1. Studebaker discloses a follower plate 34 between the intake chamber and the pump casing, which follower plate 34 is a suction liner (Studebaker, col. 2, ll., 6-7), an impeller 20 (Studebaker, col. 1, l., 69) with a front shroud (front shroud is read on the rightmost face of the impeller 20 facing the follower plate/liner 34 (Studebaker, Figs. 2 and 4)), and a nose gap between the suction liner and the front shroud of the impeller (nose gap is read on the space between the rightmost face of the impeller 20 and the leftmost face of the plate 34 which faces the impeller 20 (Studebaker, Figs. 2 and 4)).

2. Studebaker discloses that the surface of the follower plate 34 opposing the impeller 20 has a protrusion 50 formed upstream of the nose gap, the protrusion extending inwardly toward the front shroud of the impeller (Studebaker, col. 2, ll. 14-16, Figs. 2 and 4, FF 1), such protrusion 50 corresponding to the diverter recited in Appellants' claims; (b) an impeller front shroud being operatively opposed to the suction liner face (follower plate 34) and a relief (labyrinth means 24) formed within the front shroud (Studebaker, col. 1, l. 71, Figs. 2 and 4, FF 1).

3. Studebaker discloses that the tip of the protrusion 50 extends into the relief (labyrinth means 24) of the front shroud (Studebaker, col. 2, ll. 14-16, Figs. 2 and 4, FF 2).

4. The Examiner's Answer states:

> The only difference between the claimed invention and the Studebaker et al. reference is the rounded geometry

> of the lip 50 and the complimentary rounded geometry of the relief in the impeller front shroud (unnumbered, see col. 1, lines 71-75), and the 45° inclination of the lip 50. (Answer 8).

5. The Examiner found that "the follower plate 34 of Studebaker et al. is mechanically no different than the claimed suction liner 4. Both elements bound a slurry flow path." (Answer 8).

6. The Examiner found that "[a]t the time the invention was made, it would have been an obvious matter of design choice to a person of ordinary skill in the art to have a rounded protrusion tip and rounded relief because Applicant has not disclosed that a rounded protrusion tip and rounded relief provide an advantage, are used for a particular purpose, or solve a stated problem." (Final Rejection 5).

7. Studebaker discloses that the protrusion formed by the annular lip 50:

> …serves to direct the flow of slurry into the runner eye in such a manner that it reduces secondary circulation of slurry between the runner and the follower plate to a minimum. (Studebaker col. 2, ll. 14-21.)

8. It is our understanding that the secondary flow in Studebaker, discussed *supra* (FF 7), would also include particulates suspended in the disclosed slurry which would move with the slurry as part of the secondary flow. However, any such secondary flow in Studebaker is reduced by the protrusion 50 as found *supra* (FF 7), as does Appellants' protrusion 2 reduce flow through the nose gap because both protrusions are disposed perpendicularly to the radial path, which is the direction the secondary flow would otherwise take through the space between the

impeller and the liner. (Specification 3: 4-6).

9. The (Specification 7: 7-13) discloses:

> A protruding piece 2 extends out from the suction liner face 4 near and/or under the inside of the clearing vanes on a slurry pump impeller to divert particles to the impeller front clearing vanes which will cause particles to be pumped back into the main volute collector 22 reducing the concentration, size and/or number of particles that go through the lower sealing nose gap 12 thereby reducing wear in this high nose gap wear area. A protrusion 2 on the suction liner will divert abrasive particles away from the liner and improve wear.

10. The (Specification 7: 2-3) describes that the diverter 2 on its inside has a surface set "at about a 45 degree angle to minimize the wear effect of particles being thrown off the impeller."

11. Studebaker discloses:

> The follower plate also includes an annular cap 54 which extends toward the impeller or the runner and is disposed radially outwardly thereof. This annular cap includes a first annular inclined or sloping fluid directing surface 56 disposed at an oblique angle to the axis of rotation of the runner… The annular cap of the follower plate deflects slurry from the pressure relief vanes into the volute section of the pump and protects the mating portion of the casing from abrasive slurry action. (Studebaker, col. 2, ll. 21-35.)

