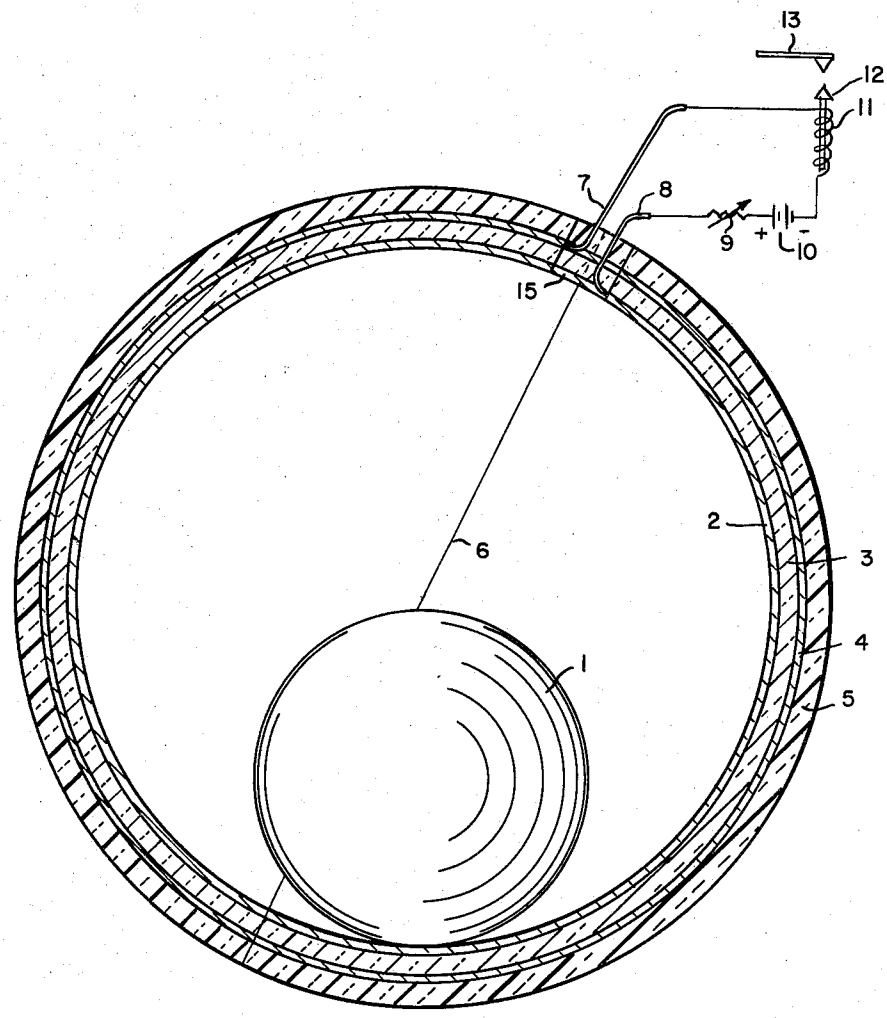
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OMNIDIRECTIONAL "G" SWITCH

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OMNIDIRECTIONAL "G" SWITCH

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The invention that is described herein may be manufactured and used by or for the United States Government for governmental purposes without the payment to me of any royalty thereon.

This invention concerns a "G" switch that is omnidirectional in its response to acceleration and deceleration to which it is subjected.

Accurate indications of G values in rocketry, missile launchings, jet propelled sleds and the like are becoming of increasing importance as research work progresses on sending living beings away from the surface of the earth. G is a symbol used for acceleration due to gravity and is a constant of the value 6.6576×10^{-8} c.g.s. units.

The invention that is disclosed herein is adjustable in terms of G forces and has as objects the prevention of people and apparatus from experiencing critical forces; providing a dependable indication of the relative magnitude of acceleration and decleration forces and the like.

An illustrative embodiment of the present invention is shown in section in the single FIGURE of the accompanying drawing.

The device that is illustrated in the drawing comprises a heavy spherical ball 1 of steel, iron or the like enclosed within a pressure sensitive spherical shell such that the inertia of the ball under acceleration or deceleration applies localized pressure on the ball contacted inside thin shell wall of a magnitude that is in direct relation with the force of the acceleration or deceleration for the time period the acceleration or deceleration is applied and in the direction that is opposite to the direction from which the force is applied.

The pressure sensitive spherical shell wall comprises a thin metal, electrically conductive, first hollow sphere 2 that is spaced by a layer of powdered carbon 3 from a rigidly backed second hollow sphere 4 that also is of electrically conductive metal such as copper, silver, steel or the like. The powdered carbon in the layer 3 is electrically sensitive to pressure. The powdered carbon illustratively may be bonded in a compact mass with clear finger nail polish, which is commonly an amyl acetate solution of lacquer, varnish or shellac.

