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54 **Method of improving wear-resistance characteristics of a porous metal machine part.**

57 A method of improving wear-resistance characteristics of a porous metal machine part by densifying the part throughout its thickness. The method includes the steps of ultrasonically cleaning the part to remove impurities from the pores of the part and then drying the part. The part is then exposed to cryogenic temperatures generated by a cryogenic liquid during a period of time. The period of time is divided into three cycles—a gradual cooling cycle wherein the part is gradually cooled from ambient temperature to a temperature of between minus 173 and 212°C; a soak cycle wherein the part is maintained at a temperature of between minus 173 and 212°C; and a gradual warming cycle wherein the part is gradually warmed to ambient temperature. The surface of the metal part is thereafter removed to a depth of from .000254 to .0254 cm to expose a new densified metal wearing surface; and the newly-exposed metal surface is polished.



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 4141

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.5)
X A	US-A-4 739 622 (SMITH) * column 1, line 1 - line 40; claim 9 * ---	11,12 1	B22F3/24
A	FR-A-2 383 234 (BOC LTD) * claim 1 * ---	1,11,12	
A	CRYOGENICS vol. 22, no. 8 , August 1982 , SURREY, GB pages 409 - 413 BARRON 'Cryogenic treatment of metals to improve wear resistance' ---		
A	MACHINE DESIGN vol. 53, no. 2 , 22 January 1981 , OHIO, USA pages 73 - 78 DREGER 'The promise of cryogenic processing' ---		
A	WERKSTATT UND BETRIEB vol. 114, no. 10 , October 1981 , MÜNCHEN, DE pages 723 - 726 KEINATH 'Anwendungen der heissisostatischen Presstechnik' * Page 725, "Nachverdichten durch heissisostatisches Pressen" * ---	1,11,12	TECHNICAL FIELDS SEARCHED (Int.Cl.5) B22F C21D
A	DATABASE WPI Derwent Publications Ltd., London, GB; AN 80-54223 & JP-A-55 079 805 (MITSUBISHI METAL KK) * abstract * ---		
A	GB-A-2 216 545 (KIKUCHI ET AL) -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 March 1994	Examiner Ashley, G
<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 A : member of the same patent family, corresponding document</p>			

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