C. DE BANGE.

RAILWAY AND TRAMWAY.

APPLICATION FILED DEC. 28, 1911.

1,085,373. Patented Jan. 27, 1914.

4 SHEETS—SHEET 1.

Fig. 1

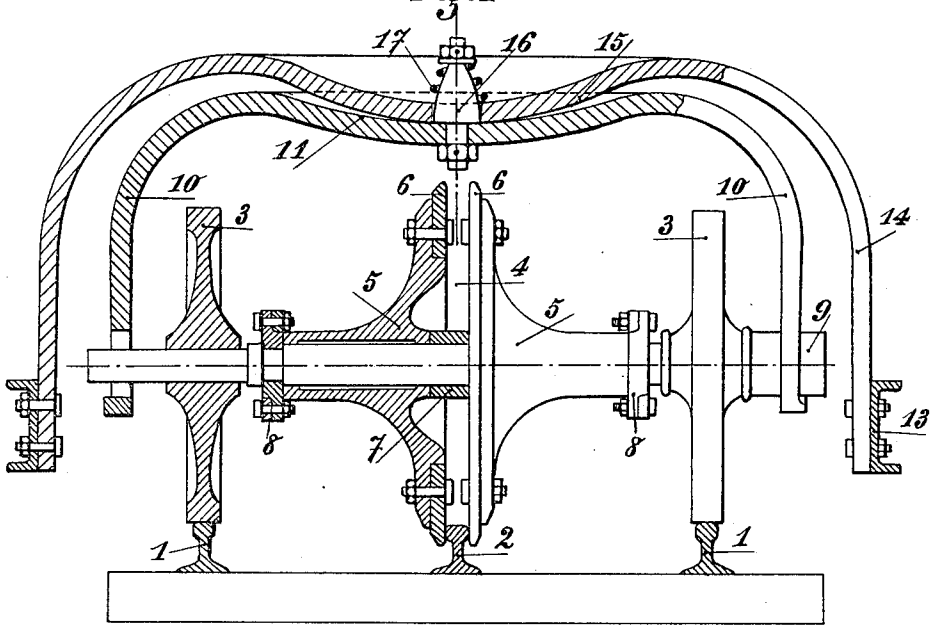
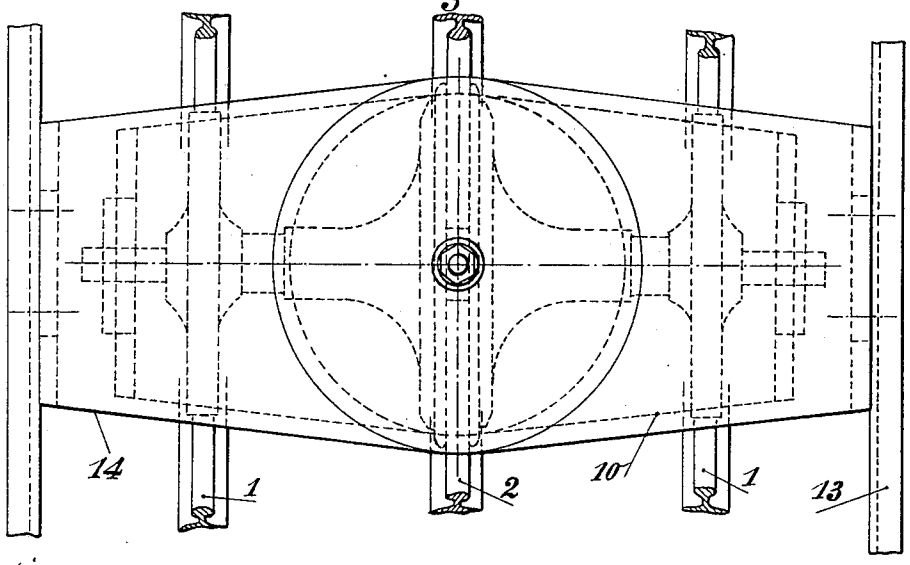


Fig. 3



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4 SHEETS—SHEET 2.

