UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WALLACE E. VORECK and WENBO YANG

Appeal 2008-2640
Application 10/197,244
Technology Center 3600

Decided: September 29, 2008

Before: HUBERT C. LORIN, JENNIFER D. BAHR and
STEVEN D.A. McCARTHY, *Administrative Patent Judges*.

McCARTHY, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

The Appellants appeal under 35 U.S.C. § 134 (2002) from the final rejection of claims 24, 25, 27-40, 72 and 73. We have jurisdiction under 35

U.S.C § 6(b) (2002). We AFFIRM the rejections of claims 24, 25, 28 and 29 under 35 U.S.C. § 103(a) (2002). We REVERSE the rejection of claim 24 under 35 U.S.C. § 112, ¶ 1 (2002). We also REVERSE the rejection of claims 24, 25, 27-40, 72 and 73 under 35 U.S.C. § 112, ¶ 2 (2002).

The claims on appeal relate to a percussion detonator designed to be adapted so as to achieve a high temperature rating suitable for downhole applications in subterranean wells. (Spec. 3, ll. 17-20.)[1] Claim 24 is typical of the claims on appeal:

> 24. A detonator comprising:
> a first pyrotechnic material to ignite in response to a percussive impact;
> a first retainer to cause a pressure to increase in response to burning of the first pyrotechnic material and rupture in response to the pressure exceeding a threshold; and
> a plate to respond to the rupturing of the first retainer to form a projectile to detonate a first explosive.

ISSUES

The issue in this appeal is whether the Appellants have shown that the Examiner erred in:

> rejecting claim 24 under § 112, ¶ 1 as failing to comply with the enablement requirement;
>
> rejecting claims 24, 25, 27-40, 72 and 73 under § 112, ¶ 2 as being indefinite for failing to particularly point out and

[1] All references in this opinion to the Appellants' Specification refer to the Specification as originally filed.

distinctly claim the subject matter which the Appellants regard as the invention;

rejecting claims 24, 25 and 28 under § 103(a) as being unpatentable over Corney (US Patent 5,485,788, issued 23 Jan. 1996) and Dixon (US Patent 5,717,159, issued 10 Feb. 1998); and

rejecting claim 29 under § 103(a) as being unpatentable over Corney, Dixon and either Yates (US Patent US 4,522,665, issued 11 Jun. 1985) or Official Notice that potassium perchlorate was a well known pyrotechnic material possessing very desirable properties for use in pyrotechnic compositions in a primer.[2]

These issues turn on whether the disclosure in the Specification of at least one working example covered by claim 24 enables claim 24; and whether the Examiner has a reasonable basis for belief that a paper disc disclosed in Dixon is capable of causing a pressure increase in response to burning of a first pyrotechnic material and rupture in response to the pressure increase exceeding a threshold.

[2] Although the Appellants do not specifically mention this rejection in the Appeal Brief, we interpret their statement that claim 29 overcomes "the obviousness rejections for at least the same reasons as independent claim 24" (App. Br. 13) as contesting the obviousness rejection of claim 29 relying on the same arguments put forth against the obviousness rejection of claim 24.

FINDINGS OF FACT

The record supports the following findings of fact ("FF") by a preponderance of the evidence.

1. The Appellants' Specification discloses a detonator including a pyrotechnic material and a plate. The pyrotechnic material ignites in response to a percussion impact, and the plate forms a projectile in response to energy released by the ignition of the pyrotechnic material to detonate an explosion. (Spec. 2, l. 27 – 3, l. 2.)

2. The Specification does not include a working example of a detonator including a pyrotechnic material and a plate but no secondary pyrotechnic or explosive material positioned intermediate the pyrotechnic material and the flyer plate.

3. The Appellants' Specification also discloses a detonator including a pyrotechnic material and an explosive. The pyrotechnic material ignites in response to a percussive impact, and the explosive detonates in response to the ignition of the pyrotechnic material. (Spec. 2, ll. 23-26.)

4. The Specification discloses and illustrates in Fig. 1 a working example of a percussion-type detonator *10* that includes a high temperature-rated percussion primer mix, referred to as a pyrotechnic initiator charge *42*. The burning of the charge *42* produces pressure on a first retainer *62*. This pressure builds until the first retainer *62* breaks apart to cause communication of the flame from the burning charge *42* to a second pyrotechnic charge *64*. (Spec. 3, ll. 22-29.)

