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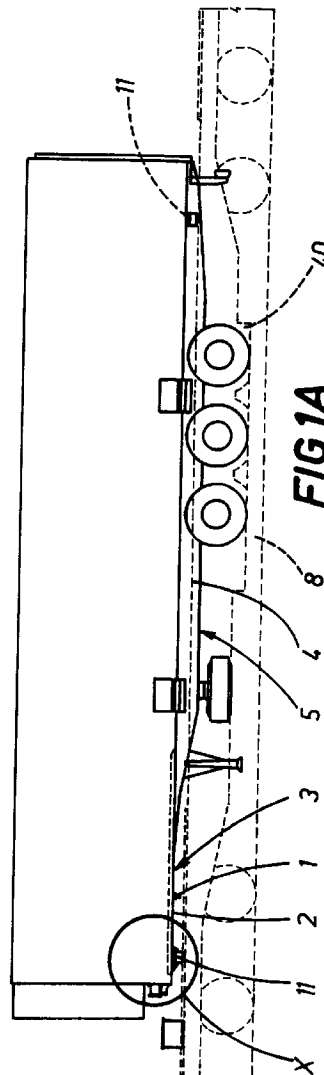
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An anti-pitching device for intermodal semitrailers during transport by rail.

The invention relates to an anti-pitching device for semitrailers destined both for use on the road and for loading on railway cars. The semitrailer (5) comprises a vertical pivot (1) projecting from a flat face (2) of a frontal part (3) of the trailer frame (4), which pivot (1) is associable with a fifth wheel of a hauling vehicle. The railway car exhibits means for fixing containers to the car, comprising spikes (10) for blocks (9) affording engagement holes (14) for the spikes (10). The device (18) comprises four rigid supports (11) bearing the blocks (9) and constrained to the frame (4) and distributed on the two opposite sides (9) thereof. Two of the four supports (11) are located on the front part (3) of the frame (4) and are conformed such as to support said blocks (9) at least during road transport of the semitrailer (5).



The invention relates to an anti-pitching device for intermodal semitrailers (destined both for use on the road and for loading on railway cars), during transport on railway cars.

The semitrailer comprises a vertical pivot projecting from a frontal part of the trailer frame, which pivot is associable with a fifth wheel of a hauling vehicle; the above-mentioned association provides a vehicle-trailer articulation necessary for transporting the semitrailer by road. A railway car exhibits means for fixing containers to the car, comprising spikes for blocks affording engagement holes for the spikes.

Railway cars are usually equipped for receiving various types of load, among which are semitrailers also equipped for road use and usual unwheeled containers.

To fix the front of the semitrailers to the railway car a special housing is provided for the semitrailer articulation pivot, while the back end of the semitrailer, though its wheels are housed in a special loading pit fashioned in the car floor, is free to oscillate and tilt, obeying the properties of the semitrailer suspension, when the car negotiates a curve in the railway track.

Containers, on the other hand, can be solidly constrained to the railway car by means of a system of spikes engaging in shaped holes in fixing blocks exhibited by the containers themselves.

Anchoring the semitrailers in the the loading pit has however proved to be effective, except where the width of said semitrailers is between 2.5 metres and 2.6 metres on lines not equipped to tolerate such measurements. The above drawback is due to the fact that when the semitrailers, particularly if they are refrigeration-plant-equipped, or in any case wheeled trailers, tend to tilt during transport around curves, and their main sections are therefore liable to exceed the legally-set width limits for transport on certain lines.

A further drawback is represented by the fact that with respect to the railway tracks the loading pit is higher than the fixing spikes for the containers: this means that containers loaded on to the cars (due to legal container height limits) have to be vertically shorter than would otherwise be possible, leading to a loss of transportable volume.

The aim of the present invention, as it is characterised in the claims that follow, is to obviate the above-described drawbacks.

The invention solves the problem by providing an anti-pitching device for intermodal semitrailers comprising rigid supports bearing fixing blocks of the semitrailer to the spikes of the railway car, arranged on two opposite sides of the car and conformed in such a way as to realize rigid connections between the semitrailer and the car which at least during the semitrailer's use as a road trailer, are positioned above the face of the frame associable to the fifth

wheel of the vehicle hauling said semitrailer.

