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[CA/CA]; 1718 Markham Court, Kelowna, British Columbia, V1V 2W1 (CA).

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PCT/US2009/045674(74) Agent: **DODGE, Ryan, E.**; Christensen O'Connor Johnson Kindness PLLC, 1420 Fifth Avenue, Suite 2800, Seattle, WA 98101 (US).(22) International Filing Date:
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(72) Inventors; and

(75) Inventors/Applicants (for US only): **LINDBERGH, Leif, R.** [US/US]; 5033 38th Avenue Northeast, Seattle, WA 98105 (US). **SHANAHAN, Aaron, J.** [US/US]; 7712 17th Avenue Southwest, Seattle, WA 98106 (US). **CAHOON, Ian, R.** [US/US]; 27523 139th Court Southeast, Kent, WA 98042 (US). **ROBBINS, Richard, J.** [US/US]; 154 Lake Washington Boulevard East, Seattle, WA 98112 (US). **MOORE, James, C.** [US/US]; 1570 Pemberton Drive, Columbus, OH 43221 (US). **BROWN, Brent, R.** [US/US]; 10243 Valley Forge Lane North, Maple Grove, MN 55369 (US). **REILLY, Timothy, J.**

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(54) Title: APPARATUS AND METHOD FOR MONITORING TUNNEL BORING EFFICIENCY

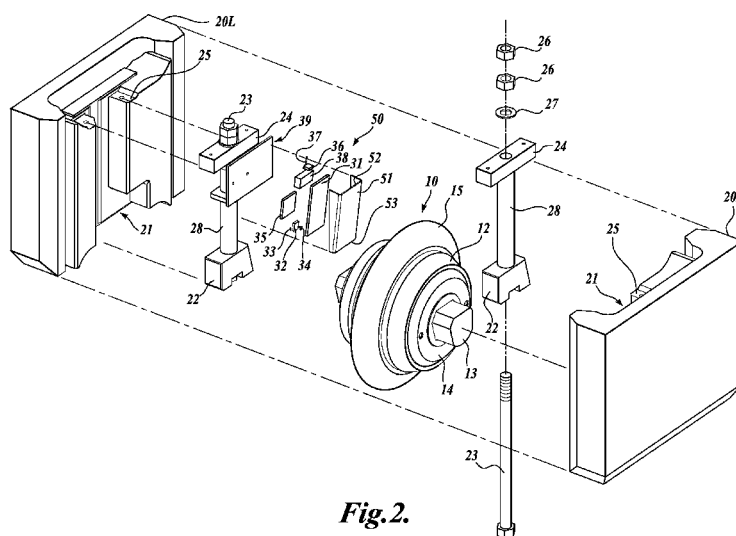


Fig. 2.

(57) Abstract: A tunnel boring machine (90) having a rotating cutter head (93) that rotatably supports a plurality of cutter assemblies (10). A plurality of instrument packages (50) are attached to the rotating cutter head, each instrument package having a distal end in contact with an associated cutter assembly. The instrument packages include a plurality of sensors including an accelerometer (32), magnetometer (33) and temperature sensor (34), for monitoring the associated cutter assembly. The sensors are mounted in a distal end of the instrument packages that is biased to remain in contact with the cutter assembly. The instrument packages include a wireless transmitter, and they are interconnected in a mesh or peer to peer network. A power supply (176) such as a battery pack is provided for each instrument package. The data from the sensors may be used to control operation of the tunnel boring machine and/or to monitor the condition of the cutter assemblies.

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