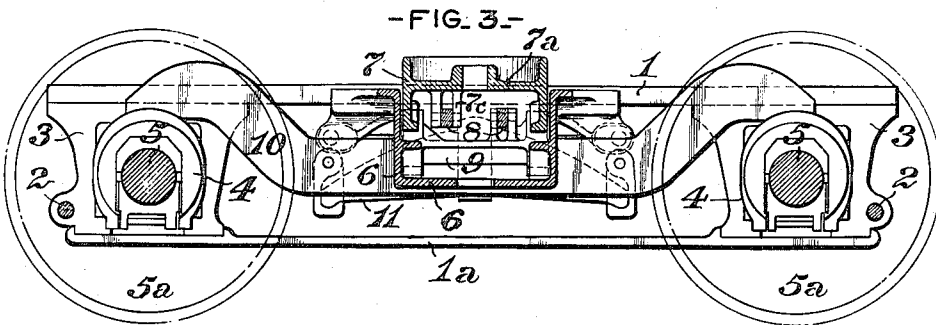
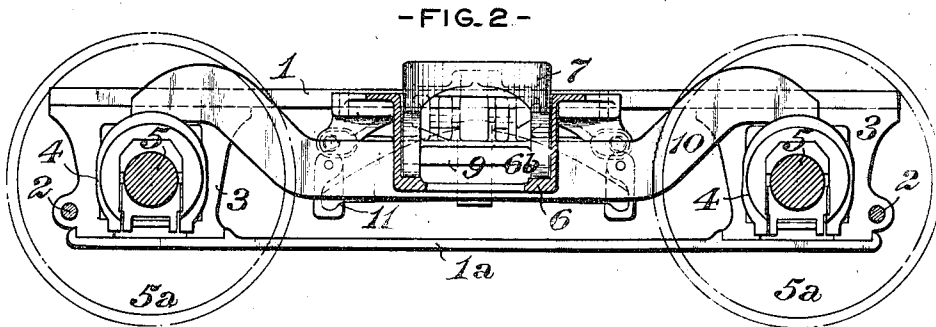
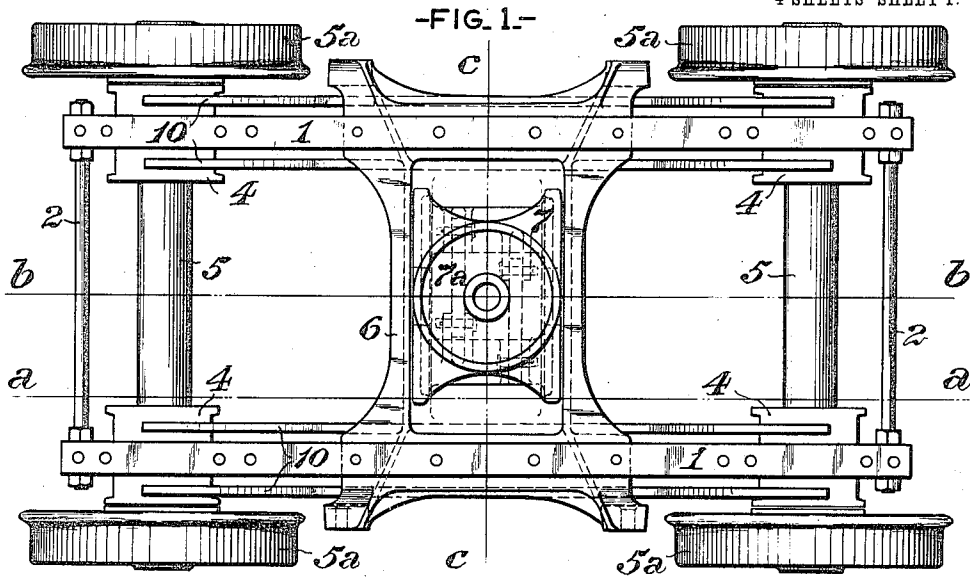


W. E. WOODARD.
TRUCK FOR RAILROAD ROLLING STOCK.
APPLICATION FILED DEC. 23, 1912.

1,060,222.

