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PATENT SPECIFICATION

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Int. Cl.:—B 60 g, B 62 d // F16f.

COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in Vehicle Suspension

We, GIRLING LIMITED, a British Company of Kings Road, Tyseley, Birmingham 11, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to improvements in a suspension unit for a vehicle wheel, the suspension unit being of the kind in which a stub axle is carried by a substantially vertical telescopic strut of which the lower end is articulated by linkage to the vehicle chassis or frame and the upper end is supported in an anchorage allowing a limited degree of angular movement, the suspension unit including a helical compression spring.

According to our invention, in a suspension unit of the kind set forth for a vehicle wheel the strut comprises a single tube telescopic hydraulic damper of which the cylinder carries a stub axle for the wheel and which incorporates an air or gas spring adapted to support a part of the load on the wheel and comprising a volume of air or gas under pressure located within the cylinder.

A constructional embodiment of our invention is illustrated by way of example in the accompanying drawing which is a longitudinal section of a suspension unit, the damper being shown partially extended.

In the construction shown in the drawing the damper comprises a cylinder 10 in which works a piston 11 carried by a piston-rod 12 which extends through a seal 13 at the upper end of the cylinder. The upper end of the piston rod is rotatably mounted in a bearing 14 housed in a rubber or other flexible mounting 15 on the vehicle chassis.

Passages through the piston are controlled by a shim valve 16 allowing flow of liquid through the piston in both directions against resistances determined by the loading of the valve.

A separator piston 17 is axially slidable in the cylinder below the working piston 11 and the space 18 between the separator piston and the lower end of the cylinder which is closed is occupied by air or other gas under a pressure which is preferably at least five atmospheres. The remainder of the cylinder is filled with oil or other liquid.

In a modification the separator piston may be replaced by a rolling diaphragm of which the periphery is secured to the cylinder wall.

A hollow cylindrical spacer 19 of substantial axial length is located in the upper part of the cylinder above the working piston 11. The spacer, which may be made of metal or plastic, prevents undue extension of the strut and also reduces the volume of liquid in the strut so that the strut is less sensitive to variations in the height of the suspension due to changes in the volume of the liquid with temperature.

A rubber buffer (not shown) may be provided between the lower end of the spacer 19 and the working piston 11 to prevent noise on impact of the piston with the spacer on rebound movements.

The lower end of the cylinder is secured in a socket in a fitting 21 which carries a stub axle 22 and is articulated to the vehicle chassis for substantially vertical movement relative to the chassis.

A helical compression spring 23 fits over the upper part of the cylinder between abutments 24, 25, on the cylinder and on the piston rod respectively. This spring takes part of the load on the suspension and the remainder is taken by the compressed air or gas in the lower end of the cylinder.

The abutment 25 on the piston-rod carries a cylindrical dust shield 26 extending downwardly over the upper end of the cylinder.

The piston rod 12 of the damper is of a

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diameter sufficient to accommodate forces due to braking and cornering, and the cylinder is of a diameter which is governed by the necessity for it to clear the wheel tyre which is indicated in dotted lines.

WHAT WE CLAIM IS:—

1. A suspension unit of the kind set forth for a vehicle wheel in which the strut comprises a single tube telescopic hydraulic damper of which the cylinder carries a stub axle for the wheel and which incorporates an air or gas spring adapted to support part of the load on the wheel and comprising a volume of air or gas under pressure located within the cylinder.

2. A suspension unit of the kind set forth for a vehicle wheel in which the strut comprises a cylinder containing hydraulic fluid, a piston working in the cylinder and incorporating means for controlling the flow of fluid through it in both directions, a piston-rod carrying the piston and extending through a seal at one end of the cylinder, a stub axle for the wheel carried by the cylinder, and a space within the cylinder at one end thereof filled with air or other gas under pressure acting as an air spring which supports a part of the load on the wheel.

3. A suspension unit as claimed in Claim 2 in which the space for air or gas under pressure is located at the lower end of the cylinder and is separated from the liquid with which the remainder of the cylinder is filled by a separator piston slidably mounted in the cylinder or by a rolling diaphragm.

4. A suspension unit as claimed in Claim 2 or 3 in which a hollow cylindrical spacer is located in the upper part of the cylinder above the working piston to prevent undue extension of the strut and to reduce the volume of liquid in the cylinder.

5. A suspension unit for a vehicle wheel substantially as described with reference to the accompanying drawing.

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