(No Model.)

W. M. MORGAN.

CAR WHEEL.

No. 409,219. Patented Aug. 20, 1889.

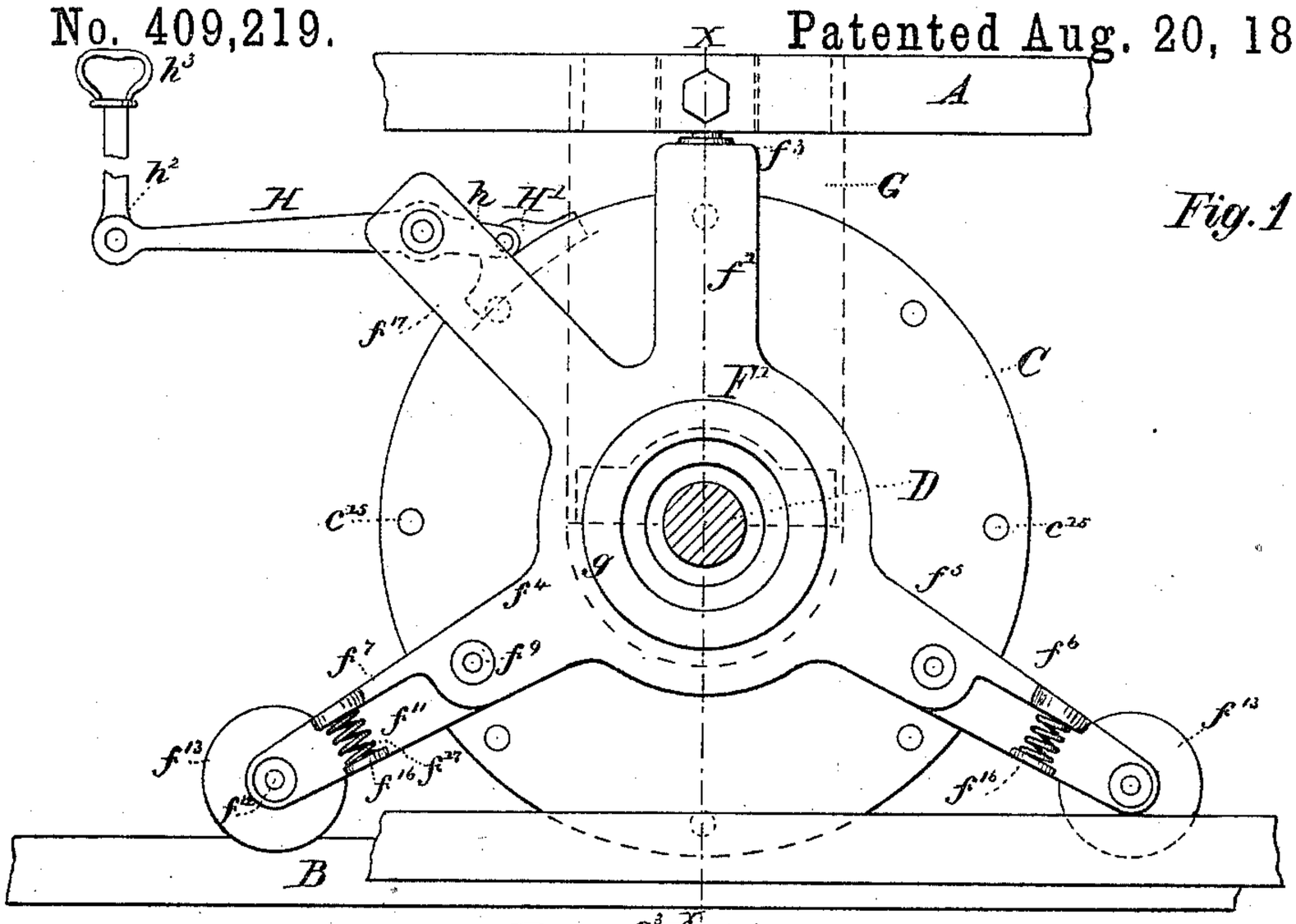


Fig. 1

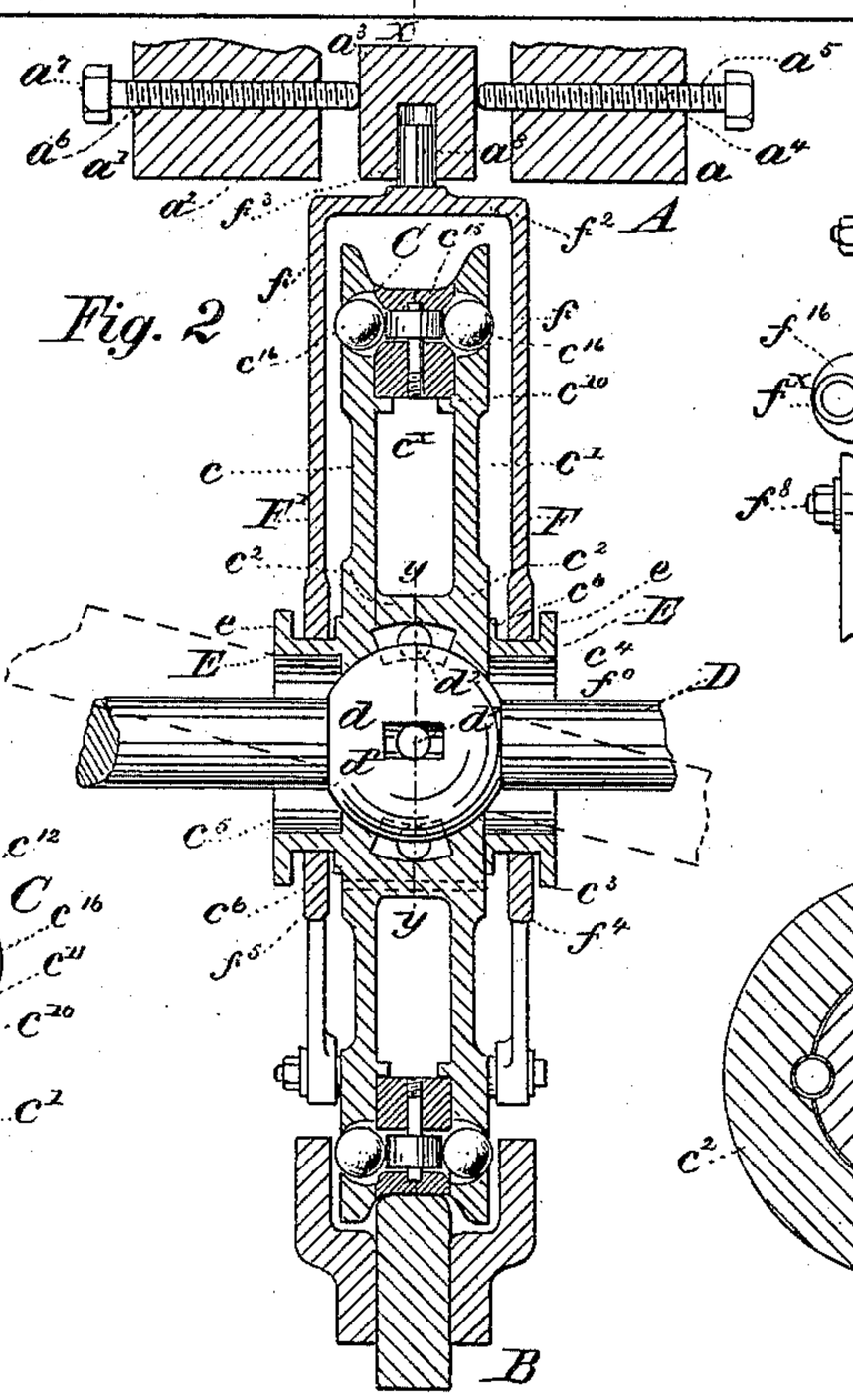


Fig. 2

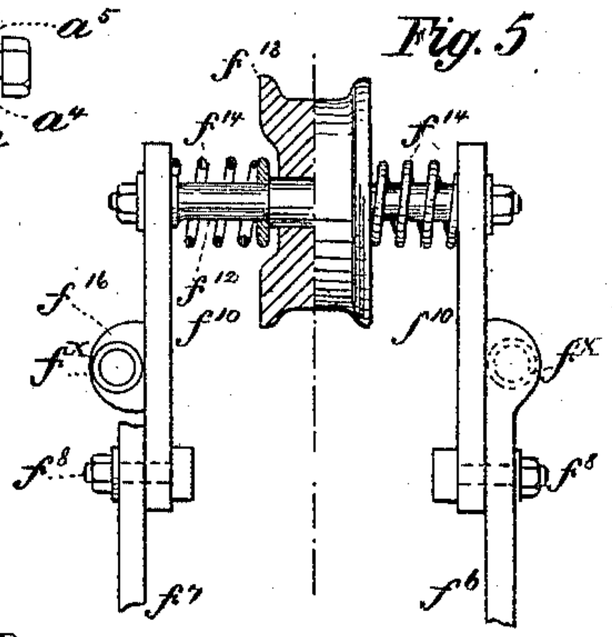


Fig. 5

Fig. 6

Fig. 4.

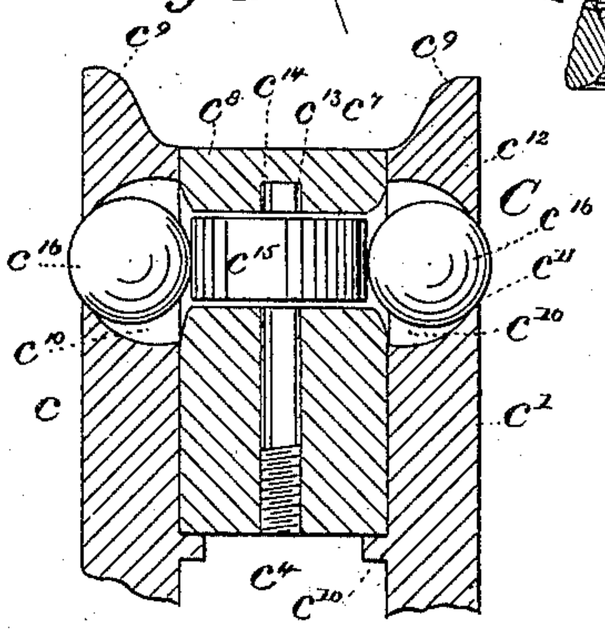
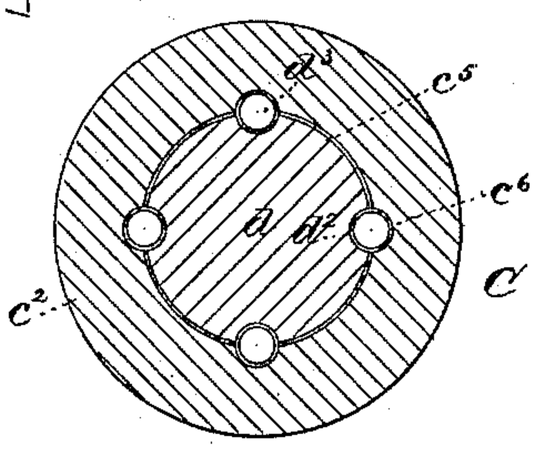


Fig. 3



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CAR-WHEEL.

SPECIFICATION forming part of Letters Patent No. 409,219, dated August 20, 1889.

Application filed September 7, 1888. Serial No. 284,809. (No model.)

To all whom it may concern:

Be it known that I, WAITMAN M. MORGAN, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Car-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention has for its object, first, to enable the vibrating of traction-wheels of a car, in describing the curves in a track, to be governed in advance between two traction-points on each curved-track rail; second, to permit the advanced and retreated trailers to accommodate themselves to the inequalities of the track.