Patented Apr. 29, 1913.

4 SHEETS—SHEET 1.



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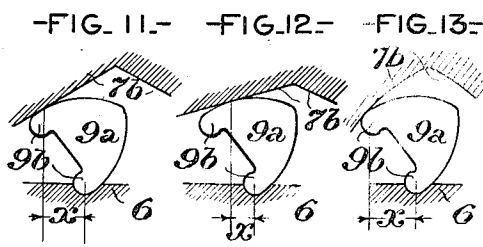
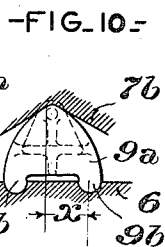
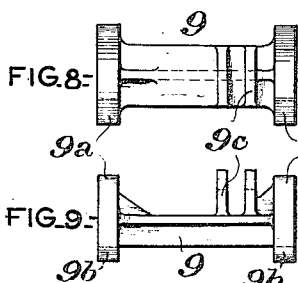
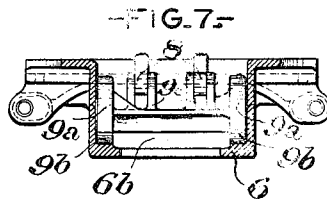
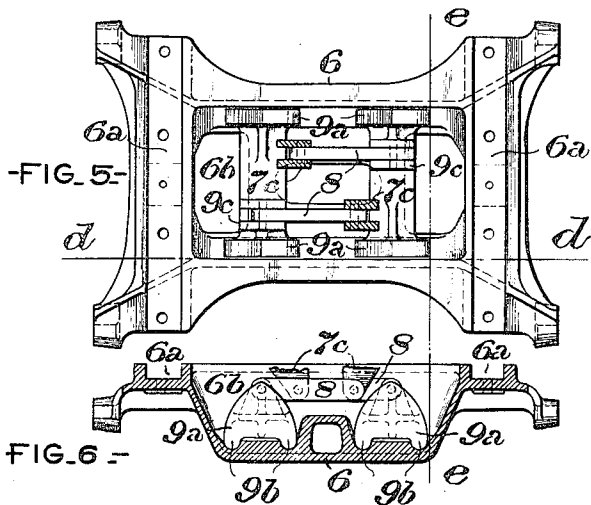
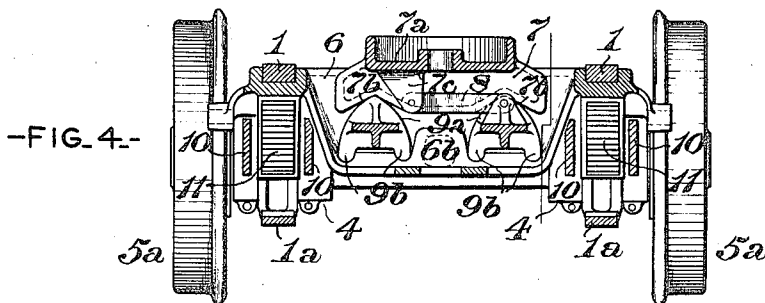
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4 SHEETS—SHEET 2.