The fundamental advantages obtained by means of the present invention essentially consist in the fact of obviating the need for a loading pit in the car, and resultingly enabling all types of road semitrailer to be carried on railway cars regardless of limitations connected with load size and dimensions.

The device of the invention affords the further advantage of permitting transport of larger-volume semitrailers, with consequent cost reductions.

Further characteristics and advantages of the present invention will better emerge from the detailed description that follows, of an embodiment of the invention, illustrated in the form of a non-limiting example in the accompanying drawings, in which:

figures 1A and 1B illustrate, according to respectively a vertical view and a plan view from above, an intermodal semitrailer arranged on a railway car and provided with fixing devices according to the 15 invention;

figure 2 is an enlarged scale of a plan view from above of the device according to the invention, indicated by X in figure 1A;

figure 3 shows a section of the device according to line III-III of figure 2;

figure 4 is a frontal view of the device of figure 3; figure 5 is an enlarged scale view of a section of the device of figure 2, made according to line V-V;

figure 6 is an enlarged scale view of a section of the device of figure 2, made according to line VI-VI;

figure 7 is an enlarged scale view of a section of the device of figure 2 according to line VII-VII;

figure 8 is an enlarged-scale view of a view of the device of figure 3 seen from point D;

figure 9 is an enlarged view of a detail of figure 3, sectioned according to line IX-IX.

With reference to the enclosed drawings, figures 1A and 1B show that the invention largely consists in an anti-pitching device 18 for intermodal semitrailers 5 destined for use as road trailers but also transportable on railway cars 8, of the type 15 provided with a loading pit 40.

The semitrailer 5 comprises a vertical pivot 1 projectingly borne on a flat face 2 of a front part 3 of its frame 4, which front part 3 is destined to couple superposingly with a conventional fifth wheel located on the back of a road haulage vehicle (not illustrated) by means of said vertical pivot 1; this to allow articulation of the haulage vehicle and the semitrailer 5 during road use.

The railway car 8 further comprises conventional fixing means, typical of such devices for constraining containers, provided with spikes 10 for blocks 9 (figures 3 and 9) exhibiting engagement holes 14 for said spikes 10.

The anti-pitching device 18 comprises four rigid

supports 11 bearing the blocks 9, which supports 11 are constrained to the frame 4 and distributed on the two opposite sides 19 thereof.

Two of the four supports 11 are located on the front part 3 of the frame 4 while the remaining two supports 11 are located at the back 41 of the frame 4 on a reinforcing crossbar 42 on said frame 4.

The front supports 11 are conformed such that the blocks 9, at least during road circulation of the semitrailer 5, can be removed totally above the face 2 of the frame 4.

Figure 3 shows in greater detail that the device 18 comprises a flange 15 for constraining the supports 11 during railway use of the device 18, which flange 15 can be removed from the face 2 of the frame 4 before the semitrailer 5 is used on the road, at least in cases where the supports 11 due to their mass cannot be stably lodged above the face 2 and removably from the frame 4.

The solution in which the flange 15 is removable preferably comprises a horizontal pivot 16 borne by the frame 4 of the semitrailer 5, on which pivot 16 a first end 151 of the flange 15 for fixing the supports 11 is hinged such as to be rotatable from a first work position corresponding to the condition of the semitrailer 5 when transported on a railway car 8 in which a second end 152 of the flange 15 is associated to means 17 for blocking interacting between the flange 15 and the frame 4, to a rest position of the flange 15 corresponding to the semitrailer 5 condition when in road use, angularly rotated with respect to the pivot 16, in which the supports 11 are located above the face 2 of the frame 4 (figure 1) while the second end 152 of the flange 15 is correspondingly engaged by means 23 for holding said flange in the rest position.

