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(54) Title: ANTI-FATIGUE SHOCK MITIGATION SYSTEM

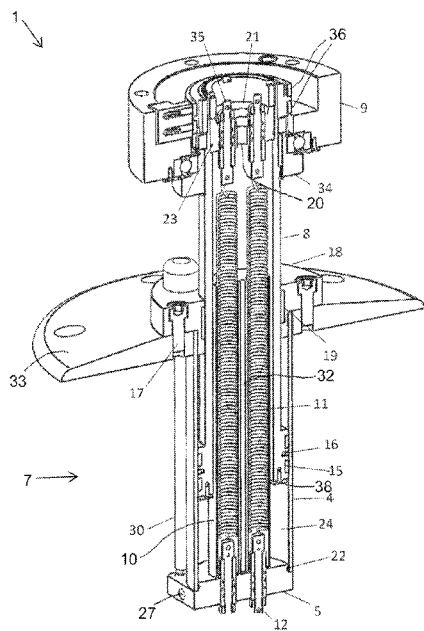


Fig. 3

(57) Abstract: A control system and method for the seat suspension described herein utilizes a pneumatic cylinder which forms the shock absorber, an air compressor, solenoid valve and a microelectromechanical system (MEMS) based control. In operation, the pneumatic cylinder is filled with a compressible gas and sustained under pressure for the purpose of supporting the static weight of the occupant as well as providing comfort by reducing transmitted vibrations and high acceleration from external disturbances. A control process utilizes vibration data from the MEMS to adjust the gas cylinder pressure accordingly to reduce and damp the undulations of the supported mass.

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AMENDED CLAIMS

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1. An adaptive pneumatic seat suspension system, comprising:
 - a seat;
 - a seat suspension comprising a pneumatic cylinder, said seat being carried by said seat suspension;
 - a piston reciprocally mounted in said pneumatic cylinder;
 - an air compressor operatively connected to said pneumatic cylinder;
 - an electronic control operatively connected to control a pressure in said pneumatic cylinder; and
 - at least one of elastic electrical conductor(s) extending through said piston and cylinder to pass current through said seat suspension.

2. The system of claim 1, further comprising a rotary connector connected to said piston to carry said seat, and an electrical slip ring interconnecting with said elastic electrical conductor(s), said electrical slip ring comprising conductors in a circular configuration to allow continuous 360° rotation of said seat with respect to said pneumatic cylinder without twisting said elastic electrical conductor(s).

3. The system of claim 1, further comprising at least one electrically insulated cavity mounted for insulating said elastic electrical conductor(s) from any other elastic electrical conductor(s).

4. The system of claim 1, further comprising microelectromechanical system (MEMS) sensor operatively connected to said control and to said piston to sense changing disturbance conditions based on movement of said piston, and a pressure sensor operatively connected to said control to sense said pressure in said pneumatic sensor.

5. The system of claim 1, further comprising a mounting flange secured to said cylinder, guide members mounted to prevent rotation of said piston, said piston being connected to a rotary connector, said rotary connector carrying said seat.

6. The system of claim 1 further comprising a piston guide, said piston being tubular and encircling said piston guide, said pneumatic cylinder encircling said piston and said piston guide.

7. The system of claim 6, comprising guide members, said guide members comprising ball bearings positioned to ride in grooves formed in at least one of said piston or said piston guide.

8. The system of claim 1, wherein said elastic electrical conductor(s) are coiled to provide an elastic property of said elastic electrical conductor(s).
9. An adaptive pneumatic seat suspension system, comprising:
- a seat;
 - a seat suspension comprising a pneumatic cylinder, said seat being carried by said seat suspension;
 - a piston reciprocally mounted in said pneumatic cylinder;
 - an air compressor operatively connected to said pneumatic cylinder;
 - at least one elastic electrical conductor(s) extending through said piston and cylinder to pass current through said seat suspension;
 - an electronic control operatively connected to control a pressure in said pneumatic cylinder;
 - at least one microelectromechanical system (MEMS) operatively connected to said electronic control and to said piston to sense changing disturbance conditions based on movement of said piston;
 - a pressure sensor operatively connected to said control to sense said pressure in said pneumatic sensor; wherein

said control is programmed to utilize signals from said MEMS and said pressure sensor.

10. The system of claim 9, further comprising a rotary connector connected to said piston to carry said seat, and an electrical slip ring interconnecting with said elastic electrical conductor(s), said electrical slip ring comprising conductors in a circular configuration to allow continuous 360° rotation of said seat with respect to said pneumatic cylinder without twisting said elastic electrical conductor(s).

11. The system of claim 9, further comprising a piston guide, said piston being tubular and encircling said piston guide, said pneumatic cylinder encircling said piston and said piston guide.

12. A method for making an adaptive pneumatic seat suspension system, comprising:

providing a seat carried by a seat suspension;

providing that said seat suspension comprises a pneumatic cylinder;

providing a piston reciprocally mounted in said pneumatic cylinder;

providing an air compressor operatively connected to said pneumatic cylinder;

providing a control operatively connected to said pneumatic cylinder to control a pressure in said pneumatic cylinder;

providing at least one elastic electrical conductor(s) that extend through said piston and cylinder to pass current through said seat suspension; and

providing that said elastic electrical conductor(s) are electrically insulated from any other elastic electrical conductor(s).

13. The method of claim 12, further comprising providing an electrical slip ring interconnecting to said elastic electrical conductor(s) and said seat, and providing that said electrical slip ring comprises conductors in a circular configuration to allow continuous 360° rotation of said seat without twisting said elastic electrical conductor(s).

14. The method of claim 12, further comprising providing a at least one electrically insulated cavity to form at least a portion of said electrical insulation of said elastic electrical conductor(s).

15. The method of claim 12, further comprising providing a microelectromechanical system (MEMS) operatively connected to said control and to said piston to sense changing disturbance

conditions based on movement of said piston, and providing a pressure sensor operatively connected to said control to sense pressure in said pneumatic sensor.