Title: IMPROVED LINEAR VARIABLE DIFFERENTIAL TRANSFORMERS FOR HIGH PRECISION POSITION MEASUREMENTS

Abstract: A transducer that reduces noise, increases sensitivity, and improved the time response of a linear variable differential transformer (LVDT). The device replaces the primary coil and the high permeability ferromagnetic core of conventional LVDTs with a primary coil (15) wound around a moving non-ferromagnetic core (14). In addition to reducing or eliminating Barkhausen noise, this approach reduced or eliminated a number of other undesirable effects in conventional LVDTs including excessive eddy current heating in the core, non-linearities associated with high permeability materials and the length scale of the flux circuit. These improvements are coupled with improved LVDT signal conditioning circuitry. The device is also an actuator and may be used to convert differential voltages into force. Devices with these improvements have numerous applications, including molecular force measurements, atomic force microscopy and manipulation technology, lithographic manufacturing, nanometer scale surface profiling and other aspects of nanotechnology.
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/48283

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G01B 7/16
US CL :240/207.18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 241/240.16, 207.16, 207.17, 207.18, 207.24, 207.25, 207.32, 207.41; 518/655-661; 540/670.55, 670.56; 586/186

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 2,452,862 A (NEFF) 02 November 1948 (02.11.1948), Fig. 2.</td>
<td>1-3</td>
</tr>
<tr>
<td>A</td>
<td>US 2,503,851 A (SNOW) 11 April 1950 (11.04.1950), Fig. 6.</td>
<td>1-3</td>
</tr>
</tbody>
</table>


Date of the actual completion of the international search

25 JULY 2002

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks

Box PCT
Washington, D.C. 20231
Facsimile No. (703) 305-3830

Authorized officer

JAY M. PATIDAR
Telephone No. (703) 305-0958

Form PCT/ISA/210 (second sheet) (July 1998)*