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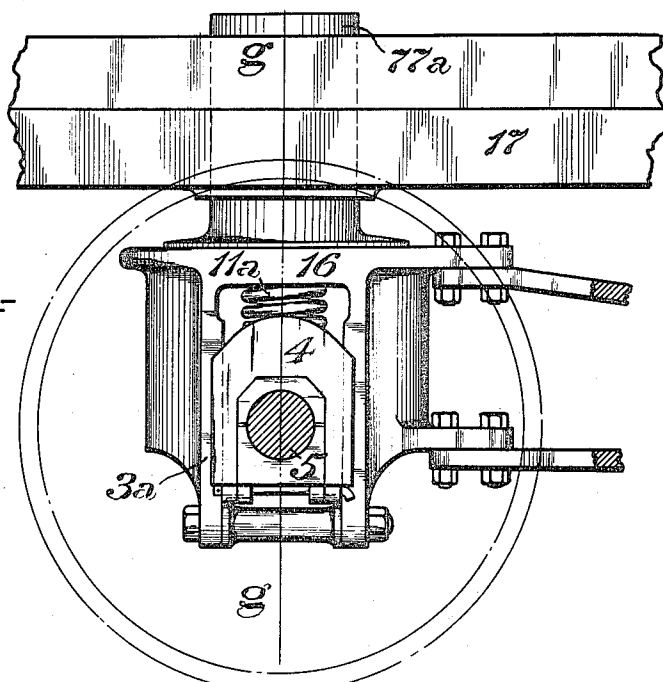
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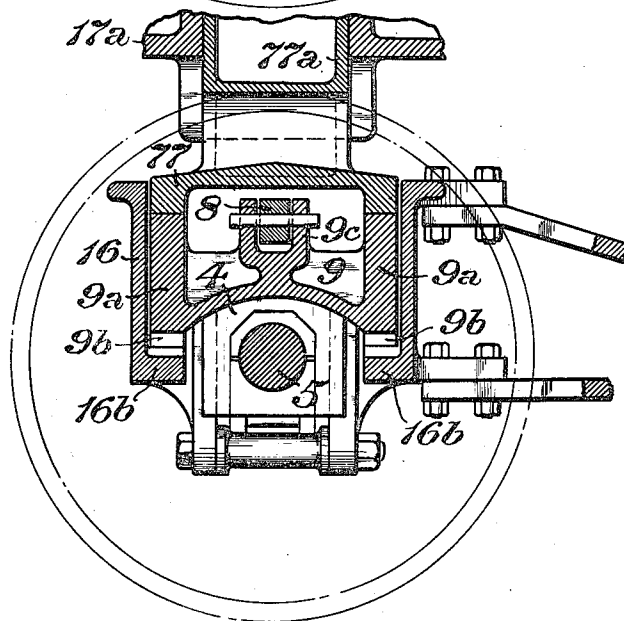
Patented Apr. 29, 1913.

4 SHEETS—SHEET 3.

-FIG. 14-



-FIG. 15-



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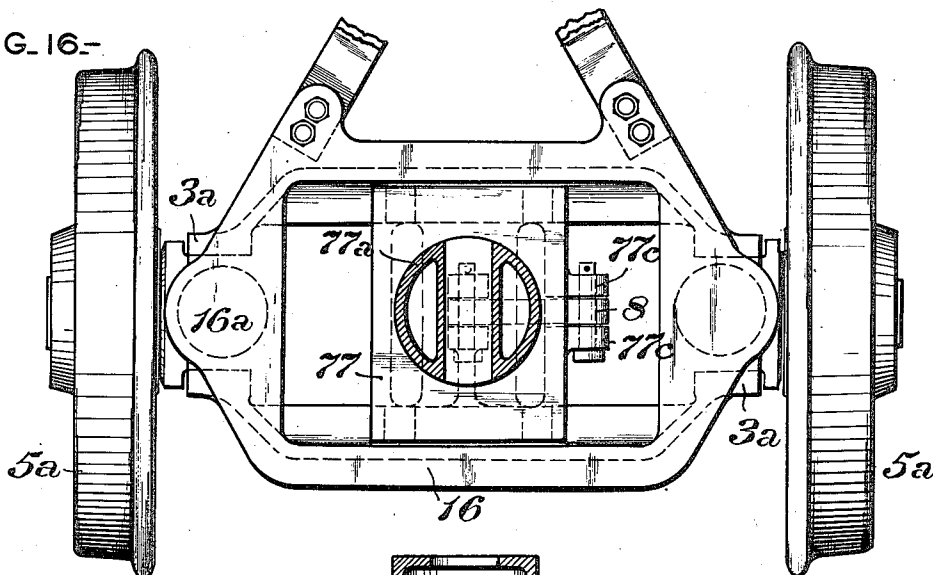
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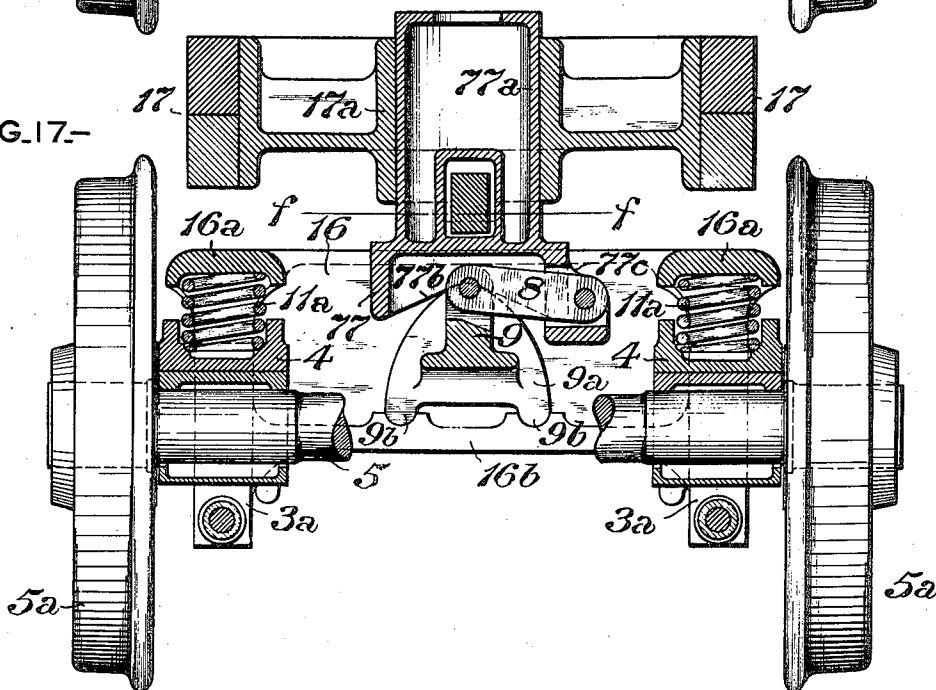
Patented Apr. 29, 1913.

