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(54) **Apparatus and methods for incrementally stepping a printer drive shaft.**

(57) A paper feed drive shaft in a printer is directly coupled at each of its opposite ends to stepper motors. The stepper motors directly drive the paper feed shaft and are actuated either synchronously or asynchronously. By directly coupling the motors and shaft, torsional vibration in the shaft and consequent high acoustical noise levels as well as paper settling times may be minimized by the phasing of the applied step timing signals to the motors.

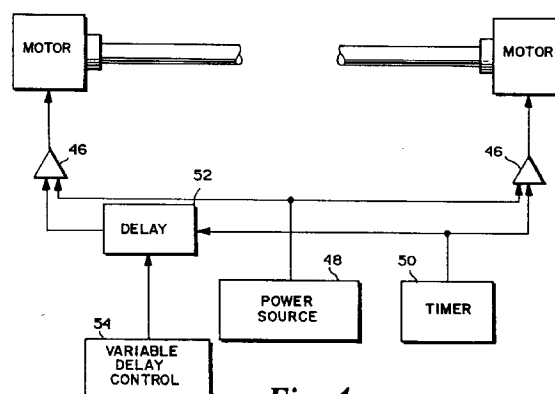


Fig. 4



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EUROPEAN SEARCH REPORT

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EP 91 30 8383

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	US-A-4 839 674 (T.HANAGATA ET AL.) * column 3, line 10 - column 6, line 6; claim 1; figures 4-8 *	1-4, 9, 10	B41J11/42 H02P8/00
Y		8	
A		6, 7	
A	--- PATENT ABSTRACTS OF JAPAN vol. 7, no. 6 (P-167)(1151) 11 January 1983 & JP-A-57 164 385 (FUJITSU K.K.) 8 October 1982 * abstract *	1-4, 9, 10	
Y	--- US-A-4 421 262 (Y.CHIDA ET AL.) * column 2, line 13 - line 35; figure 1 *	8	
A	--- US-A-4 468 140 (S.C.HARRIS) * abstract; figures 1-6 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	--- PATENT ABSTRACTS OF JAPAN vol. 6, no. 230 (E-142)(1108) 16 November 1982 & JP-A-57 132 793 (TOKYO SHIBAURA DENKI K.K.) 17 August 1982 * abstract *	1	
			B41J H02P
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 24 AUGUST 1992	Examiner DUCREAU F.
<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 & : member of the same patent family, corresponding document</p>			

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