The flange 15 is further provided with a guide 33 for sliding along the pivot 16 such that the flange 15 can be translated (see figure 2) horizontally between a vertical plane 20 passing through the work position and the rest position of said flange 15 and a vertical plane 21 intermediate to the vertical plane 20 and the halfway line plane 22 of the railway car 8 at which position the flange 15 and the relative support 11 are contained internally of the outline of the semitrailer 5 during turning manoeuvres in road use. The angle of curvature of the maximum road turning manoeuvre (with the pivot 1 as the centre point) is indicated by R in figure 2.

In figure 6 it can be seen that the means for blocking 17 comprise a bolt 24 shaped to fit into a through-cavity 25 made at the second end 152 of the flange 15. The bolt 24 is slidably borne by a guide 26 on the frame 4 having an interrupted central portion 27 in which, in said work position of the flange 15, the second end 152 of the flange 15 is inserted in alignment with the cavity 25, with the guide 26 staying engaged by drawing the bolt home through the guide 26 and the cavity 25.

The means for constraining 23 the flange 15 comprise a structure 28 for holding, together with the flange 15, the supports 11 in their rest position.

The structure 28 is interconnected with the frame 4 and is provided with horizontal rest elements 29 having an angular profile and a flat vertical element 32 for horizontally contacting the supports 11.

The rest elements 29 and the vertical element 32 (figure 8) are associated to a pawl 30 borne by the vertical element 32 superiorly to the rest elements 29 and rotatable about a horizontal pivot 31 oscillatingly about a stable equilibrium position.

The pawl 30, when in a raised position, allows free transit of the supports 11 so that they can locate on the rest elements 29 of the structure 28, while it interferes, when in the lowered position, with the second end 152 of the flange 15 such as to prevent extraction of the supports 11 from the structure 28.

Figures 3 and 5 show that the sliding guide 33 exhibits a much greater breadth than the pivot 16 such as to permit the flange 15 to be translatable with respect to the frame 4 perpendicularly to the rotation axis 161 of said pivot 16 to enable greater ease of insertion of the supports 11 on the rest elements 29.

Preferably the device 18 further comprises an arm 34 hinged to the pivot 16 at said first end 151 of the flange 15. The arm 34 is hinged to the flange 15 at an intermediate pivot 36 (figure 7). With this connection system the arm 34 (figure 7) permits of positioning the supports 11 in the rest position, starting from the work position of the flange 15, with two successive rotation movements, a first of which is described together by the flange 15 and the arm 34 which rotate together about the pivot 16; the second rotation movement is effected by the flange 15 which rotates with respect to the arm 34 after the arm 34 has reached a limit position determined by the strike of the arm 34 against the walls 43 of a shaped recess 44 afforded in the frame 4 of the semitrailer 5.

Claims

1. An anti-pitching device for intermodal semitrailers (5) during transport on a railway car in which the semitrailer (5) comprises a vertical pivot (1) projecting from a frontal part of a trailer frame (4), which pivot (1) is associable with a fifth wheel of a hauling vehicle to achieve a relative articulation between said semitrailer (5) and said hauling vehicle; and in which the railway car (8) comprises means for fixing a container to a car which means for fixing are constituted by spikes (10) for blocks (9) affording engagement holes (14) for the spikes (10); said anti-pitching device (18) being characterized in that it comprises at least four rigid supports (11) bearing the blocks (9), which supports (11) are constrained to the frame (4)