5. In response to this flame, the second pyrotechnic charge *64* begins to burn. The burning of the second pyrotechnic charge, in turn, builds up pressure on a flyer plate *70*. The pressure builds up to the point at

which the flyer plate *70* shears, thereby creating a projectile *71a* that travels down a barrel *76* of the detonator *10*. (Spec. 3, l. 29 – 4, l. 3.)

6. The first retainer *62* can be constructed from a number of metallic materials (an aluminum foil or Kapton foil, as examples) that break apart so a flame may go through the first retainer *62* when the initiator charge *42* burns and the pressure built up behind the first retainer *62* is sufficient to break up the first retainer *62*. (Spec. 6, ll. 22-28.)

7. Corney discloses a cartridge for a gun. (Corney, col. 3, ll. 48-50 and 53.)

8. The cartridge has a cartridge case including a base shaped to define an expansion chamber communicating with a primer recess via a primer vent. (Corney, col. 3, ll. 53-56.)

9. The cartridge also has a percussion primer mounted within the primer recess. (Corney, col. 3, ll. 56-58.)

10. The cartridge also has a flyer plate held in place by a shear pin or shear wire near the rearward end of the expansion chamber. (Corney, col. 3, l. 65 – col. 4, l. 1.)

11. When the percussion primer is detonated, the explosive force from the expanding gas is transmitted through the primer vent to energize the flying plate. (Corney, col. 4, ll. 15-18.)

12. When the flying plate is energized, the shear pin is severed and the flying plate is driven forward to impact a piezoelectric crystal. The impact of the flying plate with the piezoelectric crystal causes an explosive to detonate. (Corney, col. 4, ll. 18-25.)

13. Dixon teaches a percussion primer cup. (Dixon, col. 2, ll. 37-39.)

14. The primer cup includes primer cup portion containing a primer mix. (Dixon, col. 2, ll. 39-40.)

15. A paper disc rests on the surface of the primer mix so as to contain the primer mix in the cup portion and to prevent moisture from reaching the primer mix. (Dixon, col. 2, ll. 40-43.)

PRINCIPLES OF LAW

A patent specification must contain "a written description of the invention, and of the manner and process of making an using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art . . . to make and use the same . . . ." § 112, ¶ 1. This enablement requirement is met if the specification teaches those of ordinary skill in the art how to make the full scope of the claimed subject matter without undue experimentation. *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993). Factors to be considered in determining whether undue experimentation would be required to make or use the subject matter of a claim include (1) the quantity of experimentation necessary; (2) the amount of directin or guidance presented; (3) the presence or absence of working examples; (4) the nature of the invention; (5) the state of the prior art; (6) the relative skill in the art; (7) the predictability or unpredictability of the art; and (8) the breadth of the claims. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). The absence of working examples is not decisive of whether subject matter is enabled. *In re Borkowski*, 422 F.2d 904, 908 (CCPA 1970).

A claim is subject to rejection under section 112, ¶ 2, if the claim fails in "particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." During examination, the definiteness

of claims is determined in light of both the specification and the prior art. *In re Moore*, 439 F.2d 1232, 1235 (CCPA 1971). The language of a claim satisfies § 112, ¶ 2 if "one skilled in the art would understand the bounds of the claim when read in light of the specification." *Exxon Research & Eng'ring Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001).

A claim is unpatentable for obviousness under 35 U.S.C. § 103(a) 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 to which said subject matter pertains." In *Graham v. John Deere Co.*, 383 U.S. 1 (1966), the Supreme Court set out factors to be considered in determining whether claimed subject matter would have been obvious:

> Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

Id., 383 U.S. at 17.

ANALYSIS

A. The Rejection of Claims 24 Under § 112, ¶ 1

The initial burden on an examiner rejecting a claim for lack of enablement is to articulate a reasonable basis to question whether the specification teaches how to make and use the full scope of the claimed subject matter without undue experiment. *Wright*, 999 F.2d at 1561-62. The

Examiner concludes that the Appellants' Specification does not enable the full scope of claim 24 because the Specification fails to teach how to make or use detonators having flyer plates capable of responding to the rupturing of the first retainers to form projectiles despite lacking secondary pyrotechnic charges intermediate the first retainers and the flyer plates. (Ans. 4.) We conclude that no reasonable basis to question whether the specification teaches how to make and use the subject matter of clam 24 without undue experiment has been shown to exist in this case.