4 SHEETS—SHEET 4.

-FIG. 16-



-FIG. 17-



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UNITED STATES PATENT OFFICE.

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TRUCK FOR RAILROAD ROLLING-STOCK.

1,060,222.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed December 23, 1912. Serial No. 738,203.

To all whom it may concern:

Be it known that I, WILLIAM E. WOODARD, of Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement in Trucks for Railroad Rolling-Stock, of which improvement the following is a specification.

My invention, while more particularly designed for application in locomotive engine trucks, is equally adaptable to service in trucks for tenders and other railroad vehicles, and its object is to provide a centering mechanism for trucks of the "swing" or "lateral motion" type, which will afford as great initial resistance as may be desired, while permitting as much lateral movement as may be required by the deflection of the truck in passing curves; also, to prevent undue wear and the necessity for lubrication, by the provision of rolling contact between relatively moving members in the lateral traverses of the truck.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a plan or top view of a four wheeled locomotive engine truck embodying my invention; Fig. 2, a vertical longitudinal section, on the line *a a* of Fig. 1; Fig. 3, a similar section, on the line *b b* of Fig. 1; Fig. 4, a vertical transverse section, on the line *c c* of Fig. 1; Fig. 5, a plan or top view of the bolster support; Fig. 6, a vertical longitudinal section through the same, on the line *a d* of Fig. 5; Fig. 7, a transverse section, on the line *e e* of Figs. 5 and 6; Figs. 8, 9, and 10, plan, side, and end views of a rocker; Figs. 11, 12, and 13, diagrammatic views, illustrating different angles of the rocker bearings of the bolster support; Fig. 14, a side view, in elevation, of a two wheeled locomotive truck, illustrating a structural modification, the nearer wheel being removed; Fig. 15, a vertical central section, through the same; Fig. 16, a horizontal section, on the line *f f* of Fig. 17; and Fig. 17, a vertical transverse section, on the line *g g* of Fig. 14.