Fig. 2

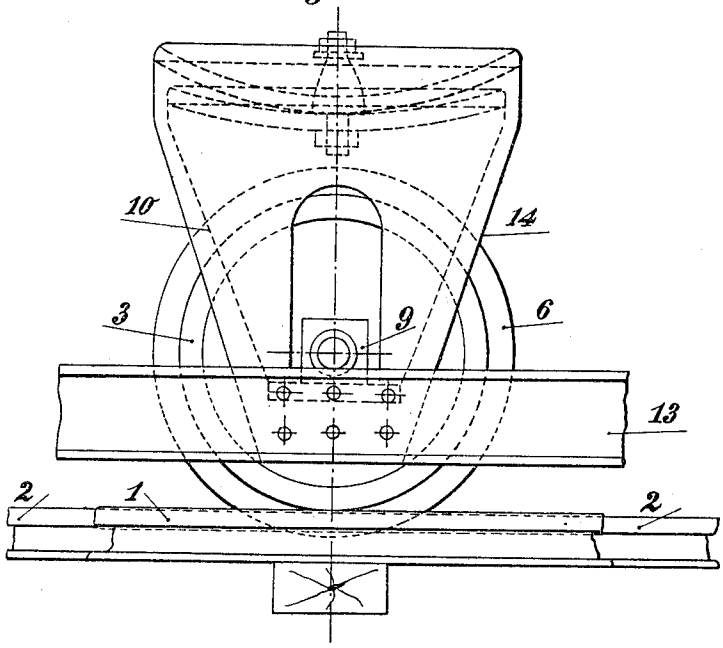
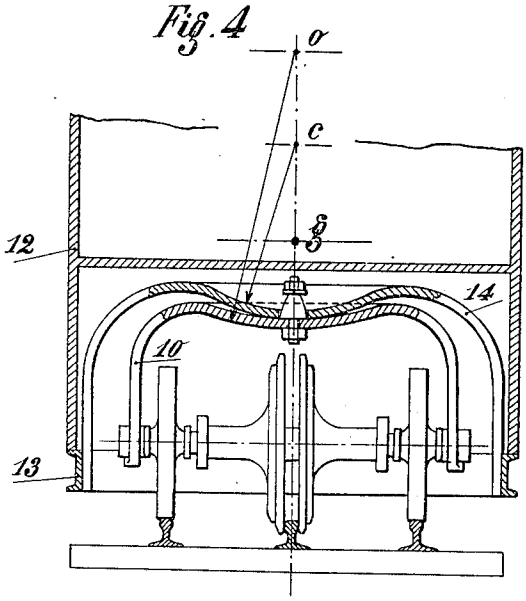


Fig. 4



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4 SHEETS—SHEET 3.

Fig. 5

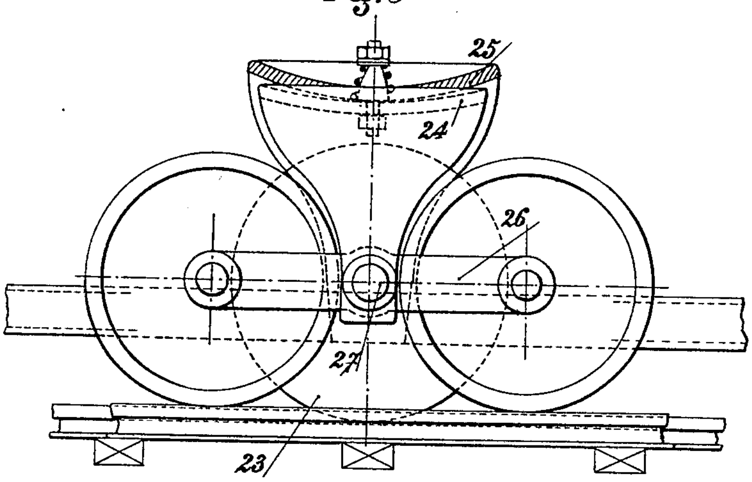
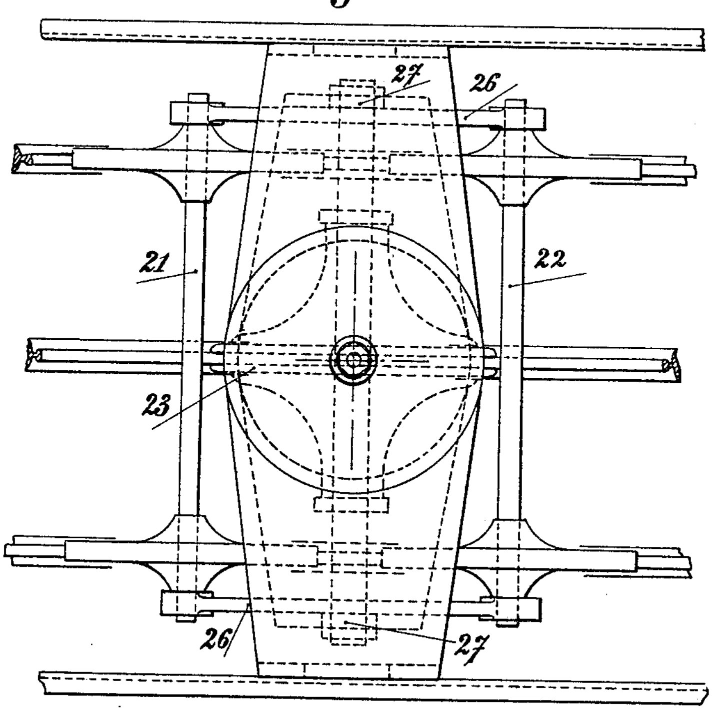