The first step in determining whether the Appellants' Specification enables the subject matter of claim 24 is to construe claim 24 so that we can determine the subject matter which must be enabled. "During examination, 'claims . . . are to be given their broadest reasonable interpretation consistent with the specification . . .'" *In re American Acad. of Science Tech. Ctrs.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). We agree with the Examiner (Ans. 4) that claim 24 is sufficiently broad to encompass a detonator which has a first pyrotechnic charge, a first retainer and a plate capable of responding to rupturing of the first retainer to form a projectile as recited in claim 24 but which lacks a secondary pyrotechnic charge positioned intermediate a first retainer and a flyer plate. The Appellants themselves appear to concede that claim 24 is broad enough to cover such an embodiment. (*See* Reply Br. 2 (asserting that claim 24 "has sufficient breadth to cover either case, i.e., an embodiment in which the second pyrotechnic material is present (as set forth in the specification) or possibly another embodiment in which the second pyrotechnic material is absent.").)

That said, we agree with the Appellants that their Specification enables the subject matter of claim 24. The Appellants contend that their

Specification enables claim 24 because claim 24 encompasses subject matter enabled by the Specification, namely, the working examples illustrated in Figs. 1 and 2. (App. Br. 9-10; Reply Br. 1-2.) Section 112, ¶ 2 requires that the subject matter covered by a claim bear a reasonable correlation to the scope of subject matter enabled by the specification and no more. "In cases involving predictable factors, such as mechanical or electrical elements, a single embodiment provides broad enablement in the sense that, once imagined, other embodiments can be made without difficulty and their performance characteristics predicted by resort to known scientific laws." *In re Fisher*, 427 F.2d 833, 839 (CCPA 1970). Hence, the disclosure of a specification may enable the subject matter of a claim even if some conceivable embodiments within the scope of the claim are inoperative.

The structure recited in claim 24 is simple—a combination of a first pyrotechnic material, a first retainer and a plate. We do not believe that one of ordinary skill in the art would have been required to perform undue experimentation to combine these three elements. To the extent that experimentation may be required, the working example provided in the Appellants' Specification would have provided guidance and direction by suggesting starting materials for the first retainer and the plate as well as configurations for arranging the elements relative to each other. The teachings of Corney and Dixon provide additional evidence that the level of ordinary skill in the art would have been sufficient to make a range of detonators reasonably correlated to the scope of claim 24. Therefore, we conclude that the Appellants' Specification teaches how to make the subject matter of claim 24 well enough to satisfy the "how to make" prong of the enablement requirement.

In view of the simplicity of the recited structure, we do not believe that one of ordinary skill in the art would have been required to perform undue experimentation in order to use the claimed structure. With regard to the Examiner's reasons for questioning whether the Specification enables claim 24 (*see* Ans. 4), we observe that any detonator having a plate *incapable* of responding to the rupturing of the first retainer to form a projectile would not fall within the scope of claim 24. This would be true regardless whether the detonator included a secondary pyrotechnic charge intermediate the first retainer and the plate. Moreover, even if some conceivable embodiments falling within the scope of claim 24 might be inoperative, this fact alone would not establish that the Specification would not have taught those of ordinary skill how to use the subject matter of claim 24. *See Atlas Powder Co. v. E.I. du Pont De Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984).

On the record before us, the Examiner has met his burden of articulating a reasonable basis for questioning whether the Appellants' Specification enables the subject matter of claim 24. The Appellants have not shown that the Examiner erred in rejecting claim 24 under § 112, ¶ 1.

B. The Rejections of Claims 24, 25, 27-40, 72 and 73 Under § 112, ¶ 2

The Examiner appears to conclude that the recitation in claim 24 of a plate to respond to the rupturing of the first retainer to form a projectile is ambiguous when the recited detonator functions without a second pyrotechnic charge positioned intermediate the retainer and the flyer plate. (Ans. 5.) The Appellants contend that the claim is definite and that claim 24

need not recite how the plate forms a projectile in response to the rupturing of the first retainer. (Reply Br. 2.)

We agree that claim 24 is not indefinite. The term "respond" means "to show some reaction to a force or stimulus." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY at 1935 (G&C Merriam Co. 1971)("respond," def. 3). One of ordinary skill in the art would understand the recitation of a plate to respond to the rupturing of the first retainer to form a projectile to detonate a first explosive in claim 24 to mean that the plate must react to the force rupturing the first retainer to form the projectile. The term "respond" is not ambiguous when claim 24 is read on detonators which have no second charge intermediate their retainers and flyer plates in which the flyer plates are incapable of reacting to the force rupturing of the first retainers by forming projectiles. Such detonators simply are not covered by the claim. On the record before us, the Appellants have shown that the Examiner erred in rejecting claim 24 under § 112, ¶ 2. Since the Examiner appears to have rejected claims 25, 27-40, 72 and 73 under § 112, ¶ 2 only due to their dependency from claim 1, the Appellants have shown that the Examiner erred in rejecting those dependent claims under § 112, ¶ 2 as well.