The pressure sensitive spherical shell wall is supported mechanically on the outside by a nonconductive outside sphere 5 of plastic or the like.

The building of the device is accomplished by assembling semispheres of the members together consecutively from the inside out and successively lap welded or butt welded as preferred, along weld lines such as the weld line 6 in the drawing, or the like.

Electrical signal is derived from the device over insulated lead wires 7 and 8 that have ends soldered to the thin conducitve spheres 2 and 4 at exposed locations, as indicated in the drawing.

The lead wires 7 and 8 illustratively may connect through an adjustable variable resistor 9 to a power source, such as the battery 10, and to the winding 11 of an iron core relay 12.

Under the acceleration applied mass of the heavy spherical ball 1, the thin metal inner sphere 2 is flexed at a localized area and the resultant compression of the carbon powder 3 between the spheres 2 and 4 causes the battery 10 to energize the relay winding 11 to magnetize its iron core to attract and close its contact 13. The

closing of the contact 13 initiates the doing of work such as the closing of one or a number of electrical switches, not shown, that limit or correct critical forces, light a red warning light, turn off the power that energizes the force, actuate an indicator, or the like.

The nonconductive outside sphere 5 may be provided with extensions, not shown, for attaching the device to a desired mounting with screws, bolts, or the like.

The interior of the spherical shell wall may be sealed from the entrance of dust, water vapor and the like by closing the aperture 15 that houses the wires 7 and 8 in a desired manner. As illustrated, discs of the size of the aperture 15 and of the material of which the parts 2, 3, 4 and 5 are made may be fitted consecutively into their respective positions in the aperture 15 and consecutively secured in place without opening the insulation on the wires 7 and 8 to accomplish the structure shown. Where preferred however the aperture 15 may be made as small as possible and may be sealed or closed, with an air and water proof, electrically nonconducting, firmly hardening, caulking material at a desired pressure or at a desired stage of vacuum. The closing and sealing of the aperture 15 is preferred in the interest of the functional accuracy of performance of the device.

This invention may be used to activate or to deactivate an electrical circuit in the performance of desired functions. Critical acceleration may be reduced or arrested by the switching functions of the disclosed device.

It is to be understood that the device that is shown and described herein is an operative embodiment of the present invention and that similarly functioning modifications in the structure, materials and uses for the device may be made without departing from the scope of the invention.

I claim:

1. An ominidirectional force indicating device comprising a heavy spherical ball that is free to roll in any direction and that is adapted for freedom of inertial movements responsive to acceleration and deceleration forces applied to the device; an electrically conductive, hollow inner sphere of thin metal within which the ball is positioned; a powdered carbon layer disposed outwardly of the inner sphere and sensitive to localized pressure applied by the ball to the inner surface of the sphere; an electrically conductive, hollow outer sphere of metal spaced by the powdered carbon layer from the electrically conductive inner sphere; and electrical contacts attached to the electrically conductive inner sphere and the electrically conductive outer sphere and available outside of the device.

2. The device defined by the above claim 1 with the electrical contacts connected to a relay actuated by the pressure of the ball applied to the inner sphere and locally compressing the powdered carbon.

3. The device defined by the above claim 1 with its interior sealed from ambient atmosphere.

4. The device defined by the above claim 2 with the electrical contacts successively connected through components consisting of an adjustable variable resistor, a power source, and the winding of an iron core relay with a contact actuated to closed position on the localized compression of the powdered carbon layer by the localized depression of the inner sphere by the inertia of the heavy ball when the device is subjected to acceleration in any direction.

5. The omnidirectional force indicating device comprising a heavy spherical ball that is free to roll in any direction in response to acceleration and deceleration forces to which the device is subjected; an electrically conductive first spherically hollow thin metal shell wall within which the ball is positioned and that is deformed locally by movements of the ball from its inertia mass causing localized temporary deformation of the thin metal first

shell wall corresponding in direction, in magnitude and in time duration to force applied to the device; a compressible powdered carbon layer disposed radially outwardly from the thin metal first shell wall within which the ball is positioned; an electrically conductive spherically hollow second thin metal shell wall that is spaced radially by the powdered carbon layer from the electrically conductive first thin metal shell wall and that rigidly backs and supports the powdered carbon layer; a first electrical insulated lead wire that has a first end soldered to the electrically conductive first thin metal shell wall; a second electrical insulated lead wire that has a first end soldered

to the electrically conductive second thin metal shell wall and that, together with the first lead wire, conduct signal away from the device.

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