

12 **EUROPEAN PATENT APPLICATION**

21 Application number: 79302517.2

51 Int. Cl.³: **B 61 F 5/30**
B 61 F 5/38

22 Date of filing: 09.11.79

30 Priority: 14.11.78 GB 4432878

43 Date of publication of application:
28.05.80 Bulletin 80/11

84 Designated Contracting States:
BE DE FR IT SE

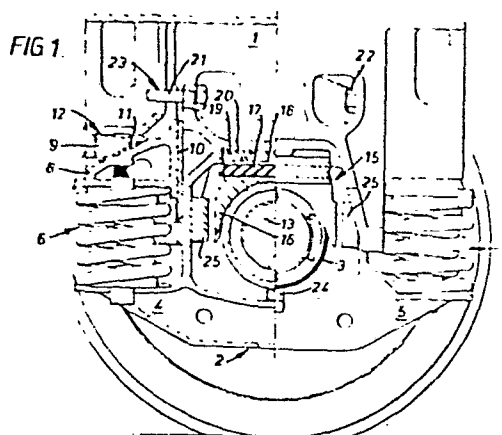
71 Applicant: **British Steel Corporation**
33, Grosvenor Place
London SW1X 7JG(GB)

72 Inventor: **Briggs, Alan Henry**
226, Hatherley Road
Rotherham, Yorkshire(GB)

74 Representative: **Broughton, Clifford David**,
British Steel Corporation Patent Section 33, Grosvenor
Place
London SW1X 7JG(GB)

54 **Railway wagon suspension units.**

57 This invention relates to a railway wagon suspension unit of the type comprising a frame (1) mounted over a saddle (2) accommodating an axle journal housing (3) with a load spring suspension system (6) disposed between the frame and the saddle. The saddle bears on the housing through a mounting which includes a rubber block (17) together with the conventional rib (19) and channel (20) structure, the rubber permitting a controlled degree of movement between the saddle and the housing principally restricted to longitudinal motion in the direction of travel of the wagon, in which rubber yields to shear stress, and lateral motion by which the saddle pivots on the mounting about the housing. The principal advantage of the introduction of this mounting is that the axle is permitted to self steer into tight curves at low speed whilst retaining satisfactory high speed performance. Hitherto, the wedges have tended to accommodate longitudinal motion on curves only in a comparatively disjointed fashion by somewhat 'stepwise' slipping and this has been particularly marked at low speeds.



RAILWAY WAGON SUSPENSION UNITS

This invention relates to railway wagon suspension units; such units may be used separately in conjunction with each wheel of a single axle two-wheel assembly, i.e. a pedestal, or embodied in side frames in a composite bogie structure,
5 e.g. a four-wheel two axle or six-wheel three axle bogie.

It is known to provide a railway wagon suspension unit comprising a frame mounted over a saddle accommodating an axle-journal housing, with a load spring suspension system disposed between the frame and the saddle, the saddle bearing
10 on the housing through a mounting adaptor including a curvilinear surface engaging a further surface whereby to permit pivotal lateral motion of the saddle and the housing relative to one another. Such a unit is the subject of UK Patent No. 1433948. With such an arrangement longitudinal
15 motion between the axle-journal housing and the saddle, principally manifested when negotiating curves, has tended to be accommodated in a comparatively disjointed somewhat stepwise fashion by movement of the customary wedges in the suspension system, adversely affecting the ride, particularly
20 at slow speeds, and promoting wear.

The present invention mitigates this drawback by providing in the mounting a body of elastomeric material. With this arrangement there is permitted a controlled degree of

movement particularly in respect of the longitudinal motion of the kind referred to where the elastomer now yields to shear stress, additionally, lateral pivotal movement of the kind by which the saddle pivots or swings about the housing mounting adaptor is accommodated whilst direct lateral translational movement of the saddle relative to the adaptor is restrained.

Now particularly, as distinct from more conventional pedestal designs hitherto, there is a larger degree of clearance for longitudinal movement between the axle-journal housing/adaptor and the saddle walls so as to accommodate such movement when the elastomeric body is subjected to shear stress. With this invention, such longitudinal movement which, as mentioned, is principally manifested when negotiating curves, is wholly accommodated by the elastomer up to a load rate equal to that at which the friction on the wedges in the load spring suspension system is overcome. The principal advantage of the introduction of this elastomeric mounting is that the axle is permitted to self steer into tight curves at low speed whilst retaining satisfactory high speed performance; this enables a higher mileage to be obtained between tyre turning, i.e. re-furbishing worn tyres on the wheels.