PRINCIPLES OF LAW

Under 35 U.S.C. § 103, a claimed invention is unpatentable if the differences between the subject matter sought to be patented and the prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." *KSR Int'l v. Teleflex Inc*., 127 S.Ct. 1727, 1734, 82 USPQ2d 1385, 1391 (2007); *Graham v. John Deere Co*., 383 U.S. 1, 13-14, 148 USPQ 459, 466 (1966).

In *Graham*, the Court held that that the obviousness analysis is bottomed on several basic factual inquiries: "[(1)] the scope and content of the prior art are to be determined; [(2)] differences between the prior art and the claims at issue are to be ascertained; and [(3)] the level of ordinary skill in the pertinent art resolved." 383 U.S. at 17, 148 USPQ at 467. *See also KSR*, 127 S.Ct. at 1734, 82 USPQ2d at 1391.

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* and *Anderson's-Black Rock* are illustrative-a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

KSR, 127 S. Ct. at 1740, 82 USPQ2d at 1396.

ANALYSIS

We affirm the rejection of claims 21-25 under 35 U.S.C. § 103(a). Appellants do not provide a substantive argument as to the separate patentability of claim 22 that depends from claim 21, which is the sole independent claim. Therefore, we address only claim 21 and, for the reasons that follow, we affirm the rejection of claim 21. Claim 22 falls with claim 21. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2006). Also, because Appellants' arguments as to independent claim 23 are limited only to those advanced with regard to claim independent claim 21, we affirm the rejection of this claim for the same reasons as set forth *infra* with respect to independent claim 21.

Appellants initially argue "Studebaker et al. does not have a suction liner construction of the type having a nose gap. Rather, the Studebaker et al. construction relies on a separate <u>follower plate</u> construction 34 that is disposed between the intake chamber 30 and the casing 32 to reduce wear." (Emphasis original) (Br. 3). However, the Examiner found that the follower plate 34 of Studebaker is mechanically no different than the claimed suction liner 4 in that both elements bound a slurry flow path (FF 5). We agree with the Examiner that the follower plate in Studebaker and the claimed liner are equivalents in that each serves to separate the two pressure zones within the impeller housing. Whether this separation occurs as a result of a two piece barrier member or a one piece

unitary member, such as found with Appellants' suction liner, is not a patentable distinction because it is well settled that to make unitary what otherwise could be made in two pieces is an obvious variant. See *In re Stenzler*, 331 F2d 898, 901, 141 USPQ 576, 578 (C.C.P.A. 1964). While Studebaker's follower plate 34 is not integrally formed with the intake chamber 30 structure, Appellants' claims do not expressly require that the suction liner be integral or unitary with the intake chamber structure.

Appellants next argue:

> [1.] Studebaker et al. employs an annular lip 50, which is not rounded, and that is integral to the follower plate. [2.] The annular lip extends inwardly to a labyrinth seal arrangement 24, which is also not rounded (see Fig. 2). [3.] Further, the annular lip does not have an inner edge that extends downwardly from a rounded tip, or end, of the annular lip to a suction liner face (or follower plate surface) at an angle that facilitates the deflection of particulate matter. (Emphasis original) (Br. 3).

The Examiner found it would have been an obvious matter of design choice to a person of ordinary skill in the art to have provided a rounded shape for the protrusion tip 50 and a corresponding rounded relief 24 in the pump disclosed in Studebaker (FF 6). Appellants, however, have failed to show how the curved shape of its diverter and recess, versus the prior art's square shape, is anything more than a predictable variation of the square shaped protrusion and recess design adopted by Studebaker. Absent such showing, we hold that Appellants' curved shaped protrusion and its correspondingly shaped recess is something that a person

of ordinary skill could implement as a predictable variation of the square shaped elements corresponding in Studebaker, and therefore 35 U.S.C. § 103(a) bars its patentability. *See KSR,* 127 S. Ct. at 1740, 82 USPQ2d at 1396.