Fig. 6



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4 SHEETS—SHEET 4.

Fig. 7

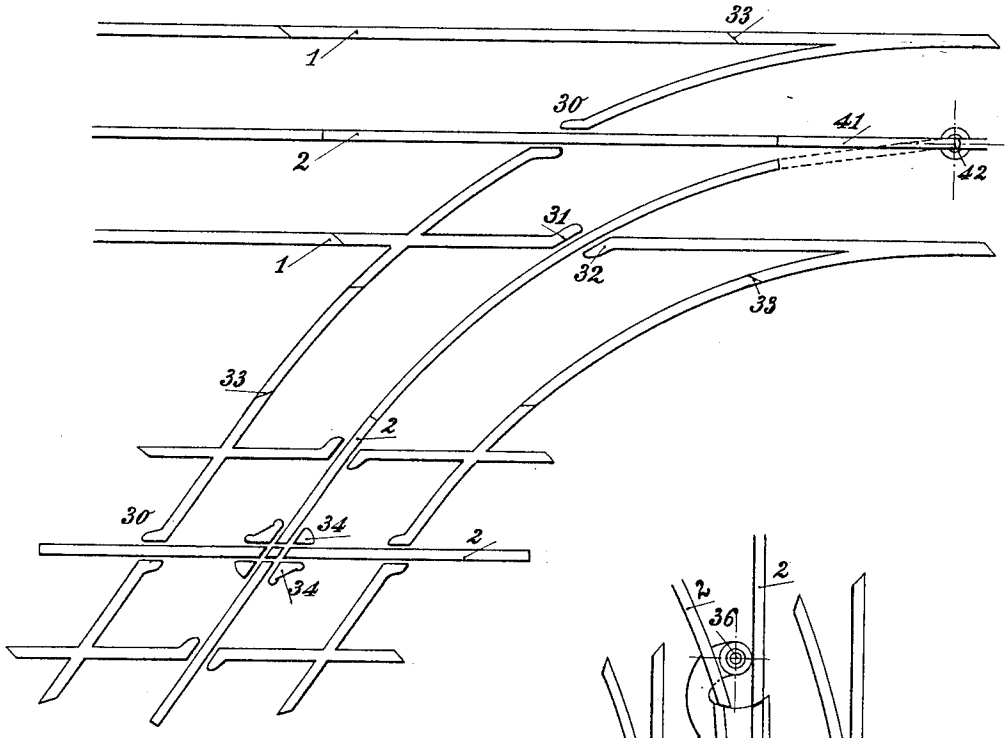


Fig. 9

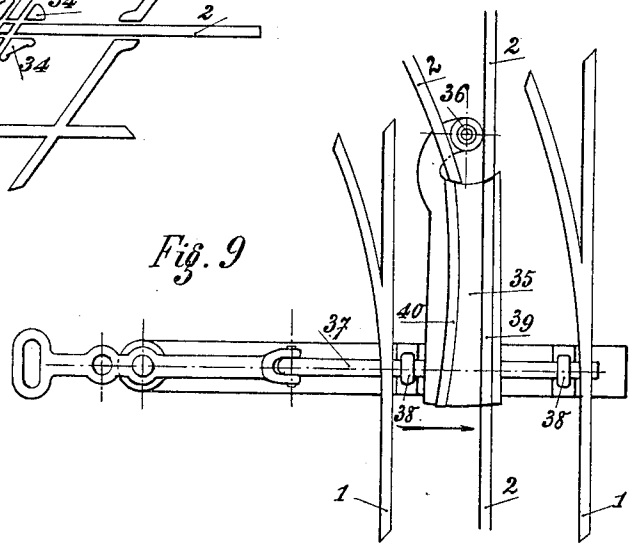
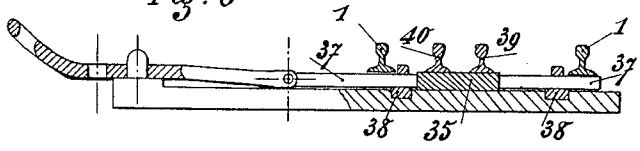


Fig. 8



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UNITED STATES PATENT OFFICE.