In order that the invention may be fully understood some embodiments thereof will now be described with reference to the accompanying drawings in which,

BAD ORIGINAL

Figure 1 is a part sectional side elevation of a pedestal unit in accordance with this invention.

Figure 2 is a part sectional end elevation through the wheel axle.

5 Figure 3 is one modified form of elastomeric mounting, and

Figure 4 is another modified form of mounting.

Referring now to Figures 1 and 2 in the drawings there is shown a railway wagon pedestal unit comprising a frame 1
10 mounted over a saddle 2 accommodating an axle-journal housing 3. The saddle embodies a platform having a fore-section 4 and an aft section 5. Mounted on these sections are spring nests 6,7 respectively engaging friction wedges, only one pair of which 8,9 is visible.

15 The wedge 8 bears on a friction pad 10 on the side of the saddle and a pad 11 on the inclined under-surface of the wedge 9, which wedge itself nestles in a right angled recess 12 formed in the frame 1.

The spring nests comprise a combination of springs having
20 different rates which together effect three stage springing.

The journal housing accommodates a wheel axle 13 in roller

bearings 14. Surmounting the journal housing is an 'adaptor' 15 comprising a cast member 16 having a recess in its upper surface accommodating a rubber block 17 which is bonded to an upper plate 18 carrying an elongated rib 19. The rib 19 has 5 a curved surface on which bears an inversely curved elongated channel member 20 which is mounted on the underside of the saddle aperture.

The channel and rib together with its resilient yaw mounting together form a composite rocker assembly.

10 Two studs 21,22 extend from the top of the saddle casting into slots, only one of which (23) is visible, in the pedestal frame 1. This ensures retention of the saddle within the pedestal unit should the latter be lifted.

A curved clip member 24 is located on the bottom of the saddle 15 aperture to prevent the journal housing from becoming detached from this aperture and a pair of 'stop' blocks 25 are welded to the sides of the saddle to limit relative longitudinal motion between the journal housing adaptor and the saddle.

When the unit is in service the saddle is rocked about this 20 composite rocker assembly imparting lateral shear stresses on the load spring nests - lateral stresses on the rubber block itself are restrained by plate 18 bearing on the side of the cast member 16.

Longitudinal motion is accommodated by the rubber block u
to a certain limiting value beyond which the friction on the
wedges in the load spring suspension system is overcome
whereby, for motion in the left hand direction in Figure 1
5 the wedge will move in that direction compressing the load
springs 6 and the right hand wedge will likewise move in that
direction under the expansive forces of springs 7.

The rubber block 17 is shearing longitudinally up to and
during the stage at which the wedges start to move, limited
10 only by the casting 16 abutting the stop block 25.

Vertical loading is accommodated directly by the load springs
sets 6,7 and the rubber block in compression. It is necessary
to select the vertical and longitudinal load rates of the
rubber block to be compatible with the vertical suspension
15 spring rates and the desired axle yaw performance at slow
speed in tight curves and at high speed on normal track.
Typical specific rates selected may be vertical greater than
50 tons/inch, longitudinal 10 - 20 tons/inch, the figure in
any one instance being dependent on vehicle characteristics,
20 performance data and track to be negotiated.

Alternative forms of mounting are shown in Figures 3 and 4,
both designed to eliminate lateral clearance. In the former
case the rubber block (26) is bonded to upper and lower

plates 27,28, the upper plate 27 additionally being spigotted at 29 to the elongated metal rib 19, the whole defining a 'flared' U-shaped configuration. In the other case, Figure 4, the design is similar but the lower plate is actually made up of three separate elements including two side plates of which only 28A is visible. The intermediate plate within the rubber mounting is omitted.

Whilst the lateral stiffness is increased, neither restrict the longitudinal stiffness in any way.

