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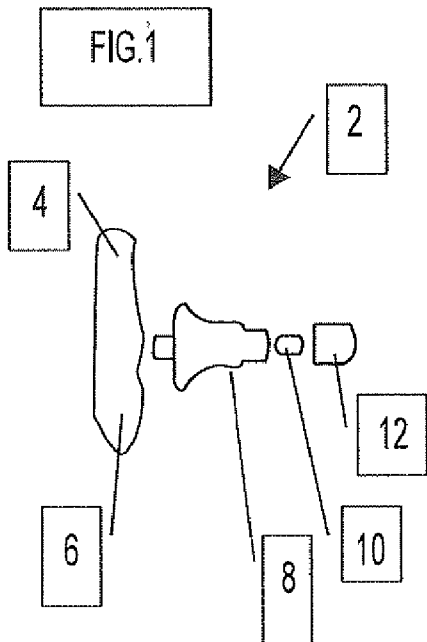
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(54) Title: A COMPREHENSIVE TIRE PRESSURE MAINTENANCE SYSTEM

(57) Abstract: A comprehensive tire pressure maintenance system for use with motor vehicles, that includes a TPMS with an externally mounted battery, a tubular battery configured for deployment on a valve stem configured to accommodate said deployment of said tubular battery, a self-inflating pressure-optimizing tire arrangement, and a self-inflating run-flat tire arrangement and a wireless tire pressure gauge.



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AMENDED CLAIMS

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1. A comprehensive tire pressure maintenance system for use with motor vehicles, the system comprising:

- (a) a TPMS having:
 - (i) a sensor deployed in an internal region defined by a tire mounted on a wheel; and
 - (ii) an externally mounted battery;
- (b) a tubular battery configured for deployment on a valve stem configured to accommodate said deployment of said tubular battery, such that at least a portion of the valve stem passes through an axial through bore of said tubular battery;
- (c) a self-inflating run-flat tire arrangement;
- (d) a self-inflating pressure-optimizing tire arrangement; and
- (e) a wireless tire pressure gauge.

2. A TPMS with an externally mounted battery for use with a wheel with a tire mounted thereon, the TPMS comprising:

- (a) a valve stem configured to accommodate deployment of the externally mounted battery;
- (b) a battery configured to deployment on said valve stem; and
- (c) wires that pass through a valve stem base into an interior region defined by a combination of the tire mounted on the wheel so as

to provide electric communication between the battery and a TPMS sensor deployed in said interior region.

3. The TPMS of claim 2, wherein said battery is a tubular battery configured with an axial through bore.

4. A tubular battery for mounting on a valve stem, the tubular battery comprising;

(a) an outer casing; and

(b) an axial through bore, such that at least a portion of the valve stem passes through said axial through bore.

5. A self-inflating run-flat tire arrangement for use with a tire mounted on a wheel of a motor vehicle having a tire pressure sensor system, the self-inflating run-flat tire arrangement comprising:

(a) a pressurized air reservoir deployed in an internal volume of the tire; and

(b) an inflatable air bladder, deployed in said internal volume of the tire, said inflatable air bladder configured to receive pressurized air from said pressurized air reservoir so as to fill said internal volume and thereby re-inflate the tire.

6. The self-inflating run-flat tire arrangement of claim 5, further including a regulator for controlling air flow between various components of the self-inflating run-flat tire arrangement.

7. The self-inflating run-flat tire arrangement of claim 6, wherein said regulator is configured to control at least one of:

- (a) air flow from a valve stem to said internal tire volume;
- (b) air flow from said valve stem to said air reservoir;
- (c) air flow from said air reservoir to said internal tire volume;
- (d) air flow from said air reservoir to inflatable air bladder;
- (e) air flow from said internal tire volume to said valve stem so as to release air; and
- (f) air flow from said air bladder to said valve stem so as to deflate air bladder.

8. The self-inflating run-flat tire arrangement of claim 6, wherein said regulator is configured so as to be remotely controlled.

9. An automatic self-inflating pressure-optimizing tire arrangement for use with tire mounted on a wheel of a motor vehicle having a tire pressure sensor system, the self-inflating pressure-optimizing tire arrangement comprising:

- (a) a pressurized air reservoir deployed in an internal volume of the tire; and
- (b) a regulator for controlling air flow between said pressurized air reservoir and said internal volume so as to maintain an optimal predetermined tire pressure so as to correct for minor air loss.

10. A wireless tire pressure gauge for use with a motor vehicle having a TPMS, the wireless tire pressure gauge comprising:

- (a) an RF receiver tuned to transmitting units of the vehicle's TPMS;
and
- (b) a display screen configured to display at least one of a target air pressure and an actual air pressure.

11. The wireless tire pressure gauge of claim 10, wherein said RF receiver and said display screen are integrated into a key fob.

12. The wireless tire pressure gauge of claim 10, wherein said RF receiver and said display screen are configured in an electronic tire pressure gauge and regulator combination that physically attaches to a valve stem during tire inflation.

13. A method for operating a self-inflating run-flat tire arrangement for use with tire mounted on a wheel of a motor vehicle having a tire pressure sensor system, the method comprising:

- (a) deploying within a internal volume of the tire:
 - (i) a pressurized air reservoir;
 - (ii) an inflatable air bladder configured to receive pressurized air from said pressurized air reservoir so as to fill said internal volume and thereby re-inflate the tire and maintain an operational tire pressure;

- (iii) a regulator configured for automatically controlling air flow between various components of the self-inflating run-flat tire arrangement; and
- (b) upon loss of air pressure within the tire, automatically operating said regulator to control air flow between said air reservoir and said bladder.

14. A method for operating a self-inflating pressure-optimizing tire arrangement for use with tire mounted on a wheel of a motor vehicle having a tire pressure sensor system, the method comprising:

- (a) deploying within a internal volume of the tire:
 - (i) a pressurized air reservoir; and
 - (ii) a regulator configured for automatically controlling air flow between said pressurized air reservoir and said internal volume; and
- (b) upon loss of air pressure within said internal volume to a level below a predetermined threshold, automatically operating said regulator to control air flow between said air reservoir so as to return the air pressure in said internal volume to within an optimal tire pressure range.