- and distributed on the two opposite sides (19) thereof; at least two of said supports (11) being located on a front part (3) of the frame (4) and being such that the blocks (9), at least during transport by road of the semitrailer (5), can be displaced totally to above the face (2) of the frame (4).
2. A device as in claim 1, characterized in that it comprises a flange (15) for constraining the supports (11), which flange (15) can be removed from the face (2) of the frame (4) before the semitrailer (5) is transported by road.
 3. A device as in claim 1, characterized in that said supports (11) are removably fixed to the frame (4) above the face (2).
 4. A device as in claim 2, characterized in that it comprises a horizontal pivot (16) solidly mounted on the frame (4), on which a first end (151) of said flange (15) is hinged such as to render said flange (15) rotatable from a first position corresponding to when said semitrailer (5) is transported on the railway car (8), in which a second end (152) of said flange (15) is associated with means for blocking (17) interacting between the flange (15) and the frame (4), to a second position, corresponding to when said semitrailer (5) is transported by road, in which the flange (15) is angularly rotated with respect to said horizontal pivot (16) and in which said supports (11) are located superiorly to the face (2) of the frame (4) while said second end (152) is engaged by means for holding (23) said flange (15) in a rest position.
 5. A device as in claim 4, characterized in that said flange (15) is provided with a guide (33) along which said horizontal pivot (16) slides from a first vertical plane (20) passing through said first position and said second position of the flange (15) and a second vertical plane (21) which is intermediate to said first vertical plane (20) and a half-way line plane of the railway car (8) at which second vertical plane (21) the flange (15) and the support (11) are contained within a total mass outline of the semitrailer (5) during turning manoeuvres of the hauling vehicle during road use of the semitrailer (5).
 6. A device as in claim 4, characterized in that the means for blocking (17) comprise a bolt (24) shaped such as to fit into a through-cavity (25) made at the second end (152) of said flange (15), said bolt (24) being slidably borne by a guide (26) situated on the frame (4), said guide (26) having a central portion (27) in which at said first position of the flange (15), the second end (152) thereof is inserted in alignment with the cavity (25) with the guide (26) staying engaged due to the bolt (24) being drawn home through said guide (26) and said cavity (25).
 7. A device as in claim 4, characterized in that said means for constraining (23) the flange (15) comprise a structure (28) for holding, together with the flange (15), the supports (11) in said second position, said structure (28) being interconnected with the frame (4) and being provided with horizontal rest elements (29) and a vertical element (32) for horizontally contacting the supports (11), said rest elements (29) and the vertical element (32) being associated to a pawl (30) borne by the vertical element (32) superiorly to the rest elements (29) and rotatable about a horizontal pivot (31) such that the pawl (30), when in a raised position, allows location of the supports (11) on the rest elements (29) of the structure (28), while when in the lowered position, the pawl (30) interferes with said second end (152) of the flange (15) such as to prevent extraction of the supports (11) from the structure (28).
 8. A device as in claim 5, characterized in that the sliding guide (33) exhibits a much greater breadth than the pivot (16) such as to permit the flange (15) to be translatable with respect to the frame (4) perpendicularly to a rotation axis (161) of said pivot (16).
 9. A device as in claim 4 or 5, characterized in that it comprises an arm (34) hinged to the pivot (16) at said first end (151) of the flange (15) and hinged to the flange (15) at an intermediate pivot (36), said arm (34) enabling the supports (11) to be positioned in said second position, starting from said first position of the flange (15), with a first rotating movement performed together by the flange (15) and the arm (34) which rotate together about the pivot (16); followed by a second rotation effected by the flange (15) which rotates with respect to the arm (34) after the arm (34) has reached a limit position determined by an endrun strike of the arm (34) against the frame (4) of the semitrailer (5).
 10. A device as in claim 7, characterized in that said horizontal rest elements (29) exhibit an angular profile.
 11. A device as in claim 7, characterized in that said pawl (30) is oscillatingly supported by said horizontal pivot (31) about a stable position of equilibrium.

