

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 19

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

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Ex parte DOUGLAS M. FORTUNA et al.

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Appeal No. 2001-1628  
Application No. 09/054,794

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ON BRIEF

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Before McQUADE, NASE, and BAHR, Administrative Patent Judges.  
NASE, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 to 7, which are all of the claims pending in this application.

We REVERSE.

### THE INVENTION

The appellant's invention relates to a fuel-air mixer for a combustor of a gas turbine engine and more particularly to a means of reducing the formation of carbon resin on such a fuel-air mixer (specification, p. 1). Claims 1 and 4, the only independent claims on appeal, read as follows:

1. A fuel-air mixer for a combustor of a gas turbine engine having a compressor for discharging compressed air to said combustor, said fuel-air mixer comprising:
  - (a) a substantially annular venturi defined by a wall having an inner surface and a longitudinal axis therethrough, said venturi including an upstream end and a downstream end;
  - (b) a primary swirler comprising a substantially annular upstream end and a downstream end located adjacent the upstream end of said venturi along the longitudinal axis, a plurality of primary air jets interposed between the swirler upstream and downstream ends, and primary swirler jet airflow supplied to said primary air jets wherein said swirler airflow is swirled and delivered to said venturi; and
  - (c) a fuel nozzle positioned inside the upstream end of said primary swirler adjacent to said venturi and along the longitudinal axis thereof, said fuel nozzle further comprising a fuel passage therein through which fuel is sprayed into said venturi at a designated spray angle; and an air passage therein through which purge airflow is discharged into said venturi, substantially parallel to the longitudinal axis of said venturi; wherein said purge airflow is sufficient to provide a boundary layer of air along the inner surface of said venturi wall.
  
4. A combustor for a gas turbine engine having a compressor for discharging compressed air to said combustor, said combustor including a plurality of fuel-air mixers wherein each said fuel-air mixer comprises:
  - (a) a substantially annular venturi defined by a wall having an inner surface and a longitudinal axis therethrough, said venturi including an upstream end and a downstream end;
  - (b) a primary swirler comprising a substantially annular upstream end and a downstream end located adjacent the upstream end of said venturi along the longitudinal axis, a plurality of primary air jets interposed between the swirler upstream and downstream ends, and primary swirler jet airflow supplied to said

primary air jets wherein said swirler airflow is swirled and delivered to said venturi; and

(c) a fuel nozzle positioned inside the upstream end of said primary swirler adjacent to said venturi and along the longitudinal axis thereof, said fuel nozzle further comprising a fuel passage therein through which fuel is sprayed into said venturi at a designated spray angle; and an air passage therein through which purge airflow is discharged into said venturi, substantially parallel to the longitudinal axis of said venturi; wherein said purge airflow is sufficient to provide a boundary layer of air along the inner surface of said venturi wall.

### THE REJECTION

Claims 1 to 7 stand rejected under 35 U.S.C. § 103 as being unpatentable over Koshoffer et al.<sup>1</sup> (Koshoffer) in view of Shekleton et al.<sup>2</sup> (Shekleton). The examiner's basis for this rejection as set forth on pages 3-4 of the answer (Paper No. 16, mailed October 31, 2000) is as follows:

Koshoffer teaches the invention substantially as disclosed and as claimed: a combustor 10 having a fuel injector assembly 38 comprising an air nozzle having venturi walls 92 and a plurality of primary air jets 78 interposed between the swirler upstream and downstream ends, and a fuel injector 40. However, Koshoffer does not teach an air purge passage, the exits of the air purge passage and the fuel passage being coaxial, the purge air preventing the fuel from contacting the venturi walls of the air injector. It was known in the art at the time of the claimed invention that fuel/air injectors of the type claimed experienced coking problems when the fuel would contact the high temperature surface of the venturi wall (see for example Ekstedt 3, 899, 834, col 1, ll. 44-46, brought here for example of "common knowledge" only; Ekstedt is incorporated by reference in Koshoffer col. 1, l. 27, and it is not part of the rejection). Shekleton teaches a gas-turbine fuel injector comprising an air purge passage

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<sup>1</sup> U.S. Patent No. 4,584,834 issued April 29, 1986.

<sup>2</sup> U.S. Patent No. 5,321,950 issued June 21, 1994.

