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ARTICULATED ROAD TRAINS

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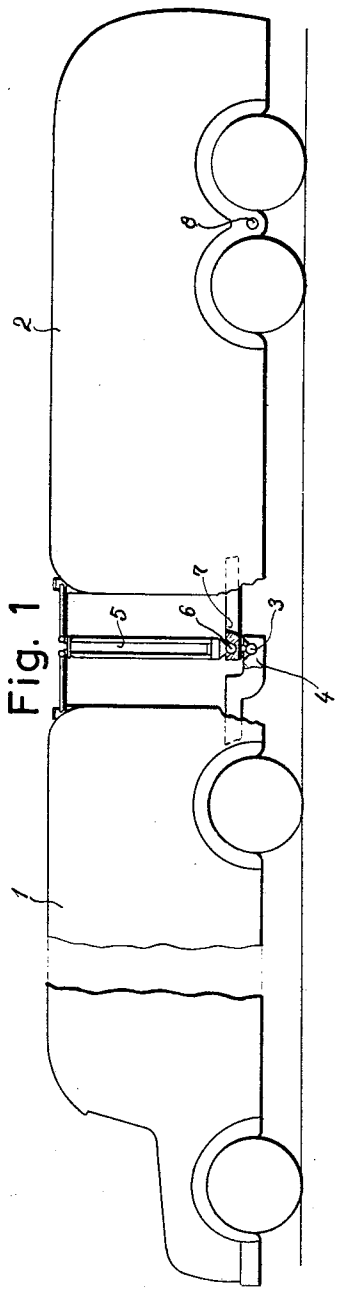


Fig. 1

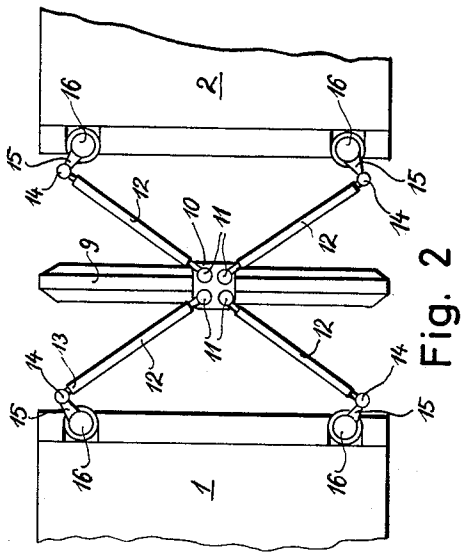


Fig. 2

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ARTICULATED ROAD TRAINS

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The present invention relates to a road train consisting of a tractor truck and a trailer, the front part of which reposes by means of an articulated coupling on the rear end of the tractor truck.

It is known to arrange in such a road train between the extremities facing each other a portal-type yoke which is arranged over the center of the vehicle coupling in an articulated manner and which serves as a support for the concertina connection of the two vehicles. This yoke is held in its position by bars linked to the roof of the vehicles. For this purpose there is arranged on each vehicle in its longitudinal center a bar, the second extremity of which is coupled to the upper bow of the yoke, whereby the bars, seen from above, form a straight line. These bars comprise telescopic tubes, into each of which is mounted a pre-tensioned spring. The spring forces of the two telescope tubes act against each other and compensate one another and the yoke arranged between them is held in the central position.

It is furthermore known in a road train of the described kind to hold the yoke in position by means of two rigid rods, which each engage in an articulated manner a double-arm lever arranged pivotally on the yoke and parallel to it. Such means hold the yoke in central position, but they cannot prevent pendulum movements of the vehicle bodies towards each other around their longitudinal axis.

In another road train of the described kind it is known to arrange on the roof of each vehicle a toggle-joint acting in a vertical plane, whereby the toggle-joints meet above the center of the vehicle coupling in a double universal joint. The upper yoke bow is connected with this universal joint. The purpose of this double toggle-joint coupling is to prevent the vehicle from making pendulum movements in opposite directions around the longitudinal axis and to avoid having the rotatable platform passage arranged between the two vehicles lift at its rims to present an obstruction which might present a stumbling risk for the passengers. The toggle-joint coupling, however, is not suitable for maintaining the yoke in position, and for this purpose additional springs are provided. It is also possible to bring the yoke in the center position, when driving through curves, by means of the toggle joint coupling.

