W. E. WOODARD.

SPRING AND EQUALIZER SYSTEM FOR ELECTRIC LOCOMOTIVES.

APPLICATION FILED SEPT. 19, 1908.

918,810. Patented Apr. 20, 1909.

2 SHEETS—SHEET 1.

FIG. 1.

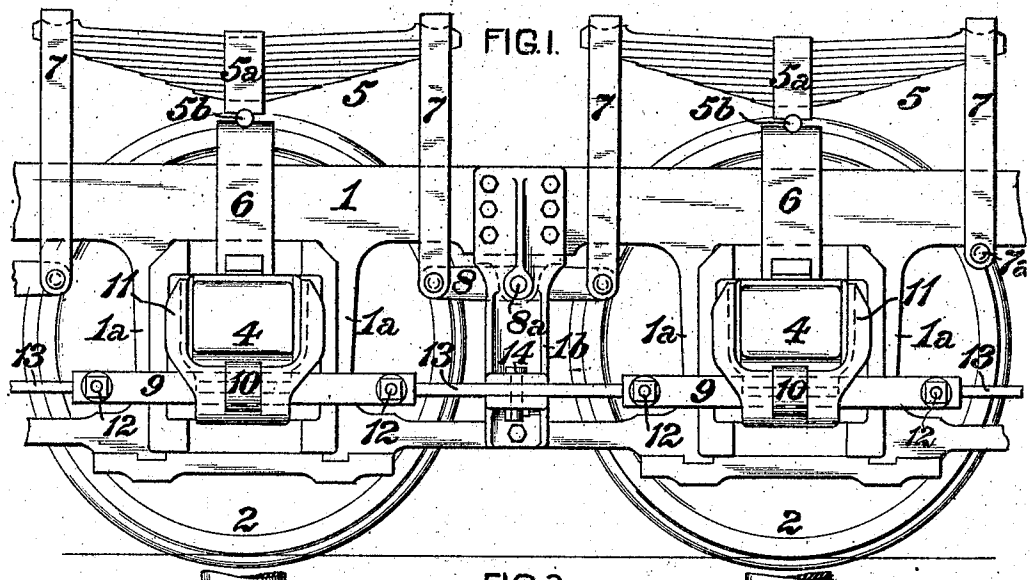


FIG. 2.

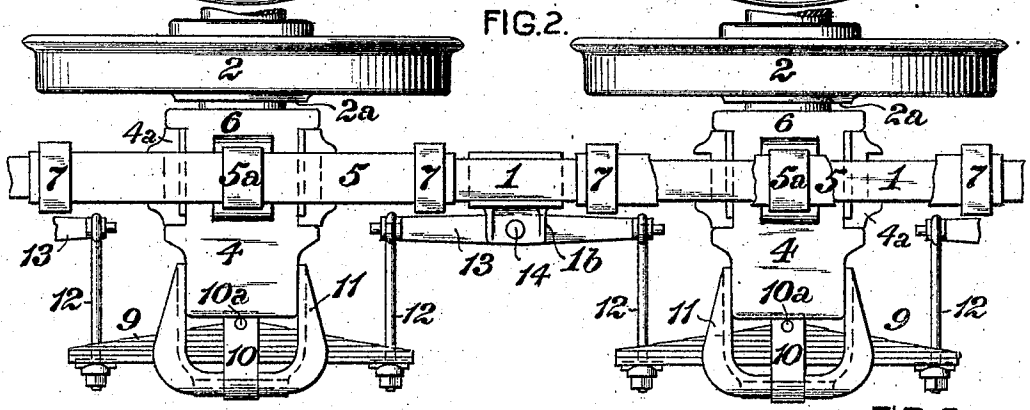


FIG. 4.

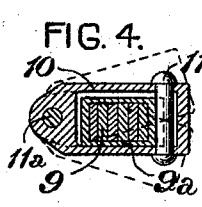


FIG. 3.

FIG. 5.

FIG. 6.

WITNESSES

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2 SHEETS—SHEET 2.

FIG. 7.