- 10 The pedestal unit described may be manufactured as shown complete with the rocker assembly or the latter may be separately incorporated in 'converted' units, i.e. existing units which have been machined to accommodate the rocker assembly conversion.
- 15 Although this suspension unit has been described with reference to the specific embodiments illustrated, it is to be understood that various modifications may be made without departing from the scope of this invention. For example, other forms of wedge configuration and load spring nests could readily be adopted as indeed could other forms of the elastomeric mounting, e.g. an additional plate could be inserted in the side rubbers in the Fig 3/Fig 4 embodiments to increase lateral stiffness. Variable rate springs could
- 20

be introduced instead of the multi-stage springing shown in the suspension system.

1. A railway wagon suspension unit comprising a frame (1) mounted over a saddle (2) accommodating an axle-journal housing (3), with a load spring suspension system (6) disposed between the frame and the saddle, the saddle bearing on the housing through a mounting adaptor (15) including a curvilinear surface engaging a further surface whereby to permit pivotal lateral motion of the saddle and the housing relative to one another, characterised in that the mounting includes a body of elastomeric material (17) whereby to permit a controlled degree of movement between the saddle and the housing principally restricted to longitudinal motion in the direction of travel of the wagon in which the elastomer yields to shear stress but additionally affecting both lateral shift and the said lateral pivotal motion.

2. A suspension unit according to claim 1, characterised in that both of the mutually engaging surfaces of the mounting adaptor are curvilinear, one being in the form of a channel (20) and the other in the form of a rib (19) of smaller curvature which nestles in the channel, the elastomeric body being bonded to the channel or rib about which the said pivotal motion is effected.

3. A suspension unit according to claim 2, characterised in that the channel is formed in, or housed in, the saddle.

4. A suspension unit according to claim 3, characterised in that the elastomeric body is bonded to the rib via a plate (27) intermediate the rib and body.

5. A suspension unit according to claim 4, characterised in that the elastomeric body is additionally bonded to an intermediate plate (28) mounted on the axle journal housing.
6. A suspension unit according to claim 5, characterised in that the elastomeric body and one or both of the intermediate plates bonded thereto are U-shaped depending over the sides of the axle journal housing whereby to restrain lateral motion.
7. A suspension unit according to claim 5 or claim 6, characterised in that the constituent parts of the mounting adaptor together form a separate detachable rocker assembly.
8. A suspension unit according to any one of the preceding claims, characterised in that the suspension system comprises two spring nests (6,7) one mounted on the fore platform of the saddle and the other mounted on the aft and engaging two friction wedges (8) each of which bears on the side (10) of the saddle and the underside of the pedestal frame.
9. A suspension unit according to claim 8, characterised in that each wedge bears on the underside of the pedestal frame via an intermediate wedge (9), whereby the co-operating wedge angles can be selected to suit the required degree of friction control.
10. A railway wagon suspension unit substantially as herein described with reference to the accompanying drawings.