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RAILWAY AND TRAMWAY.

1,085,373. Specification of Letters Patent. Patented Jan. 27, 1914.

Application filed December 28, 1911. Serial No. 668,336.

To all whom it may concern:

Be it known that I, CHARLES DE BANGE, citizen of the Republic of France, residing at 10 Rue des Marais, Versailles, France, have invented certain new and useful Improvements in Railways and Tramways, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its object improvements relating to the mounting on wheels of the rolling stock of railways and tramways and is specially intended to be used for railways which are laid on the side space of the roads or on grounds diversified by hill and dale necessitating to pass over curves of a very short radius and on sudden changing inclines. In order to run safely on such diversified track the axles must be capable of placing themselves in the direction of the radius of the track, the wheels must always be equally loaded and are to be protected against all longitudinal and transverse reactions due to the inertia of the load.

The invention consists in supporting the load on each axle through a pivot or spherical bearing, in such a manner that both wheels of an axle should always be equally loaded, and each axle should be guided by a central rail by means of a double flanged wheel which always causes the same to return to a normal position with regard to the track, whereby both side wheels may be without flanges.

It will be hereafter explained how this device is facilitating the switching and crossing of the tracks which are then effected with all the desirable security.

In the accompanying drawings: Figure 1 is an elevation partly in section of an axle embodying the invention. Fig. 2 is an end view and Fig. 3 is a plan view of the said axle. Fig. 4 is a view showing the position of the centers of rotation with respect to the center of gravity of the load. Figs. 5 and 6 are side and plan views respectively of a modification. Fig. 7 is a plan view of a switch and crossing for the circulation of a railway stock constructed according to the present invention. Figs. 8 and 9 are a sectional and plan view of a modification in which the switching is effected by means of the central rail.

The track comprises three rails, two outside supporting rails designed at 1 and a central guiding rail 2, these three rails being fixed on the same sleeper. The axle is provided with three wheels, two outside supporting wheels 3 3 without flanges and a central wheel 4 provided with a groove in which engages the central rail 2, the flanges of the groove being used for guiding the said wheel. The central wheel is used as a guiding wheel only and must never bear on the rail. The supporting wheels 3 3 and guiding wheel 4 are preferably loose on the axle which may be journaled in oil-boxes. The guiding wheel may be advantageously formed of two rims 6 6 bolted on hubs 5 5 independent from each other and loosely mounted on the axle. Since the rims alone are subjected to wearing by friction on the rail 2, it will be easy to change them for new ones. The frictional bearing of the rims 6 6 will be further reduced since they can revolve independently from each other. Rings 7 and 8 are provided for keeping the hubs 5 5 apart, and outside the hubs of the supporting wheels are oil-boxes as shown at 9. The latter are used as bearings for an arch bridge 10 the central portion of which has the shape of an inverted spherical cap 11 the center of curvature *o* of which is higher than the center of gravity of the load or body of the carriage (see Fig. 4). The load or body of the vehicle the longitudinal frame members of which are shown at 13, rests on the cap 11 by means of an arch bridge 14 the central part of which is shaped to a cap 15, the curvature of which is smaller than the radius of curvature of the cap 15 on which it rests. The center of curvature *c* of the cap 15 is higher than the center of gravity *g* and is located below the center of curvature *o* of the cap 11. It will thus be seen that the load represented by the center of gravity *g* rests on the wheels by means of a spherical pivot formed by the cap 15 resting on a spherical bearing formed by the cap 11, and that all the oscillations of the center of gravity of the load, either longitudinally or transversely to the track, will have the effect of raising the center of gravity which will automatically return to its normal position. For the purpose of exactly centering the caps 11 and 15, the cap 11 is provided with a bolt or trunnion 16 the curved surface of which does not prevent the spherical parts from rolling upon each other. A spring 17 fixed

to the trunnion presses on the cap 15 whereby the same is caused to resume its normal position.