In the drawings, Figure 1 is a side elevation of the car-wheel shown upon its track, and with its axle journaled within the journal-box, attached to the outer side-supporting beam of the truck-frame or floor-beam of a car, and the radial arms on the cylinder pivoted adjustably to said beam and carrying the advanced and retreated rollers and brake. Fig. 2 is a vertical sectional view taken through the wheel and bearing of the car-truck and track at right angles to and upon the line $x\ x$, Fig. 1, showing in illustration in dotted lines the relative position of the axle when the wheel vibrates thereon. Fig. 3 is a detail sectional view of the axle-bearings, taken at right angles to and upon the line $y\ y$, Fig. 2, showing the registering grooves in the globular hub and opposite central bearing of the wheel and the interlocking-balls thereon. Fig. 4 is a detail sectional view of the peripheral end portion of the wheel, as shown in Fig. 2. Fig. 5 is a detail sectional view, partly in plan and partly in horizontal section, of the yielding end portion of the radial arms, showing the laterally spring-held roller. Fig. 6 is a plan view of a section of curved track, showing the relative position of the traction and trailing rollers in describing a curve.

Like letters of reference indicate corresponding parts in all the figures.

In carrying out my invention, A represents the horizontal side beam of the truck-frame or floor of a car. B is the track-rail. C is the vibrating traction-wheel, and D its axle. In the construction of the wheel C two circular side disks $c\ c'$ are formed, the diameters of which are equal and proportionate to the circumference of the wheels. From one or the relative inner side portions of each disk $c\ c'$, extending from the line of the axis of said disks radially the distance required for the axle-bearings and equal in width, are cast rigidly on said disks the circular flanges $c^2\ c^2$, which portions $c^2\ c^2$ are connected with the disks $c\ c'$ firmly together by the transverse bolt c^3, which passes through said flanges and said disks as far radially from the point of the axis of said disks as is practicable. In a transverse relation to disks $c\ c'$ and through the axis of said disks and the flanges $c^2\ c^2$ is first made a circular opening c^4, exceeding in proportions the proper degree to that of the diameter of the axle D. In the sides of said opening c^4, and concentric thereto, is made a groove c^5, which extends in a transverse curved relation to the side disks $c\ c'$ from one outer side portion disk c to an outer side portion of the opposite disk c' and at equal distances apart circumferentially in the groove c^5. Extending below said groove into the flange portions $c^2\ c^2$ of the side disks $c\ c'$ are made the concentric depressions $c^6\ c^6$, which extend in a transverse relation to a point in a vertical line relatively with the inner portions of the opposite sides $c\ c'$, the ends of said grooves inclining in opposite directions and describing a line in relation to the axis of the wheel.

In the concentric grooved depression c^5 of the wheel C is placed a solid globular hub or ball d, which is made of the proper size diametrically to fit within the dimensions of said opening, so as to turn freely. Through the ball d in the direction of its diameter, and in the direction of the line of the axis of said disks $c\ c'$, is made a circular opening d', through which opening is inserted the axle D. Said ball d is then keyed upon or otherwise rigidly attached to the axle D.

In the ball d, and extending below its surface, are made at suitable distances apart registering with the concentric grooves c^6, the concentric depressions $d^2\ d^2$, which are equal in depth to the said depression c^6 and in length extend to the opposite points in a line

radially with the ends of the grooves c^6 on the wheel C. In each of the said registering depressions c^6 d^2 is placed a small loosely-fitting globular block d^3, one-half of block d^3 extending below the surface of the ball d. Between the opposite side disks c c' of the wheel C, near the peripheral portions of said plates, and of a thickness equal to that of the combined flanges c^2 c^2 on said disks c c' and forming the circular tread of the wheel C, is placed a concentric flat ring c^7, the outer circumferential portion c^8 of which ring extends radially to a point a short distance from the peripheral flanged portions c^9 c^9 of said wheel C. The inner circular portions of the ring c^7 extend radially toward the flanges c^2 c^2 comparatively one-third of the relative distance from said portions c^8 to said flanges c^2 c^2, and between the disks c c' and the flanges c^2 c^2 and ring c^7 is formed an annular chamber $c^\times$. For the purpose of retaining the ring c^7 in place between the side disks c c' a circular flange c^{10} is cast upon the inner side portions of the plates c c' in chamber $c^\times$, which is in close contact with the inner side portion of and forms a bearing for said ring.