1/3

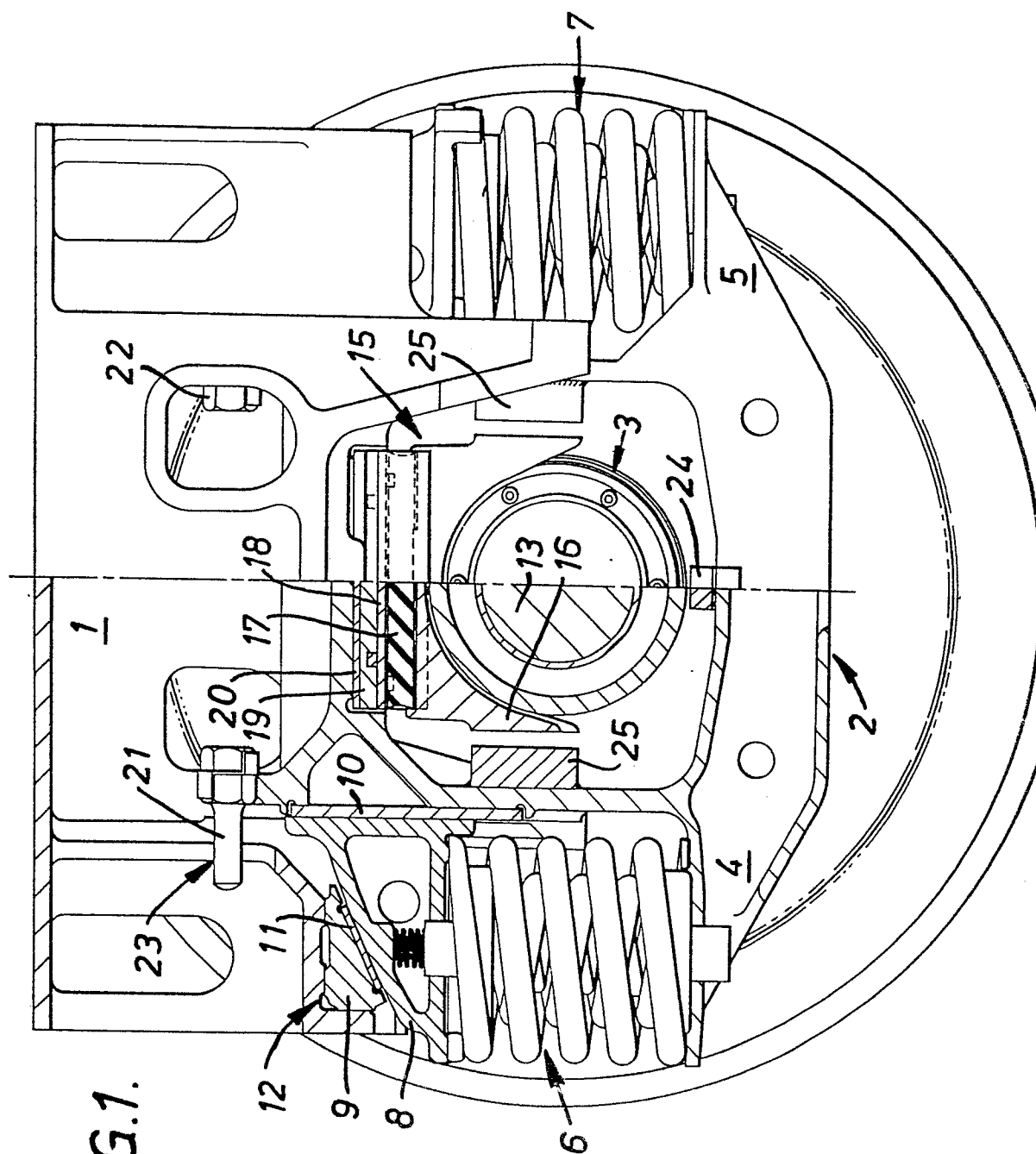


FIG. 1.

3/3

FIG. 3.