The above described device answers to all the requirements for a safe running on rails, namely whatever might be the unevenness of the track, the traction or braking strains, whatever might be the angle of the axle with respect to the carriage, the axle can always move, being guided by flanges connected therewith and in permanent contact with the central rail, and remaining loaded, so that the weight which is supported and transmitted by the said axle to the supporting wheels balances up the disturbing forces exerted on it. At the start, supposing that the forward axle is a driving axle, the said axle will have to overcome its own inertia before carrying the body along with it, which will result in a rolling motion of the cap 11 on the upper cap 15 of the body the center of gravity of which will be raised until the lever arm of the weight of the load is sufficient to balance the driving strain, and the body will then be carried along, but at the same time the displaced body will roll by means of its rear cap on the rear axle cap and will carry it along with it as soon as the lever arm of the load is sufficient to overcome the resistance of the rear axle.

Figs. 5 and 6 show the invention used in connection with two axles forming a truck. The supporting wheels are without flanges, the axles 21, 22 remain parallel, the guiding wheel 23 and the caps 24, 25 are situated in the middle of the truck. The lower cap 24 rests on the oil-boxes by means of cross bars 26 supported by the oil-boxes of the axles, and the lower cap 24 has its lower end pivoted at 27 to the said cross bar so that the load is always equally distributed on each oil-box, through the rolling motion of the upper cap on the lower cap, whatever might be the oscillations of the load.

The set of tracks represented in Fig. 7 comprises two parallel tracks each of which is composed of two outer carrying rails 1—1 and a middle guiding rail. In this figure is also shown a crossing. To insure a continuous guiding of the supporting wheels the guiding wheel must always be in engagement with the central rail. To this end, the latter should not be interrupted at the crossing, and the supporting rails should be cut, as shown at 30, for allowing the said wheel to pass over. To avoid shocks when the supporting wheels are running over the central rail, the supporting rails will be provided with extensions 31—32 parallel with the central rail which intersects them, so that the supporting wheel still bears on the rail extension 31 when it already bears on the central rail, and will already bear on the rail extension 32, before leaving the central rail. To avoid also any shocks when running over the supporting rails the latter will advantageously be assembled at an angle of 45° as shown at 33. At the crossing of the guiding rails with each other, these will necessarily have to be cut to allow of the wheel flanges to run freely over. At these points the corners will have to be provided with pieces 34 for guiding the wheel outside as a substitute for interruption of the inner guiding agent. At the crossing of the supporting rails, the latter will have to be so adjusted so as to present neither projections nor solution of continuity. For a change of direction it will be sufficient to switch the central rail. This switch may be constituted as shown in the section and plan view in the Figs. 8 and 9 in which 35 is a plate pivoted about a fixed bolt 36 and controlled by a rod sliding in guides 38. On such plate are arranged two properly shaped rail sections 39—40. In the position shown in Fig. 9 the section 39 insures the continuity of the central rail, and as the plate is moved in the direction shown by the arrow the section 40 will connect the rail 2 with the central rail of the junction line, without any interruption. The switching of the central rail can also be effected by means of a single rail section 41 pivoted about a bolt or pin 42, causing the train to run on a straight line or on the junction line according to the position, indicated in full line or in dotted line, occupied by the rail section.

Having thus described and ascertained the nature of my invention and the manner in which it is to be carried out what I claim is:

1. A device for the mounting of the rolling stock of railways in which every axle, provided with supporting wheels 3 without flanges and with a grooved central wheel 4 the flanges of which engage the guiding rail, supports the load by means of a spherical cap 15 resting on a spherical bearing 11 forming the center of an arch 10, the pedestals of which are carried on the axle by means of the oil-boxes 9; the spherical bearing 11 having a greater diameter than the spherical pivot 15 and both having their centers of curvature o and c at a higher level than that of the center of gravity g of the load, substantially as described.

2. A device for the mounting and guiding on rails of the rolling stock of railways, comprising an axle pivotally connected to the load, having its supporting wheels unprovided with flanges and having in the middle a grooved wheel 4 the flanges of which engage the guiding central rail 2, the bottom of the groove not resting on the said guiding rails and said groove being formed by two rims 6 fixed to independent hubs 5 loosely mounted on the axle, substantially as described.

3. In mounting means for railway cars, wheels and axles, an arch having a dished carrying surface mounted on each axle, and a corresponding bearing arch for each axle, fixed to the car and having a curved bearing portion carried by and adapted to turn upon said dished carrying surface, substantially as described.

4. In mounting means for railway cars, wheels and axles, an arch having a dished carrying surface mounted on each axle, a bearing arch for each axle fixed to the car and having a curved bearing portion carried by said dished bearing surface and having a radius of curvature shorter than that of said surface, and a bolt loosely uniting said curved surfaces in contact, whereby rolling is permitted without improper slipping between said surfaces, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

CHARLES DE BANGE.

Witnesses:
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H. C. COXE.