In railroad practice prior to my invention, the usual and generally accepted method of providing for lateral motion of the swing bolsters of trucks of the type to which my invention relates, has been to suspend the bolster from a supporting member carried on the truck frame, by means of

swing links. These have ordinarily been of the class known as "three point suspension" links, having two bearing points at their upper ends, which are connected to the supporting member, and one bearing point at their lower ends, which are connected to the bolster. With swing links of this class, the bolster possesses a certain initial stability, but the resistance to lateral movement increases rapidly with such movement. For example, the initial resistance of a swinging bolster, supported by three point links having their upper bearing axes spaced 5 inches apart, and their lower bearing axes located 8 inches below, and midway between, their upper bearing axes, is 312 pounds per 1000 pounds of load on the bolster. After $2\frac{1}{2}$ inches lateral movement, the resistance increases to 743 pounds per 1000 pounds of load on the bolster, and it is not practicable to operate such links to a greater deflection than $2\frac{1}{2}$ inches from their central positions, on account of the high lateral resistance which is developed, and which tends to overturn the truck. If greater lateral movement of the bolster is required, it is necessary to space the axes of the upper bearings more closely together, relatively to the vertical distance between centers. For example, with links having their upper bearing axes spaced $3\frac{1}{2}$ inches apart and their lower bearing axes located 12 inches below, and midway between, their upper bearing axes, the initial resistance will be 145 pounds center pin load, and at 4 inches lateral movement will be 439 pounds per 1000 pounds load on bolster. It will therefore be seen that on very long locomotives, which require a comparatively large amount of deflection at their trucks, in order to pass curves, it is necessary, under the ordinary construction, to employ bolster supporting links which afford only a comparatively small initial resistance, in order to permit sufficient lateral motion of the bolster, and these involve the objection that the lateral resistance of the leading trucks of such locomotives is not as great as is desirable for maintaining the stability of the locomotive on tangent track and curves of comparatively large radius.

My invention is designed to provide means for centering a swing bolster, by which as high an initial resistance as desired may be afforded, and as much lateral movement as is required for the deflection

of the truck on curves, will be permitted. In the truck herein described, the initial resistance per 1000 pounds of center pin load is approximately one half the load imposed on the bolster, and this resistance remains constant for the full travel of the bolster, and, as hereinafter explained, this resistance can be made an increasing or a decreasing quantity, without involving any substantial changes in the design or construction of the truck.

Referring first to Figs. 1 to 13 inclusive of the drawings, my invention is herein exemplified as applied in a four wheeled locomotive truck, of the swing or lateral motion type, the frame of which comprises two upper side members, 1, and two lower side members, 1^a, the opposite side members of which are connected, at their ends, by transverse bolts, 2, and at their middle portions by a bolster support, 6, hereinafter more fully described. Pedestals, 3, are interposed between, and secured to, the side frame members, at the ends thereof, and the axle boxes, 4, of a pair of axles, 5, upon which the truck wheels, 5^a, are secured, are fitted in the pedestals in the usual manner. The weight carried by the truck is applied to the driving boxes through springs, 11, on the middle portions of which the upper side frame members, 1, bear, and which are coupled at their ends to equalizers, 10, the ends of which bear on the tops of the axle boxes, 4. So far as above described, the truck herein set forth accords substantially with those of constructions ordinarily used in railroad service prior to my invention.

In the practice of my invention, the weight carried by the truck is primarily applied thereto through a floating or swing bolster, 7, provided with a center plate, 7^a, perforated for the passage of a center pin, said bolster being supported on the truck frame, with the capacity of relative lateral movement, by a pair of rockers, journaled on a bolster support, 6, which is a member of the truck frame structure, and extends, in the middle transverse plane of the truck, from one side frame thereof to the other. Recesses, 6^a, are formed in the bolster support, adjacent to its ends, said recesses receiving the upper frame members, 1, to which the bolster support is rigidly secured. The bolster support is extended downwardly between the recesses, 6^a, its downward extension constituting a rocker chamber, 6^b, of box like form, which incloses and provides bearings for the pair of rockers above referred to. The chamber, 6^b, in addition to performing the function of a casing for the rockers and their connections, also serves as a retaining guide for the bolster, 7, which permits it to move laterally as required, and prevents its motion in the direction of a longitudinal plane of the truck. The entire

bolster support casting forms a substantial frame cross tie, and, by reason of its box like form, imparts strength and rigidity to the truck frame, and enables it to safely resist shocks and tendency to be thrown out of alinement when entering and rounding curves.