In the inner side portions of the disks c c', opposite the ring c^7, at suitable distances apart and in opposite relations to each other in the line of the circumference of the wheel C, are made the concave recesses c^{10} c^{10}, which extend through the outer sides of said disks c c', forming a concentric opening c^{11}. In a transverse relation to the sides c c' of the wheel C, and through the ring c^7 opposite the concave recesses c^{10} c^{10}, are made the slots c^{12}. In the ring c^7, extending from the tread c^8 in a line radially to the axis of the wheel through slot c^{12} and at a point centrally between the opposite side disks c c', is made a perforation c^{13}, which is screw-threaded a suitable distance. In said perforation c^{13} is inserted a threaded pin c^{14}, and upon said pin in the transverse slot c^{12} is loosely mounted an anti-friction roller c^{15}. In each of the concave recesses c^{10} c^{10} is then placed a small ball c^{16}, which projects outwardly a short distance beyond the outer side portions of the disks c c'.

Extending laterally a short distance from the outer sides of the disks c c', in a curved plane equal in extent to that described by the concentric curved depression c^5 and in a circular relation around shaft D, are cylinders E E', upon the extreme outer ends of which cylinders are the radial flanges e e'. Upon cylinder E is loosely mounted a circular flat disk F, which is relatively one-third the dimensions of the wheel C, and is provided with a central opening f^0, adapted to receive said cylinder E, and upon the cylinder E', on the opposite side of the wheel C, is mounted in a similar manner a disk F', provided with a like transverse central opening. From the peripheral edge portion of the circular disks F F' extend, in a transverse relation to a point in line with the under side portion of the floor-beam A of the car, the radial arms f f', and extending from the upper end of one to the upper end of an opposite arm f' in a horizontal relation is a plate f^2.

Attached rigidly to and extending above the plate f^2 at a point an equal distance from the opposite arms f f' is a pivot f^3. Through the beam A in truck-frame of a car, at a point intermediate between the opposite sides, is made a square opening a^2 of a suitable size. In said opening a^2 is placed a movable block a^3, smaller in dimensions than the said opening a^2. In a transverse relation to said beam A and the opening a^2 from one side of said beam is made a screw-threaded perforation a^4, and in said perforation is fitted an adjusting-screw a^5, the end of which in the opening a^2 bears against one side of block a^3. Upon the opposite side of the beam is made a similar screw-threaded perforation a^6, in which is an adjusting-screw a^7, which bears against an opposite side of the block a^3 to that receiving the screw a^5. In the lower side portion of the block a^3 is made a vertical perforation a^8, in which is inserted the pivot f^3 on the plate f^2 of the radial arms f f'. On the outer side portion of the beam A is attached the upper end portion of a journal-hanger G, the lower end portion of which carries a journal-box g, in which is journaled one end of the shaft D. From the opposite circular side disks f f' on the wheel C, and radially from the axis of said wheel and the peripheral edge portion of the said disk in one direction toward the track B, extend the arms f^4 f^4, and extending in a similar relation to the disks F F' toward the track D, in an opposite direction to the arms f^4 f^4, are the arms f^5 f^5.

From the ends f^4 f^4 f^5 f^5, in a transverse relation and extending back a short distance toward the axis of the wheel, is removed a lower rectangular portion, leaving a narrow projecting end f^6, the extreme end of which $f^\times$ $f^\times$ is made nearly flat.