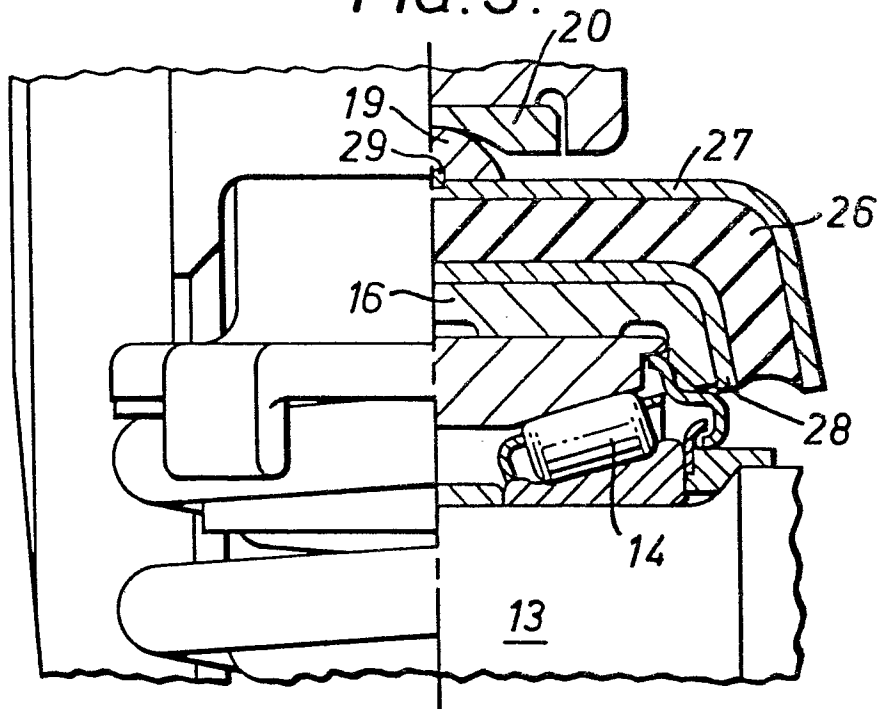
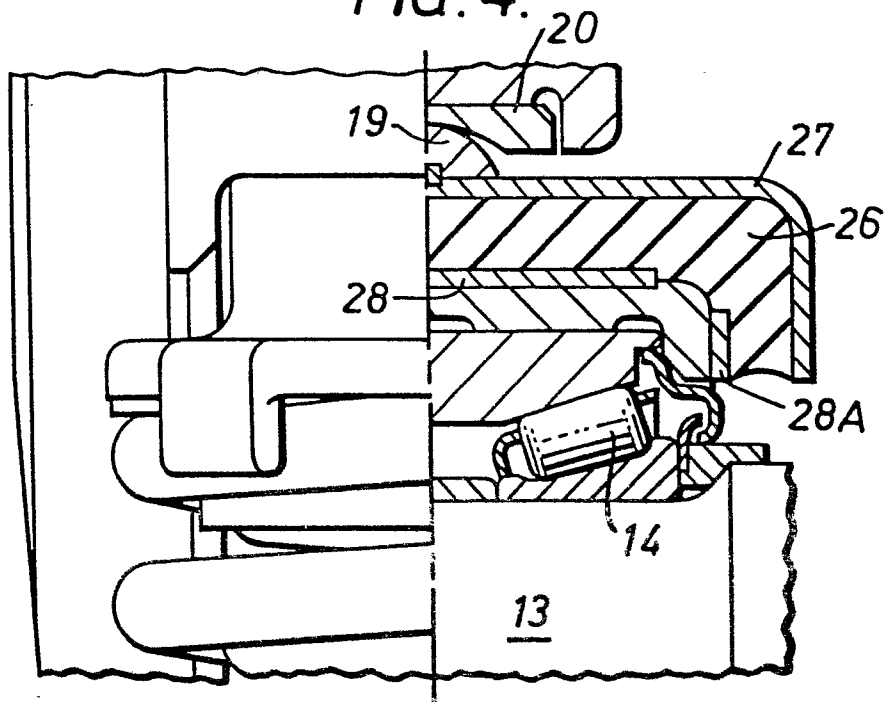


FIG. 4.





European Patent
Office

EUROPEAN SEARCH REPORT

0011453

Application number
EP 79 30 2517

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 1 065 228</u> (LORD) * Page 1, line 29 - page 2, line 66; figures 1-5 *	1,6,7	B 61 F 5/30 5/38
	--		
	<u>GB - A - 1 025 808</u> (LORD) * Page 1, line 49 - page 2, line 41; figures 1-4 *	1,2	
	--		
	<u>US - A - 3 638 582</u> (BERBE) * Column 1, line 16 - column 2, line 59; figures 1-3 *	1,2,4, 5-7	TECHNICAL FIELDS SEARCHED (Int.Cl. ³)
	--		
	<u>US - A - 1 745 320</u> (BRITAIN) * Entire document *	1-3,8	B 61 F B 60 G
	--		
	<u>US - A - 4 026 217</u> (CROSS) * Entire document *	1-3	
	--		
	<u>GB - A - 1 408 651</u> (BRITISH STEEL) * Figure 1 *	8,9	
	--		
D	<u>GB - A - 1 433 948</u> (BRITISH STEEL)		CATEGORY OF CITED DOCUMENTS
A	<u>FR - A - 2 296 556</u> (GLOUCESTER)	1	X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
A	<u>GB - A - 1 138 059</u> (S.A.G.A.)	1	
A	<u>GB - A - 976 605</u> (LORD)	1	
A	<u>GB - A - 772 644</u> (SCHWEIZERISCHE LOKOMOTIV- UND MASCHINENFABRIK)	1	
	--		
	The present search report has been drawn up for all claims		&: member of the same patent family, corresponding document
Place of search The Hague		Date of completion of the search 03-03-1980	Examiner ESPEEL



0011453

Application number

EP 79 30 2517

-2-

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>US - A - 2 405 132 (BRITAIN)</u> -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)