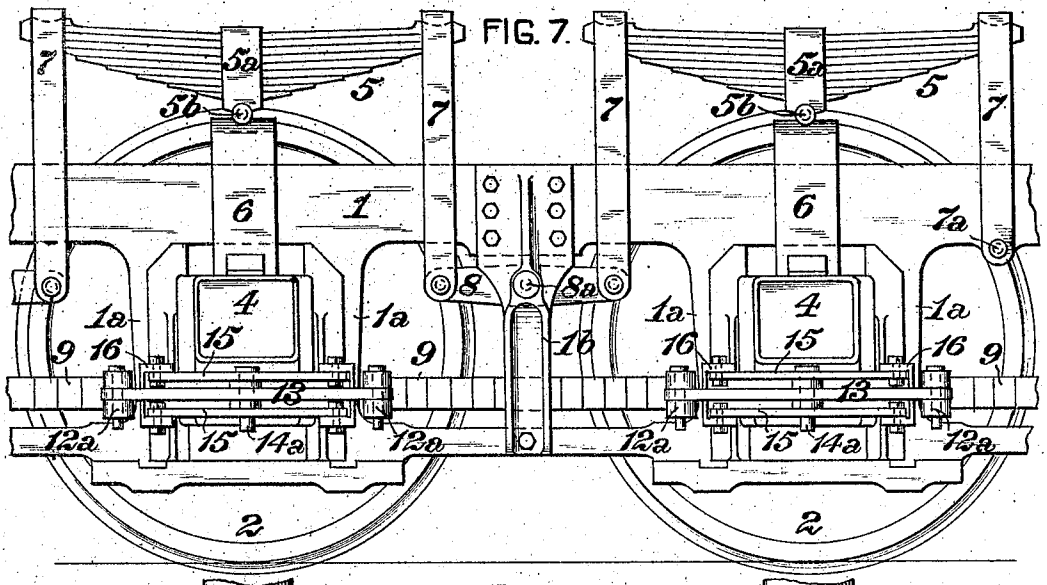


FIG. 8.

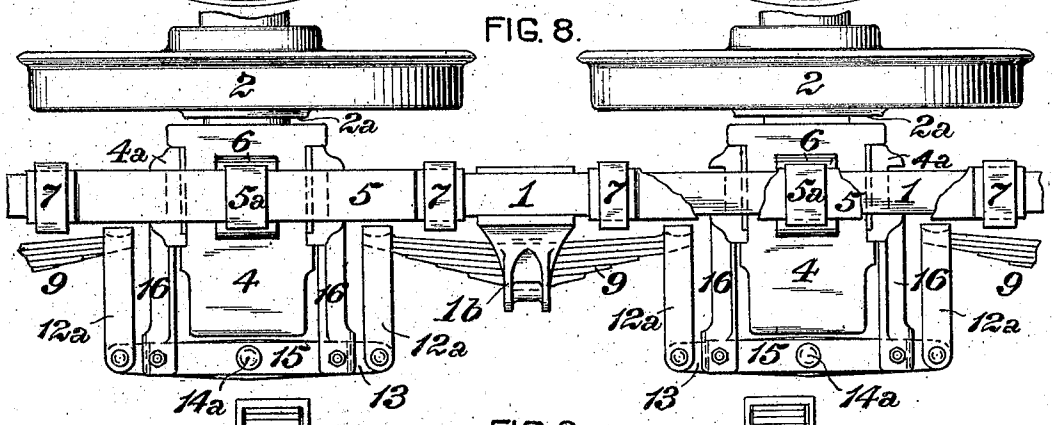
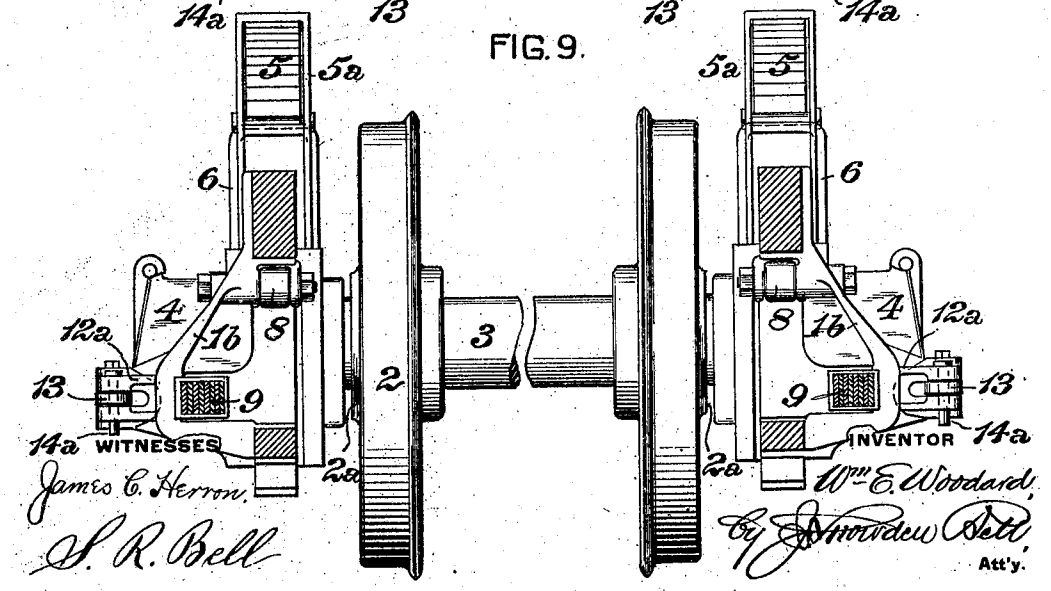