An object of the invention is, to provide a mounting support for a connecting yoke for vehicles, which holds the yoke in position and which controls also the center position when driving through curves and damps the relative movements of the vehicles in respect to each other.

In order to solve this problem the invention provides in a road train articulated connection which engages—starting from each vehicle—at least on two separate points arranged at a distance from the longitudinal center of the road train on the upper bow of the yoke. By this measure there is reached simultaneously the holding of the yoke and a considerable tranquilization of the vehicle bodies during the run.

A particularly simple embodiment of the inventive idea is obtained if on the upper yoke bow in four points the extremities of four elastic tapes are fastened, the other extremities of which are connected with the front

rims of the vehicles in such a way that the tapes—seen from above—have the shape of an X.

For heavy vehicles an increase of the elastic forces is desirable in some cases. This can take place according to the invention in such a manner that the tapes are replaced by bars which are elastic in the pull and pressure direction, e.g. telescopic bars with springs. A particularly effective design can be reached by the fact that the bars are arranged rigidly but are mounted on the front walls of the vehicles by vertically arranged rotation springs, the horizontally pivotable operating levers of which are connected with the bar extremities in an articulated manner. The rods can be designed in such a manner that their length can be modified and that they can be locked. In this way the elastic means can easily be placed under pre-tension when the road train is running straight. For the damping effect it is, furthermore, advantageous, if the springs are formed as progressively acting spring element.

Other objects and advantages will be apparent from a consideration of the specification and claim.

FIG. 1 shows the road train in side elevation, whereby the concertina connection is partly broken away for a better understanding of the drawing; and

FIG. 2 is a plan view of a mounting support of the yoke in an enlarged scale.

The road train with articulated connection consists in a known manner of a tractor truck **1** and a trailer **2**, the front part of which reposes through a ball coupling **3** on the rear extremity **4** of the tractor truck **1**. This ball coupling **3** can be replaced by another articulated couplings, e.g. a rotating ring coupling. Between the extremities of the vehicles **1** and **2** facing each other there is arranged a portal-type yoke **5**, which is arranged over the center of the vehicle coupling **3** by means of a further ball coupling **6** and on the front extremity **7** of the trailer **2**. This portal-type yoke **5** serves as a support for a (not shown) concertina connecting the vehicles **1** and **2**.

In the embodiment shown, the trailer **2** is provided with two vehicle axles, which are carried on the trailer frame in such a manner that they oscillate around the transverse axle **8**, so that the trailer can swing vertically with its front part. In FIG. 1 the two vehicles **1** and **2** are represented as vehicles with frames. It is, however, possible that the tractor truck as well as also the trailer may be configurated as self-supporting vehicles.

The portal-type yoke **5** carries on its upper yoke bow **9** over the center of the ball-coupling **3** an abutment plate **10** rigidly connected with the bow **9**. On each corner of the abutment plate **10** there is linked a rigid bar **12** by means of a ball and socket joint **11**. The bars **12** lead to the front rims of the vehicles **1** and **2** and they are arranged symmetrically in such a way that they have the shape of an X, seen in plan view. Each rod **12** carries on the other end **13** a further ball coupling **14** which serves as a connection with a horizontally pivotable operating lever **15** which cooperates with vertical rotation springs **16** arranged on the front rims of the vehicles **1** and **2**. These rotation springs **16** are formed preferably as rubber springs, e.g. as a sleeve with a rubber element cured into it, or, as two square tubes shifted into each other with round rubber cords arranged between them in the corners. Such rubber rotation springs are known in different embodiments and, therefore, are not described further. The rods **12** can be formed in such a way that they are subdivided in several parts, so that they can be adjusted in their length and then locked in order to adjust them easily to the necessary length.

