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(54) **Method to tune the natural frequency of turbine blades by using the orientation of the secondary axes**

(57) Tuning of turbine bucket torsional and stripe mode natural frequencies can be effected without altering any turbine bucket physical features, such as weight and/or shape, and without affecting flexure frequencies. The tuning of certain turbine bucket natural frequencies serves to avoid detrimental blade resonance, thus im-

proving the reliability of a gas turbine. The method includes investment casting the turbine bucket with a single crystal alloy, and tuning the natural frequency of the turbine bucket without modifying physical features of the turbine bucket by placing a crystal seed along a desired direction according to a relative orientation of an engine axial direction.

SECONDARY ORIENTATION EFFECT ON STRIPE MODES

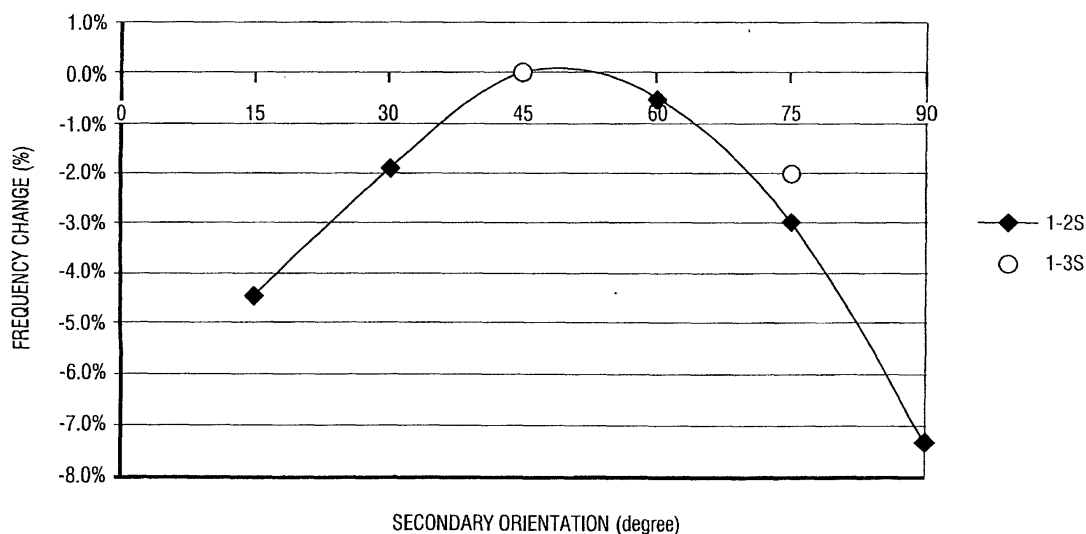


Fig. 3



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# EUROPEAN SEARCH REPORT

Application Number  
EP 01 30 6925

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		1 August 2003	Steinhauser, U
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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Application Number  
EP 01 30 6925

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<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 01 30 6925

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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