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(54) **Single wheel drive for electrically powered vehicles, in particular trams**

Einzelradantrieb für elektrisch angetriebene Fahrzeuge, insbesondere Strassenbahnen

Propulsion de roue indépendante pour véhicules à traction électrique, en particulier pour trams

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**WO-A-00/21815** **DE-U1- 9 302 351**

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**Description**The Technical Field

[0001] The invention deals with drive of a rail vehicle wheel with pivoted mounting on an axle housing.

The Prior Art

[0002] There are particularly two conceptions applied to vehicle drive designs known so far.

[0003] The first solution group is characterized by a motor directly built in the wheel construction. The motor thus becomes a part of unsprung mass of the vehicle and thus has negative influence on the dynamic forces between the vehicle and the rails. The motor itself is exposed to high dynamic forces. Patents DE 42 34 831 C1 and EP 0 464 929 A3 serve as examples of this solution.

[0004] The second solution group is characterized by a motor mounted separately from the wheel and sprung against the wheel. The moment transmission between the motor and the wheel is solved by joints or mechanisms exposed to wear and aging. Inventions EP 0 760 305 A2, DE 196 00420 C1, DE 195 31 355 A1 may serve as examples of the second solution groups.

[0005] The disadvantages of the above solutions are thus either a high proportion of unsprung masses of a vehicle and subsequent dynamic effects or use of costly parts requiring periodic maintenance and replacement.

The Nature of the Invention

[0006] The drawbacks of the known solutions are eliminated by a single wheel drive, particularly applicable to a tram wheel, mounted on an axle housing, the nature of which is based on the principle, that the driving motor is swing mounted in a suspender firmly connected with the sprung parts of a vehicle, and the driven wheel of a rail vehicle is mounted on an axle housing pin in such a manner, that there is a cavity inside the pin for location of the driving shaft of the driving motor, or for location of the driving shaft of the driving motor and an articulated joint.

[0007] The driving shaft of the driving motor is connected by means of an articulated joint with angular and axial flexibility with the driven wheel of the rail vehicle pivot mounted on an axle housing pin.

[0008] A motor suspended this way in combination with a gear box, or a motor with a gear box and friction brake or a motor with a friction brake may form a drive unit.

[0009] The arrangement according to the invention with a sprung driving motor or sprung driving unit will favourably influence the ratio between sprung and unsprung masses of a vehicle, which will result in lower dynamic effects between the vehicle and the rail. The motor impact stress is also lower, than if it is built in a wheel, which increases reliability and life cycle of the motor.

Outline of the Figures in the Drawing

[0010] The single wheel drive according to the invention is detailed in the enclosed drawing, where Fig. 1 shows a view and cross section of a version with a ball joint, and Fig. 2 shows a version with an articulated joint with flexible elements.

Example version of the invention

[0011] The single wheel drive, particularly applicable to a tram wheels shown in Fig. 1 consists of a driving motor 1 swing suspended by a suspender 2 on a holder 3, which is connected to the sprung parts of a rail vehicle, e.g. with the chassis frame. A driving shaft 4 of the driving motor 1 is connected by means of an angularly and axially flexible articulated joint 5 with a driver 6 mounted to the rail vehicle driven wheel 7 pivot mounted on a pin 9 of the axle housing 8.

[0012] During vehicle movement the driving motor 1 is permanently connected by the driving shaft 4 and the angularly and axially flexible articulated joint 5 with the rail vehicle driven wheel 7, so it can apply driving or braking effect on the rail vehicle driven wheel 7. The reactive moment of the driving or braking effect is transferred to the sprung parts of the vehicle through the swing suspender 2.

[0013] On moving over roughness mutual vertical movement of the rail vehicle driven wheel 7 and the driving motor 1 occurs. The driving motor 1 swings in the swing suspender 2. The impacts resulting from this movement are only marginally transferred to the driving motor and thus do not threaten its function.

[0014] Fig. 2 shows wheel drive with swing mounting of the motor 1 with application of an articulated joint 5 with flexible elements.