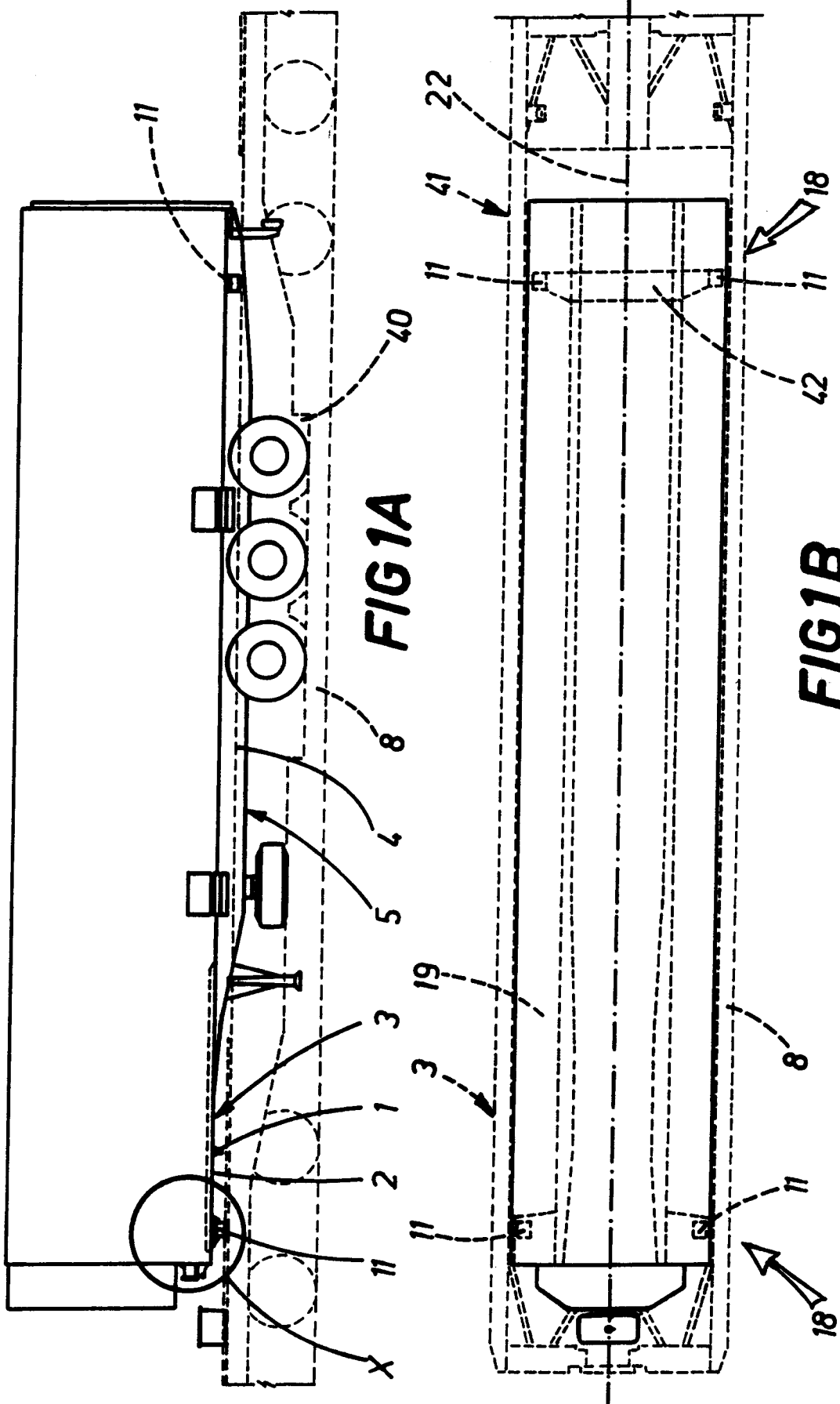


FIG 1A

FIG 1B



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0058

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	FR-A-2 534 870 (INGE-TRANS ET AL.) * page 6, line 27 - page 7, line 8; figures 1,2,8,9 *	1	B62D53/06 B61D3/18
A	EP-A-0 572 849 (WAGGONFABRIK TALBOT) * column 5, line 2 - line 50; figures 4,5 *	1	
A	EP-A-0 510 467 (WAGGONFABRIK TALBOT) * column 5, line 4 - line 29; figures 2-4 *	1	
A	EP-A-0 142 589 (FRUEHAUF FRANCE) * the whole document *	1,3	
A	EP-A-0 401 391 (ROSBY) * abstract; figures *	1-5	
A	US-A-3 575 118 (GRAMSE) * figures 3,4,6 *	1,3-5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B62D B61D B60S B60P
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 26 July 1995	Examiner Krieger, P
CATEGORY OF CITED DOCUMENTS		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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