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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte EUNICE ALLEN-BRADLEY, ERIC A. GROVER, THOMAS J. PRAISNER, and JOEL H. WAGNER

Appeal 2010-005916
Application 11/415,898
Technology Center 3700

Before: GAY ANN SPAHN, JOHN W. MORRISON, and MICHELLE R. OSINSKI, *Administrative Patent Judges*.

MORRISON, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from a rejection of claims 1-14 and 19-26. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

The claimed subject matter "relates to airfoil arrays such as those used in turbine engines." Spec. 1, para. [0002]. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. An airfoil array comprising a laterally extending endwall with a series of airfoils projecting therefrom, each airfoil having a suction surface and a pressure surface, the airfoils cooperating with the endwall to define a series of fluid flow passages, the endwall having a pressure side trough that blends on the pressure side of one of the passages into a more elevated region with increasing lateral displacement toward a suction side of the one of the passages, the more elevated region being noncomplementary with respect to the trough.

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Hausmann	US 2,735,612	Feb. 21, 1956
Hoeger	US 6,017,186	Jan. 25, 2000
Staubach	US 6,669,445 B2	Dec. 30, 2003

Appellants' admission of prior art (hereinafter "AAPA") of Figures 2-4.

REJECTIONS

The following Examiner's rejections are before us for review:

Claims 1, 2, 4, 5, and 23-26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hoeger.

Claims 3, 6-8, and 19-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hoeger and Staubach.

Claims 9-11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hoeger in view of AAPA.

Claims 12-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hoeger and Hausmann.

ANALYSIS

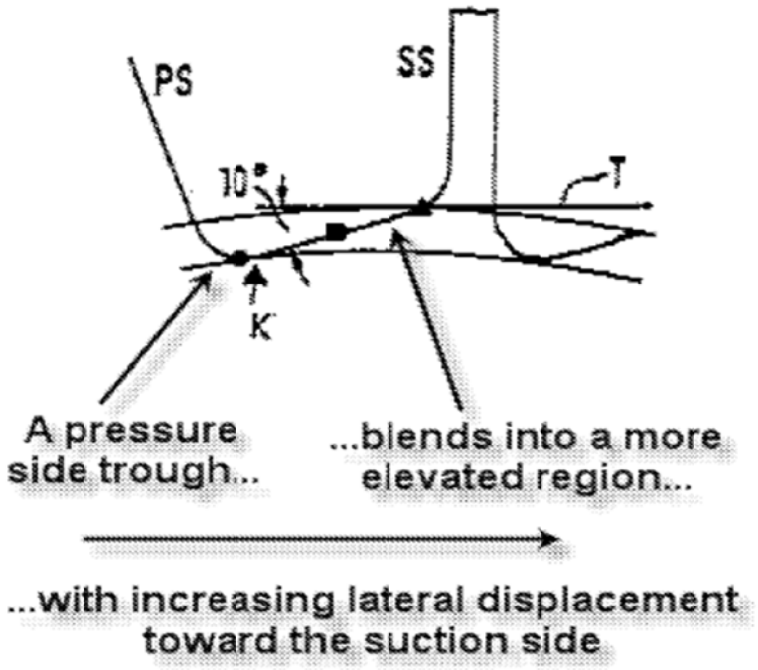
Anticipation by Hoeger

Addressing claim 1, the Examiner finds that Hoeger discloses

> an airfoil array (3) comprising a laterally extending endwall (2) with a series of airfoils projecting therefrom. Each airfoil has a suction surface and pressure surface, and they cooperate with the endwall to define a series of fluid flow passages. The endwall has a pressure side trough (K) that blends on the pressure side of the passage into a more elevated region with increasing lateral displacement toward a suction side of the passage. The more elevated region is axisymmetric and non-complementary with respect to the trough.

Ans. 3-4. To clarify his findings, the Examiner provides an annotated version of Hoeger's Figure 4C. Ans. 9. (Reproduced below).

Examiner's Annotated Figure 4C of Hoeger



The Examiner's annotated Figure 4C of Hoeger depicts the Examiner's findings with respect to the claim language of "pressure side trough," "blends . . . into a more elevated region," and "with increasing lateral displacement toward a suction side."

The Examiner's annotated figure appears to show the area where the trough "blends into a more elevated region" to be between the square and the triangle symbol, and the Examiner states that "[t]he part of the Hoeger et al. trough which is to the right of the square in the figure is clearly more elevated than the area to the left of the square." Ans. 9. Appellants counter that "the contours J [represented by triangle symbol in Figures 4B and 4C] are on the suction side, not the pressure side. The contours J thus do not teach a pressure side trough that blends 'on the pressure side' of the passage into a more elevated region." App. Br. 7. The portion of the passage

identified by the Examiner that ". . . blends into a more elevated region" is much closer to the suction side (SS) of the airfoil than the pressure side (PS). Thus, Appellants have correctly identified error in the Examiner's findings. As such, we cannot sustain the rejection of claims 1 or claims 2, 4, 5, 23, and 24 which depend therefrom.

Addressing claim 25, this claim differs from claim 1 as it does not include the limitation of a "pressure side trough that blends *on the pressure side* of one of the passages into a more elevated region" as recited in claim 1 discussed *supra*. App. Br., Clms. App'x. Emphasis added. Rather, claim 25 recites that the endwall has "a trough that blends laterally toward a suction side of the passage into a more elevated region that is noncomplementary with respect to the trough," and the trough "having a negative peak that is closer to the pressure surface of the airfoil defining the passage than the suction surface of the cooperating airfoil defining the passage." *Id*.