Industrial Applicability

[0015] Single wheel drive, particularly applicable to a tram wheel, with a swinging driving motor or a swinging driving unit is applicable for newly manufactured vehicles with electric drive or electric power transmission. The arrangement is particularly suitable for low-floor vehicles, as the drive parts do not substantially interfere the space between wheels.

**Claims**

1. A single wheel drive of an electrically powered vehicle, particularly applicable to a tram wheel, mounted on an axle housing, **characterized by** swing mounting of the driving motor (1) in a suspender (2) and by connection of a driving shaft (4) of the driving motor (1) by means of an angularly and axially flexible articulated joint (5) with the driven wheel (7) pivot mounted on a pin (9) of the axle housing (8).

2. A single wheel drive according to claim 1., **characterized by** the fact that the swing suspender (2) of the driving motor (1) is connected with the part of the vehicle chassis sprung against the driven wheel (7).
3. A single wheel drive according to claims 1. and 2., **characterized by** the fact that the pin (9) of the axle housing (8) and the pivoted mounting of the driven wheel (7) are arranged so as there is a cavity inside the pin (9) of the axle housing (8) for the driving shaft (4) or the driving shaft (4) and the articulated joint (5).
4. A single wheel drive according to claims 1. to 3., **characterized by** the fact that the driving motor (1) in the arrangement with a gear box or a friction brake or in arrangement with a gear box and a friction brake form a swing driving unit.

#### Patentansprüche

1. Antrieb vom Einzelrad eines elektrisch angetriebenen Fahrzeugs, insbesondere Straßenbahnwagens, gelagert auf dem Achsträger, **dadurch gekennzeichnet**, dass der Antriebsmotor (1) in der Aufhängung (2) schwenkbar aufgehängt ist, und die Antriebswelle (4) vom Antriebsmotor (1) über die winkelig und axial nachgiebige Gelenkkupplung (5) mit dem angetriebenen Rad (7) verbunden ist, der drehbar auf dem Bolzen (9) vom Achsträger (8) gelagert ist.
2. Antrieb vom Einzelrad nach Anspruch 1., **dadurch gekennzeichnet**, dass die schwenkbare Aufhängung (2) vom Antriebsmotor (1) mit den Fahrgestellteilen des Fahrzeugs verbunden ist, die gegenüber dem angetriebenen Rad (7) abgefedert sind.
3. Antrieb vom Einzelrad nach Ansprüchen 1. und 2., **dadurch gekennzeichnet**, dass der Bolzen (9) vom Achsträger (8) und die drehbare Lagerung vom angetriebenen Rad (7) auf solcher Weise ausgeführt sind, dass ein Hohlraum für die Antriebswelle (4), bzw. für die Antriebswelle (4) und die Gelenkkupplung (5) innerhalb des Bolzens (9) vom Achsträger (8) entsteht.
4. Antrieb vom Einzelrad nach Ansprüchen 1. bis 3., **dadurch gekennzeichnet**, dass der Antriebsmotor (1) in der Anordnung mit dem Getriebe, bzw. mit der Reibungsbremse und/oder in der Anordnung mit dem Getriebe und der Reibungsbremse eine schwenkbare Antriebseinheit bildet.

#### Revendications

1. La commande de la roue indépendante du véhicule

mû électriquement, surtout la voiture de tram, posée sur la porte-essieu, se distinguant par le fait que le moteur d'entraînement (1) est logé en position orientable dans la suspension (2) et l'arbre de commande (4) du moteur d'entraînement est lié de façon angulaire et axiale par le raccord flexible orientable (5) à la roue propulsée (7) mise en position tournante sur la fusée (9) d'essieu (8).

2. La commande de la roue indépendante selon l'exigence 1., qui se distingue par le fait que la suspension basculante (2) du moteur d'entraînement (1) est assemblée aux parties du châssis du véhicule garnies envers la roue propulsée (7).

3. La commande de la roue indépendante selon les exigences 1. et 2., qui se distinguent par le fait que la fusée (9) d'essieu (8) et la position tournante de la roue (7) sont effectuées de telle façon qu'à l'intérieur de la fusée (9) d'essieu (8) il y a une petite cavité pour un arbre de commande (4) ou pour un arbre de commande (4) et un raccord orientable (5).