The function of the described mounting support is as follows: When the road train is straight the rods **12** hold the yoke **5** in the vertical position as shown in FIG. 1. The rods are urged into this position by the rotation

springs 16 which are in a center position and not under pre-tension when the road train is in a straight position. It is, however, also possible that each rotating spring 16 is adjusted in such a way that it exerts in this position—by a slight pre-tension—a pressure on the appertaining rod 12.

If the articulated road train runs through a curve, it bends laterally, whereby the tractor truck and the trailer rotate about the ball coupling 3. As the connection points 11 of the rods 12 coincide nearly with this rotational axis, there is practically no tension of the rotation spring 16 in such curves. The rods 12 urge, however, the yoke 5 always in a center position which bisects the angle formed by the tractor truck 1 and the trailer 2.

If the articulated road train runs over a sharp transverse bump or hole it bends vertically. Thereby the rims of the vehicle roofs come nearer to each other or the distance from each other becomes longer. As the rods 12 are of a rigid length the rotation springs 16 are tensioned in the one or the other direction when the train bends in the vertical direction. This means in practice that the vehicle bodies of the vehicles 1 and 2 cannot effect the vertical movements to their full extent when running over sharp bumps, but that they are controlled by progressively increasing force effected by the rods 12 and the rotation springs 16, whereby the progressive spring action of the rubber rotation springs has a particularly favorable effect. The vehicle bodies of the vehicles 1 and 2 execute thus an only very much damped nodding movement, while the main compensation spring work is done by the suspension springs of the wheels of the vehicles.

It is, finally, also possible that the tractor truck and the trailer make pendulum movements against each other around the longitudinal axis. In this case the front rims of the extremities of the vehicles facing each other twist, a movement which strains very much the concertina. Also these pendulum rotation movements are damped by the bars 12 and the rotation springs 16. If, e.g. seen from above in driving direction, the right hand side of the trailer 2 tends to deviate in the course of such a pendulum movement towards the right, a pulling action takes place on the bar 12 arranged on the right-hand roof side of the trailer and a pressure against the bar arranged opposite to it. These forces can become active, however, only to a certain extent, because they are absorbed by the rotation springs 16.

Thus, the mounting support consisting of the bars 12 and the rotation springs 16 always holds the yoke 5 in a vertical center position and when running through curves

does not disturb or lead to lateral shiftings of the vehicle bodies, but damps the relative movements of the two extremities of the vehicle bodies and contributes on the one hand to spare the concertina and makes possible, on the other hand, a comfortable riding for the passengers.

The fact is of a certain importance that the yoke 5 is carried on the front part 7 of the trailer 2 by means of a ball coupling 6. Thus the yoke 5 can follow pendulum movements of the vehicles against each other around the longitudinal axis in a damped manner without the fastening point of the yoke 5 on the trailer 2 being overstressed.

It is also possible to replace the rigid bars 12 by telescopic tubes with pressure and tension springs arranged between them. In this case the rotation springs 16 can be left away. Also in case of such a configuration of the yoke mounting support e.g. in the pendulum movements of the vehicle bodies around their longitudinal axis all the connection elements, i.e. the telescopic rods become active, so that the damping is relatively important.

I claim:

A coupling device for wheeled vehicles, particularly a tractor element and a trailer element, comprising a yoke frame extending substantially the height and width of said elements, ball and socket means supporting said yoke frame on one of said elements adjacent the lower end thereof, elastic means for interconnecting said wheeled elements arranged for connection to each upper corner of each of said elements and articulated to said yoke frame adjacent the top thereof at four corner locations above and adjacent a projection of the axis of said ball and socket means, said elastic means for interconnecting said wheeled elements including four rod elements, ball and socket means connecting said rod elements at the four corner locations to said yoke frame, a pivot lever connected to the free ends of each of said rod elements at their one ends and adapted to be pivotally mounted on the upper corners of said vehicle elements at their opposite ends, ball and socket joint means at the connection of said pivot lever and said rod elements, and means to bias said pivot levers to a predetermined position in a horizontal plane against rotation in either direction around the vertical axis.

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