Furthermore, the Specification discloses that Appellants' protrusion 2 acts to divert, and thus limit the flow of particulates through the nose gap 12 (FF 9). In this way, the flow is diverted back to the vanes and pumped into the main collector 22 (FF 9). Likewise, as found *supra* (FF 7), the annular lip 50 of Studebaker "serves to direct the flow of slurry into the runner eye in such a manner that it reduces secondary circulation of slurry between the runner and the follower plate to a minimum." Any such secondary flow in Studebaker would intrinsically include particulates suspended in the disclosed slurry which would move with the secondary flow (FF 8). Studebaker's protrusion 50 reduces the secondary flow (FF 7) just as Appellants' protrusion 2 reduces flow through the nose gap (FF 9), because both protrusions are disposed perpendicularly to the radial direction of the pump, which is the direction the secondary flow would otherwise take through the space between the impeller and the liner (FF 8).

Appellants further argue that Studebaker's protrusion (annular lip 50) projects into a non-rounded labyrinth seal arrangement 24 and not a recess, and thus does not meet the claim limitations (Br. 3, 4). However, the independent claims require only that a relief or recess be formed in the front of the impeller shroud to receive the protrusion. As found *supra* (FF 3), Studebaker discloses the projecting feature of the protrusion (annular lip 50), wherein the protrusion

(annular lip 50) is shown received within a corresponding cutout or recess 24 of the labyrinth, as required by the claims.

Appellants further argue that claims 23 and 25 require that the projection 2 have an inner edge that extends downwards from a rounded tip, or end, of the annular lip to a suction liner face (or a follower plate surface) at an angle that facilitates the deflection of particulate matter (Br. 3). The reason given for this feature is that the angle of about 45 degrees minimizes the wear effect of particles being thrown off the impeller. (Specification 7:1-3)

We do not consider the 45 degree angled surface on Appellants' diverter to patentably distinguish Appellants' claims over Studebaker. As found *supra* (FF 11), the sloping surface 56 on the follower plate/liner 34 shown in Figures 2 and 4 in Studebaker is an oblique surface inclined by definition to the rotational axis at about 45°. The purpose of this sloping surface 56 is disclosed to reduce wear by deflecting the slurry from the pressure relief vanes into the volute section of the pump so as to protect the mating portions of the casing from abrasive slurry action (FF 11). Similarly, the Specification describes that the 45° angled surface on Appellants' diverter minimizes the wear effect of the particles being thrown off by the impeller (FF 10). Thus, a person with ordinary skill in the art would understand that the result of using the 45° angled surface on the diverter (annular lip 50) would yield a predictable result, e.g., deflecting particulates away from a boundary surface and into the main flow, while reducing wear, such as taught by the annular cap 54 of Studebaker. *KSR,* 127 S. Ct. at 1740, 82 USPQ2d at 1395.

Finally, Appellants argue "[t]he 'obvious design choice' rejection has been rejected by the Federal Circuit where there is no teaching or suggestion in the reference to modify its own structure in the manner of the rejected claim." (Br. 4-5.) To the extent that Appellants argue that an *explicit* motivation, suggestion, or teaching for the modification must be found in the applied prior art, the argument has been foreclosed by *KSR Int'l Co. v. Teleflex Inc*., 127 S. Ct. 1727, 82 USPQ2d 1385 (2007). In *KSR*, the Court characterized the teaching, suggestion, motivation test as a "helpful insight" but found that when it is rigidly applied, it is incompatible with the Court's precedents. *KSR*, 127 S. Ct. at 1741, 82 USPQ2d at 1396.

> Helpful insights, however, need not become rigid and mandatory formulas; and when it is so applied, the TSM test is incompatible with our precedents. The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents. *KSR*, 127 S. Ct. at 1741, 82 USPQ2d at 1396.

While there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness, "the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *Id.* at 1741, 82 USPQ2d at 1396. Accordingly, the application of common sense may control the

reasoning to modifying prior art teachings. *See Id.* at 1742, 82 USPQ2d at 1397. In this instance, common sense would dictate that a surface, such as defined in claims 23 and 25, which faces an impeller, and against which particulates are being thrown, would desirably be angled obliquely relative to the axis of rotation to reduce wear from impacting particles.

CONCLUSIONS OF LAW

We affirm the rejection of claims 21-25 under 35 U.S.C. §103(a) as being unpatentable over Studebaker in view of a design choice.

On the record before us, Appellants are not entitled to a patent containing the claims on appeal.

DECISION

The decision of the Examiner to reject claims 21-25 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2006).

AFFIRMED

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