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54 **Method of tuning an ultrasonic device, ultrasonic device and machine for performing an ultrasonic tooling operation.**

57 To ensure that an ultrasonic tool is driven at an optimum frequency, the phases of the voltage applied to the transducer and the current flowing through the transducer are compared, and an error signal is generated dependant upon the divergence of the phase difference from a desired difference, which may be zero phase difference. The error signal is functional to vary the frequency at which the ultrasonic device is driven, in the direction to reduce the error signal, so that the ultrasonic device can be driven at zero error signal (i.e. the desired current/voltage phase relationship) and thus at maximum efficiency.

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US-A-3 472 063 (N.G. BRANSON) * Abstract; column 2, lines 5-15; column 2, line 37 - column 3, line 25; claim 1 * ---	1-6,8	B 06 B 1/02 G 01 H 13/00
X	US-A-2 917 691 (C.F. DE PRISCO) * Column 1, line 15 - column 2, line 45; column 3, line 12 - column 5, line 63; claims * ---	1-6,8	
X	US-A-3 743 868 (T. KAWADA) * Abstract; column 2, lines 47-61; column 3, line 38 - column 4, line 34; claims * ---	2-6,8	
X	US-A-3 819 961 (I.M.G.P. BOURGEOIS et al.) * Abstract; column 1, lines 3-61; column 2, lines 1-44; column 2, line 58 - column 3, line 8; column 4, lines 7-48 * ---	1-6,8,9	
X	US-A-3 447 051 (J.G. ATTWOOD et al.) * Abstract; column 2, lines 42-71; column 4, lines 29-41 * --- -/-	1-6,8	TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 06 B G 01 H H 03 H H 03 J H 03 L B 23 K B 24 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26-04-1988	Examiner OLDROYD D.L.
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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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	ULTRASONICS, vol. 23, no. 4, July 1985, pages 151-156, Guildford, GB; A. RAMOS-FERNANDEZ et al.: "Automatic system for dynamic control of resonance in high power and high Q ultrasonic transducers" * Page 151, "Abstract"; page 153, section entitled: "Dynamic tuning of the transducer"; page 154: figure 5; pages 154-156: Section entitled: "Description of the Electronic System for Dynamic Control of Resonance" (comprising four sub-sections) and figures 6,7 *	2-6,8,9	
A	US-A-3 808 752 (W.D. BEAVER et al.)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26-04-1988	Examiner OLDROYD D.L.
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