4. La commande de la roue indépendante selon les exigences 1. et 3., qui se distinguent par le fait que le moteur d'entraînement (1) en disposition avec la boîte de changement de vitesse ou le frein à friction ou en disposition avec la boîte de changement de vitesse et avec le frein à friction forment une unité motrice basculante.

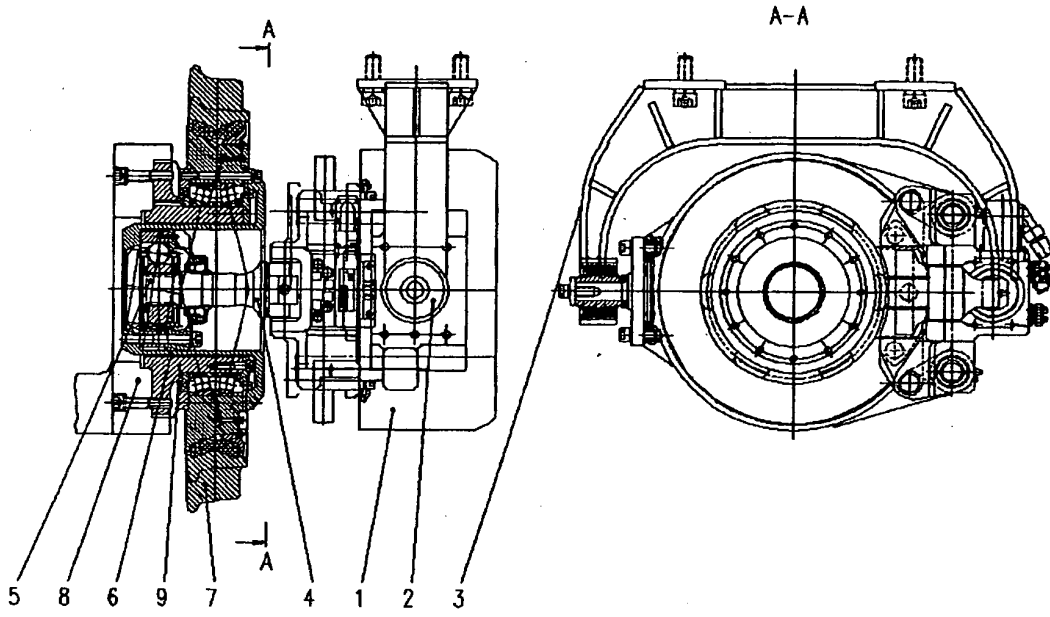


Fig. 1

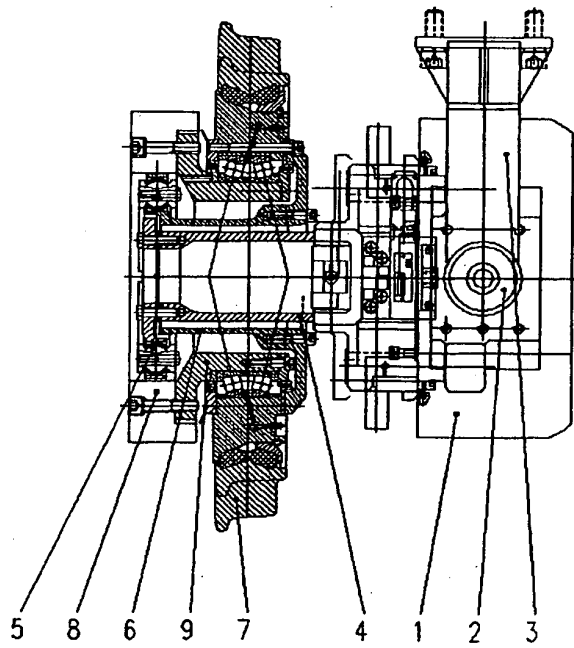


Fig. 2

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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- EP 0464929 A3 [0003]
- EP 0760305 A2 [0004]
- DE 19600420 C1 [0004]
- DE 19531355 A1 [0004]