The Examiner finds that

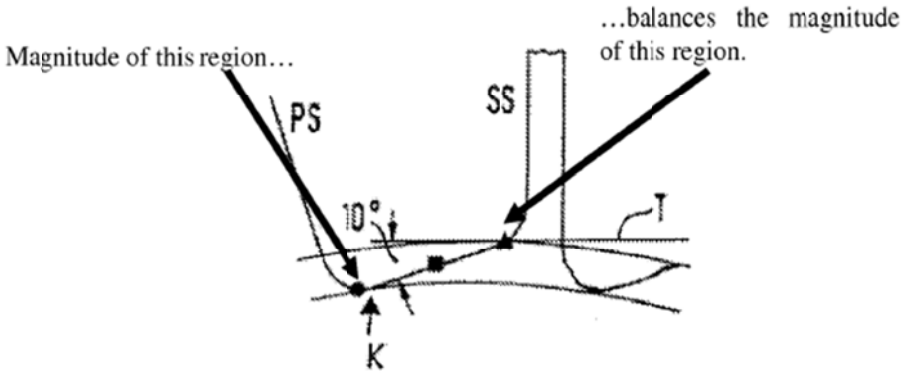
> Hoeger et al. disclose an airfoil array (3) comprising a laterally extending endwall (2) with a series of airfoils projecting therefrom. Each airfoil has a suction surface and pressure surface, and they cooperate with the endwall to define a series of fluid flow passages. The endwall has a trough (K) that blends laterally toward a suction side of the passage into a more elevated region that is non-complementary with respect to the trough. The trough has a negative peak that is adjacent to the pressure surface of the adjacent airfoil, thus making it closer to the pressure surface.

Ans. 4-5.

First, Appellants argue that Hoeger's "concave contour K does not blend into a more elevated region," for the reason that "[t]here is simply no room for the more elevated region because the concave contour K covers the entire fluid flow passage." App. Br. 5. Appellants appear to be arguing that the entire cross section is a trough. This argument is unpersuasive as not being commensurate with the scope of the claim which does not limit the trough from extending entirely across the fluid flow passage, nor from the more elevated region being within the trough. The elevated portion of the contour "K" near the suction side, between the square and triangle symbols as noted by the Examiner in the annotated figure, is "more elevated" than the trough portion of contour "K," proximate to the circle symbol, near the pressure side. *See* Hoeger, Fig. 4C.

Next, Appellants contend that "[a]s can perhaps be best appreciated from Figure [4]C of Hoeger, the concave contour K is compl[e]mentary, not non-compl[e]mentary. That is, the more elevated regions of the concave contour K balance the less elevated regions of the concave contour K." App. Br. 5. In an attempt to clarify this argument, Appellants present a marked up version of Figure 4C. App. Br. 5. (Reproduced below).

Appellants' annotated Figure 4C of Hoeger



Appellants' annotated Figure 4C of Hoeger depicts where Appellants consider the magnitude of one region of the trough K balances the magnitude of another region of the trough.

In other words, it appears Appellants consider that the magnitude of the cross-sectional area proximate to the circle symbol on contour "K" is equal to the magnitude of the cross-sectional area proximate the triangle symbol on contour "K" in order to be complementary, not noncomplementary according to the Specification's definitions of that term. *See* Spec. 9, para, [0029] and Spec. 10-11, para. [0033]. However, Appellants provide no explanation as to how these two areas balance or equal one another. In applying the Specification's definition of non-complementary, i.e., "the magnitude of the depression does not balance the magnitude of the hump such that the increase in passage cross sectional area attributable to the depression equals the decrease in cross sectional area attributable to the hump" (Spec., para. [0029]), we are not persuaded that Appellants' annotated Figure 4C supports the Appellants' contention that contour "K" of Hoeger is complementary, not noncomplementary. As such, we sustain the rejection of claim 25, and claim 26 which depends therefrom.

Obviousness over Hoeger and Staubach

With respect to claims 3, 6-8, and 19-22, the Examiner introduces Staubach to address the dependent claim limitations. However, Staubach does not remedy the underlying deficiency of Hoeger, which fails to teach a "trough that blends on the pressure side of one of the passages into a more elevated region" as required by claim 1. Therefore, we do not sustain the rejection of claims 3, 6-8, and 19-22 as obvious over Hoeger and Staubach.

Obviousness over Hoeger and AAPA

Addressing claims 9-11, the Examiner finds that Hoeger "disclose[s] all elements substantially as claimed, but fail[s] to disclose the particular relationships of the platforms to the airfoils in either blade or vane configuration. However, these features are well-known to the art." Ans. 6. Because AAPA, i.e., prior art Figures 2-4, does not remedy the underlying deficiency of Hoeger, which fails to teach a "trough that blends on the pressure side of one of the passages into a more elevated region" as required by claim 1, we do not sustain the rejection of claims 9-11 as obvious over Hoeger and AAPA.

Obviousness over Hoeger and Hausmann

Addressing claims 12-14, the Examiner finds that Hoeger "fail[s] to disclose that there is a ridge adjacent a forward portion of the trough. Hausmann teaches an axisymmetric platform construction which includes a ridge which blends into a less elevated profile extending laterally across the passage toward the trailing edge of a neighboring airfoil in the array." Ans. 7. However, Hausmann does not remedy the underlying deficiency of Hoeger, which fails to teach a "trough that blends on the pressure side of one of the passages into a more elevated region" as required by claim 1. Therefore, we do not sustain the rejection of claims 12-14 as obvious over Hoeger and Hausmann.

DECISION

For the above reasons, the Examiner's rejection of claims 1-14 and 19-24 is reversed and the rejection of claims 25 and 26 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)(1)(iv).

AFFIRMED-IN-PART

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