34, the exits of the air purge passage 36 and the fuel passage 38 being coaxial as in the claimed invention, the fuel exiting the conical divergent tip of the fuel injector being prevented from contacting the venturi walls 26 of the air injector by the purging air 36; the venturi wall 26 being protected from contact with the fuel by the inherent air boundary layer formed along said wall. It would have been obvious to one of ordinary skill in the art to modify the Koshoffer injector with the coaxial purging-air passage of Shekleton in order to prevent the fuel from contacting the wall of the venturi, and therefore prevent the fuel coking from occurring. The combination would have been obvious to one of ordinary skill in the art, in particular because the proper design of the Shekleton injector, i.e., surrounding the fuel jet in a shroud of air, preventing the fuel from hitting the hot venturi wall and consequently removing the necessary source of coking material from the hot wall, did not suffer from the coking deficiency of Koshoffer. Therefore, one of ordinary skill in the art would look at the coking-free design of Shekleton, in order to cure the coking deficiency of Koshoffer.

#### OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellant's specification and claims, to the applied prior art references, to the respective arguments articulated by the appellant in the brief (Paper No. 15, filed October 6, 2000) and reply brief (Paper No. 17, filed December 26, 2000) and to the examiner's response to argument set forth in the answer. Upon evaluation of all the evidence before us, it is our conclusion that the evidence adduced by the examiner is insufficient to establish a prima facie case of obviousness with respect to the claims under appeal. Accordingly, we will not sustain the examiner's rejection of claims 1 to 7 under 35 U.S.C. § 103. Our reasoning for this determination follows.

In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. See In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). A prima facie case of obviousness is established by presenting evidence that would have led one of ordinary skill in the art to combine the relevant teachings of the references to arrive at the claimed invention. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988) and In re Lintner, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

A critical step in analyzing the patentability of claims pursuant to 35 U.S.C. § 103 is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. See In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher." Id. (quoting W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPQ 303, 313 (Fed. Cir. 1983)).

Most if not all inventions arise from a combination of old elements. See In re Rouffet, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457 (Fed. Cir. 1998). Thus, every

element of a claimed invention may often be found in the prior art. See id. However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. See id. Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the appellants. See In re Dance, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998); In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

The motivation, suggestion or teaching may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, in some cases the nature of the problem to be solved. See Dembiczak, 175 F.3d at 999, 50 USPQ2d at 1617. In addition, the teaching, motivation or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. See WMS Gaming, Inc. v. International Game Tech., 184 F.3d 1339, 1355, 51 USPQ2d 1385, 1397 (Fed. Cir. 1999). The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. See In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981) (and cases cited therein). Whether the examiner relies on an express or an implicit showing, the examiner must provide

particular findings related thereto. See Dembiczak, 175 F.3d at 999, 50 USPQ2d at 1617. Broad conclusory statements standing alone are not "evidence." Id.

In this case, we find no motivation, suggestion or teaching in the combined teachings of the applied prior art (Koshoffer, Shekleton and Ekstedt (U.S. Patent No. 3,899,884 incorporated by reference in Koshoffer)) to have modified the gas turbine engine combustion system of Koshoffer to have arrived at the claimed subject matter. In that regard, we note that the examiner has not produced any evidence that any of the fuel-air mixers of the applied prior art experienced coking problems. While Ekstedt does discuss the problem of coking in his discussion of prior art nozzles, Ekstedt teaches (column 4, lines 19-23) that his combustion system is highly effective in preventing carbon buildup on fuel nozzles. Since the examiner has not set forth any evidence that Koshoffer's venturi suffers from coking, there is no reason for a person of ordinary skill in the art at the time the invention was made to have modified Koshoffer's system to prevent coking on the venturi. Moreover, Shekleton does not teach or suggest an air passage wherein purge airflow is discharged into the venturi substantially parallel to the longitudinal axis of the venturi sufficient to provide a boundary layer of air along the inner surface of the wall of the venturi. The airflow discharged from Shekleton's air assist tube 34 while flowing into the venturi 26 substantially parallel to the longitudinal axis of the venturi is not sufficient to provide a boundary layer of air

along the inner surface of the wall of the venturi since air from air flow path 18 is injected along the inner surface of the wall of the venturi and therefore would space the airflow discharged from Shekleton's air assist tube 34 from the inner surface of the wall of the venturi.

For the reasons set forth above, the decision of the examiner to reject claims 1 to 7 under 35 U.S.C. § 103 is reversed.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1 to 7 under 35 U.S.C. § 103 is reversed.

REVERSED

JOHN P. McQUADE  
Administrative Patent Judge

JEFFREY V. NASE  
Administrative Patent Judge

JENNIFER D. BAHR  
Administrative Patent Judge

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Appeal No. 2001-1628  
Application No. 09/054,794

Page 10

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