The rockers, which are counterparts, are disposed in the rocker chamber, parallel with, and at equal distances from, the longitudinal central plane of the truck, on each side thereof, and each rocker comprises a body, 9, of substantially T section, and two end cams, 9^a, integral therewith, each of said cams presenting lateral bearing surfaces which are curved upwardly and inwardly on its opposite sides, from a flat base, to its apex, and having segmental journals, 9^b, parallel with the body of the rocker, on the opposite sides of its base, said journals fitting correspondingly recessed bearings in the bottom of the rocker chamber, 6^b. Each of the bearing surfaces of the cams is curved substantially concentrically with the journal 9^b, on the opposite side of the cam. Upwardly projecting lugs, 9^c, are formed on the bodies of the rockers, for the connection of links, 8, by which the rockers are coupled to downwardly projecting lugs, 7^c, on the bottom of the bolster center plate, 7^a. As shown in Fig. 5, the links, 8, extend in opposite directions, so that the connection of each rocker to the bolster is made on the side of the longitudinal central plane of the truck which is farther from the rocker. The rockers are adapted to swing about the axes of their journals, 9^b, in either direction, and said journals, being located on opposite sides of the rockers, render them stable when in mid-position.

The bolster, 7, is supported on the curved bearing surfaces of the cams, 9^a, of the rockers, double upwardly inclined or V shaped bearings, 7^b, each of which rests on one of said cams, being formed on the bottom of the bolster. The surfaces of the bearings, 7^b, may, to meet special service requirements, be curved instead of inclined, but inclined surfaces as shown are ordinarily preferable. The distance of the rockers from the longitudinal central plane of the truck may be varied as desired, and a greater number of rockers may be used in order to sustain a heavier load upon the truck.

Figs. 14 to 17 inclusive illustrate a structural modification of my invention, as applied in a two wheeled swing or lateral motion locomotive truck, the frame, 16, of which is an integral casting of substantially rectangular form, in plan, having pedestals 3^a, on its ends, in which are fitted the axle boxes, 4, of an axle, 5, on which the truck wheels, 5^a, are secured. The weight carried by the truck is applied to the driving boxes through helical springs, 11^a, on which the

truck frame bears through spring bearings, 16^a. The separate bolster support herein-after described is in this instance dispensed with, the bolster, 77, being supported by a single rocker, which is, in turn, supported on lower flanges, 16^b, formed on the transverse members of the truck frame, 16. The rocker is of similar construction to that before described, comprising a body, 9, of T section, and two end cams, 9^a, integral therewith, each presenting lateral surfaces which are curved upwardly and inwardly on its opposite sides, from a flat base to its apex, and abut against double inclined or V shaped bearings, 77^b, on the bottom of the bolster, and having segmental journals, 9^b, parallel with its body, on opposite sides of its base, said journals fitting correspondingly recessed bearings in the lower flanges, 16^b, of the frame. A cylindrical center pin, 77^a, formed centrally on the top of the bolster, is fitted in a corresponding center casting, 17^a, secured to the frame members, 17, of the locomotive, and a pair of downwardly projecting lugs, 77^c, on the bottom of the bolster, are coupled by a link, 8, to upwardly projecting lugs, 9^c, on the body, 9, of the rocker, as in the instance first described, with the operation of which that of the structural modification shown in Figs. 14 to 17 inclusive is in accordance.