To the inner side, and at a point toward the axis of the wheel a short distance from the narrow portion f^6 f^6 f^7 f^7 of the arms f^4 f^4 f^5 f^5, is pivotally attached by the pivots f^8 f^8 f^9 f^9 to each respective arm a short extension f^{10} f^{10} f^{11} f^{11}, which extends an equal distance and nearly to the track B. Through the extreme ends of the extensions f^{10} f^{10} f^{11} f^{11} of the arms is extended in a transverse relation the rod f^{12} f^{12}. Upon each respective rod are mounted loosely the small flanged trailer-wheels f^{13}. Upon the rods f^{12}, on opposite sides of the flanged wheel f^{13}, are placed the spiral springs f^{14} f^{14}, which bear against the sides of the wheel f^{13} in one direction and in opposite directions against the sides of the extensions f^{10} f^{10} f^{11} f^{11}. Upon the outer sides of the extensions f^{10} f^{10} f^{11} f^{11}, on the lower edge portion, beneath the flattened end portion $f^\times$ $f^\times$ of the radial arms f^4 f^5, extends laterally the flange f^{15}, upon which is suita-

bly secured the lower end of a spiral spring f^{16}, and upon the upper end portion of which the flattened end portion $f^{\times}$ $f^{\times}$ of the radial arms f^4 f^5 is permitted to rest.

For the purpose of arresting the speed of the wheel two radial arms f^{17} f^{17} extend from the peripheral edge portion of the circular plates F F′ in an upward direction toward the end of the platform of the car and a short distance above the wheel C. To and between said upper ends of said arms is pivotally attached the short end h of a lever H. Upon said short end h of said lever H is pivotally attached a brake-shoe H′, which rests upon the periphery c^8 or tread of the wheel C. To the extreme end of the long portion of lever H is attached the lower end of a vertical hand-lever h^2, which is provided with a handle h^3.

In the construction of a car-truck a similar wheel C to that described is attached in a like manner to the car-beam on the opposite side of the car, and the axle D journaled in the box prepared for it on the said axle, so that in the application of the wheel as constructed to cars requiring the service of springs the beam A would in that case represent the side beam of a car-truck, and the bearing of the platform in either case brought, as usual, upon the axle D. The track B is shown with side flanges and with corresponding side flanges to fit within the side flanges of the track and afford safer transit of the car; but the construction of the flanges on the wheel and its track is immaterial, and may be the ordinary kind in use.

In the operation of the wheel reference is made to Fig. 6, which shows a curved-line track, and in such tracks it is the ordinary custom to raise the outer track, which has the greatest length of curve-rail, a slight distance, and the grade of the road-bed consequently is inclined in the direction of the shorter curve of the rail. The wheels C C are seen in Fig. 6 describing the curve, and in their rotation the axle D preserves in relation to the plane of the floor of the car or the truck, as the case may be, the same position, the position of the axle in Fig. 2 showing, in illustration, simply the relation it bears to the wheel. In either direction in which the car is propelled, therefore, the small trailer-wheels f^{13} are alternately an advanced or retreated guide to the wheel C. As the advanced wheel f^{13} meets the curve of the track, it preserves between the sides of the extension f^{10} f^{10} of the radial arms on the wheel C an intermediate course to a point in which the retreated trailer-roller f^{13}, following wheel C, also meets the curve in the track, in which position the tendency of the rollers f^{13} is to advance in a straight line or in the line of the chord described in relation to the curved rail between the advanced and retreated rollers f^{13} f^{13}, and to favor this result springs f^{14} on the one relative inner side of the curves of the track-rail, which tend to keep the rollers at a point intermediate between the extensions f^{10} f^{10} of the radial arm, are compressed and the roller moves laterally toward the relative side of the extension f^{10} which approaches the inner line of the curve in the track-rails.

It will be observed that the radial arms f^4 f^4 f^5 f^5 at their lower ends partake in union of a lateral sliding movement, and that the radial and vertical arm f' is adjustable only and prevents too great a disparity in the angle of movement described laterally by the lower portion f^{10} f^{10} of the arms f^4 f^5. The adjusting-screws a^5 a^7 are turned so as to adjust the block a^2, to which the upper end portions of the arms f^0 f^0 are pivoted, a distance in a lateral direction corresponding to that of the said portions f^{10} f^{10}, so far as to rectify the disparity between the width of the floor of the car and the track.