C. The Rejections of Claims 24, 25 and 28 Under § 103(a)

The Appellants argue claims 24, 25 and 28 as a group for purposes of responding to the rejection under § 103(a). We select claim 24 as being representative of the group. 37 C.F.R. § 41.37(c)(1)(vii) (2007). The Examiner finds that Corney teaches each element of claim 24 except for a first retainer to cause a pressure to increase in response to burning of the first pyrotechnic material and rupture in response to the pressure exceeding a

threshold. (*See* FF 10-13.) The Examiner further finds that Dixon teaches a primer cup including a primer mix and a first retainer in the form of a paper disc rests on the surface of the primer mix. The Examiner concludes that it would have been obvious to substitute Dixon's primer cup for the percussion primer of Corney's cartridge so as to seal the primer mix in the percussion primer and to prevent moisture from gaining access to the primer mix. (Ans. 5-6). The Appellants contend that neither Corney nor Dixon teaches a first retainer which causes a pressure to increase in response to burning of the first pyrotechnic material and which ruptures in response to the pressure exceeding a threshold. (App. Br. 12.) Since the Examiner has a reasonable basis for belief that Dixon's paper disc is capable of causing a pressure to increase in response to burning of the first pyrotechnic material and of rupturing in response to the pressure exceeding a threshold, we sustain the Examiner's conclusion that the subject matter of clam 24 would have been obvious.

Where an examiner has reason to believe that a functional limitation asserted to be critical for establishing patentability of the claimed subject matter may, in fact, be an inherent characteristic of the prior art, the examiner may require the applicant to prove that the prior art does not necessarily possess that characteristic. *In re Best*, 562 F.2d 1252, 1254-555 (CCPA 1977)(citing *In re Swinehart*, 439 F.2d 210, 212-13 (CCPA 1971)). The Specification teaches that a retainer can be constructed from an aluminum foil or Kapton foil that breaks apart when the pressure built up behind the retainer is sufficient. (FF 6.) Since Dixon teaches a paper disc which rests on the surface of the primer mix to prevent moisture from reaching the primer mix (FF 16), it would have been obvious to pack the

paper disc against the primer mix to form a gas-tight seal to prevent water vapor from reaching the mix. Even assuming that the paper disc would have been more flammable than an aluminum or Kapton foil retainer as disclosed by the Appellants' Specification (*see* FF 6), the Examiner has a reasonable basis for believing that the primer mix would burn sufficiently quickly to build up pressure behind the paper disc to a level capable of rupturing the disc before sufficient heat is transferred to the disc to raise the disc's temperature above a temperature where the disc ignites. (*Cf.* Ans. 6 and 8 (describing the build-up of sufficient pressure to burst the paper disc as being "momentary").) The Appellants have not responded with *evidence* to rebut the Examiner's belief. On this basis, we sustain the Examiner's finding that Dixon suggests a first retainer which is capable of causing a pressure to increase in response to burning of the first pyrotechnic material and which is capable of rupturing in response to the pressure exceeding a threshold.

On the record before us, the Appellants have not shown that the Examiner erred in rejecting claims 24, 25 and 28 under § 103(a) as being unpatentable over Corney and Dixon. Since the Appellants argued the rejection of claim 29 under § 103(a) as being unpatentable over Corney, Dixon and either Yates or Official Notice together with the rejections of claims 24, 25 and 28 under § 102(a) (App. Br. 13), the Appellants have not shown that the Examiner erred in rejecting claim 29 under § 103(a).

CONCLUSIONS

On the record before us, the Appellants have not shown that the Examiner erred in rejecting claims 24, 25 and 28 under § 103(a) as being unpatentable over Corney and Dixon; and in rejecting claim 29 under § 103(a) as being unpatentable over Corney, Dixon and either Yates or Official Notice.

The Appellants have shown that the Examiner erred in rejecting claim 24 under § 112, ¶ 1 as failing to comply with the enablement requirement; and in rejecting claims 24, 25, 27-40, 72 and 73 under § 112, ¶ 2 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

DECISION

We AFFIRM the rejection of claims 24, 25, 28 and 29.

We REVERSE the rejection of claims 27, 30-40, 72 and 73.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a) (2007). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED-IN-PART

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