The leading and characteristic feature of my invention will clearly appear by reference to Figs. 10 to 13 inclusive, which indicate its capability of providing a practically frictionless rolling supporting bearing for a laterally moving bolster, and of affording different desired resistances. The proportion of laterally acting resistance to vertically acting weight, depends upon the length of the moment arm x , that is to say, the horizontal distance between the line of contact of the curved cam surface of a rocker with the adjoining inclined bearing surface of the bolster, and the axis of the journal about which the rocker swings in the lateral movement of the bolster. The bolster bearing surfaces, 7^b, shown in Figs. 10 and 11, are inclined at such an angle, that the moment arm remains constant from the initial to the final position of the rocker, in the lateral movement of the bolster, with the result that the resistance remains in a constant ratio to the weight. When the angle of the bolster bearing surface is made more obtuse, as shown in Fig. 12, the moment arm is decreased relatively to that indicated in Fig. 10, and the resistance will decrease as the cam moves from its mid position toward the limit of its traverse in either direction. If the angle of the bolster bearing surfaces be made more acute, and with a rounded apex, as shown in Fig. 13, the moment arm increases as the cam moves from its mid position, and by slightly curv-

ing the bearing surfaces, 7^b, the resistance increases with its movement toward the limit of its traverse. It will therefore be seen that by changing the angle or contour of the bolster bearing surfaces, the resistance to lateral movement of the bolster may be made a constant, a decreasing, or an increasing quantity as desired.

The connection of the rockers to the bolster by the oppositely extending links, 8, effects the coincident movement of the cams of the rockers on the bolster bearing surfaces, in the lateral movements of the bolster, the rockers swinging about the axes of their journals located on their sides toward the direction of movement.

I claim as my invention and desire to secure by Letters Patent:—

1. In a railroad truck, the combination of a frame, a bolster adapted to traverse laterally relatively thereto, and a rocker journaled in bearings on the frame extending transversely to the bolster, said rocker having oppositely curved cam surfaces abutting against reversely inclined bearings on the bolster.

2. In a railroad truck, the combination of a frame, a bolster adapted to traverse laterally relatively thereto, a rocker journaled on the frame, and having curved cam surfaces abutting against bearings on the bolster, and a connection coupling said rocker to the bolster for effecting the coincident movement of said members.

3. In a railroad truck, the combination of a frame, a bolster adapted to traverse laterally relatively thereto, and having a plurality of double inclined or V shaped bearings, and a rocker journaled on the frame, and having curved cam surfaces abutting against said bearings.

4. In a railroad truck, the combination of a frame, a bolster support thereon, a bolster adapted to traverse laterally relatively to said frame, and a plurality of rockers journaled in bearings on said support extending transversely to the bolster, said rockers having oppositely curved cam surfaces abutting against reversely inclined bearings on the bolster.

5. In a railroad truck, the combination of a frame, a bolster support thereon, a bolster adapted to traverse laterally relatively to said frame, a plurality of rockers journaled on said support, and having curved cam surfaces abutting against bearings on the bolster, and connections coupling said rockers to the bolster for effecting the coincident movement of said members.

6. In a railroad truck, the combination of a frame, a bolster support thereon, a bolster adapted to traverse laterally relatively to said frame and having a plurality of double inclined or V shaped bearings, and a plurality of rockers journaled on the bolster

support and having curved cam surfaces abutting against said bearings.

5 7. In a railroad truck, the combination of a frame, a bolster adapted to traverse laterally relatively thereto, and having a plurality of double inclined or V shaped bearings, and a rocker having journals on its opposite sides fitting bearings in the frame, and opposite curved cam surfaces abutting
10 against the bearings of the bolster, said cam surfaces being curved on radii concentric with the axes of the rocker journals on the opposite side of the rocker on which they are located.

15 8. In a railroad truck, the combination of a frame, a bolster adapted to traverse laterally relatively thereto to said frame, and a rocker supporting said bolster, said rocker comprising a body, a cam at each end thereof having opposite curved surfaces adapted
20 to abut against bearings on the bolster, and

lateral journals parallel with its body fitting bearings in the frame.

9. In a railroad truck, the combination of a frame comprising two side members, a
25 bolster support secured to said side members at the ends of its top portion and having a downwardly projecting box formed rocker chamber, a bolster fitted to traverse freely in said support transversely to a longitudinal
30 plane of the truck but guided against movement in such plane, a pair of rockers journaled in the rocker chamber and having curved cam surfaces abutting against bearings on the lower side of the bolster,
35 and oppositely extending links coupling said rockers to the bolster.

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