In the position described by the radial arms f' f^4 f^5 the wheel C, in describing the curve in the track and in the momentum which it receives, hugs the outside track-rail. The cylinder E slides outwardly in the opening f^0 in circular plate as far as permitted toward the flange e, and in the rotation of the wheel past the radial arms f' f^4 f^5 the anti-friction balls c^{16} c^{16} prevent binding of the wheel C against the said arms, and the wheel C, being free to turn on the ball d, changes its angle as rapidly as the length of chord between the rollers f^{13} f^{13} increases and diminishes in describing the curve in the track. When inequalities or obstructions are met with in or upon the track-rails, the extensions of the radial arms first give warning and turn on the pivots f^8 f^8, the springs f^{16} are compressed, and the rollers pass over the obstruction and meet the track beyond, thus guarding the wheel C from derailment. When describing the curves in which the outer rail is elevated above the plane of the inner rail to preserve a vertical position of wheel C, the ball d shifts as the angle of the axle D is changed from a horizontal to an inclined position corresponding to the inclined groove of the track, the ball shifting its position within wheel C when the horizontal plane of the track is reached.

Having fully described my invention, what I now claim as new, and desire to secure by Letters Patent, is—

1. In a car-wheel having an axle and laterally-vibrating radial disks on said axle, the combination of laterally-extended supporting-cylinders on opposite sides of said disks in the line of the axis of said wheel, and suitably-connected circular disks loosely mounted in the line of their axis on said cylinders, having radial arms, substantially as and for the purpose described.

2. In a car-wheel having an axle and laterally-vibrating radial disks on said axle, the combination of laterally-extended supporting-cylinders on opposite sides of said disks in the line of the axis of said wheel, and suitably-

connected circular disks loosely mounted in the line of their axis on said cylinder, having radial arms extending in the line of the tread of said wheel and provided with adjustable guide-rollers, for the purpose described.

3. The combination, with a car-wheel having an axle and suitable axle-bearings and with the opposite radial sides of said wheel, of laterally-extended flanged supporting-cylinders in the line of the axis of said wheel, and around said axle circular disks loosely mounted in the line of their axis on said cylinder and provided with radial arms extending downwardly in the line of the tread of said car-wheel and provided with laterally-adjustable guide-rollers, for the purpose described.

4. The combination, in a car-wheel having an axle, of laterally-vibrating radial disks on said axle, laterally-extended supporting-cylinders on opposite sides of said disks in the line of the axis of said wheel, and around said axle circular disks loosely mounted in the line of their axis on said cylinders and provided with radial arms extending downwardly in the line of the tread of said car-wheel and provided with laterally-adjustable guide-rollers, for the purpose described.

5. The combination, with a car-wheel having an axle and suitable axle-bearings and with the opposite radial sides of said wheel, of laterally-extended flanged supporting-cylinders in the line of the axis of said wheel, and around said axle circular disks loosely mounted in the line of their axis on said cylinders and provided with radial arms and extensions of said arms pivoted thereto, and having an intermediate spring-bearing for said radial arms thereon, and laterally-adjustable guide-rollers on the said extension of said arms extending downwardly to and in the line of the tread of said car-wheel, for the purpose described.

6. In the herein-described wheel, the combination, with the opposite radial disks of said wheel, of laterally-extended flanged supporting-cylinders in the line of the axis of said wheel, and around said axle circular disks loosely mounted in the line of their axis on said cylinders and provided with radial arms, an extension of said arms pivoted thereto and having an intermediate spring-bearing for said radial arms thereon, and laterally-adjustable guide-rollers on the said extensions of said arms extending downwardly to and in the line of the tread of said car-wheel, for the purpose described.

7. The combination, in a car-wheel having an axle and laterally-vibrating radial disks on said axle, of laterally-extended supporting-cylinders on opposite sides of said disks in the line of the axis of said wheel, and suitably connected circular disks loosely mounted in the line of their axis on said cylinders, having radial rollers carrying arms extending in the line of the tread of said wheel, and anti-friction devices in the side of the disks of said wheel in rotary contact with said radial arms, for the purpose described.

8. The combination, in a car-wheel consisting of radial disks having concave depressions extending through the sides of said disks and a ring forming the tread of said wheel between said disks, having transverse slots opposite said concave depressions, of anti-friction rollers in said transverse slots and globular rollers in said concave depressions in frictional contact, for the purpose described.

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