FIG. 9.



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UNITED STATES PATENT OFFICE.

WILLIAM E. WOODARD, OF SCHENECTADY, NEW YORK, ASSIGNOR TO AMERICAN LOCOMOTIVE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SPRING AND EQUALIZER SYSTEM FOR ELECTRIC LOCOMOTIVES.

No. 918,810. Specification of Letters Patent. Patented April 20, 1909.

Application filed September 19, 1908. Serial No. 453,770.

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 Spring and Equalizer Systems for Electric Locomotives, of which improvement the following is a specification.

In electric locomotives, by reason of their low center of gravity, and the location of the cross centers of the driving springs outside the driving wheels, the side motion of the spring supported mass of the locomotive is less in extent and takes place in a shorter period of time than in the case of steam locomotives. It is desirable, in order to distribute the lateral pressure on the track, due to the rolling of the locomotive, over as great a length as possible, that as great a degree of lateral motion as is consistent with safety should be allowed the spring supported parts, and that this motion should be allowed to take place over as long a period of time as possible.

The object of my invention is to provide a spring and equalizer system, acting both in horizontal and vertical planes, by which greater movement of the spring supported mass will be permitted and its movement distributed over a greater length of track, and in the operation of which, movement, in either direction, of the spring supported mass, is not checked by a single wheel only, but the side pressure thereof is equalized between, and transmitted to the track through, two or more wheels.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a side view, in elevation, of a portion of a spring and equalizer system for electric locomotives, illustrating an embodiment of my invention; Fig. 2, a plan or top view of the same; Fig. 3, a view, partly in elevation and partly in vertical transverse section in the plane of one of the axles; Fig. 4, a vertical section, on an enlarged scale, through one of the horizontal springs and its swivel bearing; Fig. 5, a horizontal section through the same; Fig. 6, a side view, in elevation, of a swivel bearing support; Fig. 7, a view, similar to Fig. 1, illustrating a modification of structural detail; Fig. 8, a plan or top view of the construction shown in Fig. 7; and, Fig. 9, a view, partly in elevation and partly in vertical transverse section in the plane of one of the axles, of the same.

My invention is herein illustrated as applied in an electric locomotive having a main supporting frame comprising suitably cross connected bar side members, 1, of the standard type, which, with the mechanism carried thereon, are spring supported on a plurality of pairs of wheels, 2, fixed upon axles, 3, the end journals of which rotate in journal boxes, 4, which are provided with lateral shoes, 4^a, fitted between pairs of pedestal jaws, 1^a, on the side frame members, with the capacity of vertical movement of the latter, relatively to the journal boxes and shoes, in the ordinary manner. The frame members and journal boxes are so adapted to move laterally, or transversely to the track, through a limited range of traverse, on the axles, and are supported and cushioned in their vertical and lateral movements, by a vertical and a horizontal set of springs and connecting equalizers, the construction of which will now be described.

Referring first to Figs. 1 to 6 inclusive, a plate or leaf spring, 5, of semi-elliptic form, having its set or curvature in a vertical plane, is located above each of the frame members, 1, over each of the journal boxes, 4, thereof, the central band, 5^a, of each spring, bearing, through a roller, 5^b, on a vertical saddle, 6, the lower end of which bears on the journal box. The outer ends of the springs of the outer axles, or those nearest the ends of the locomotive, are coupled, by spring hangers, 7, to bearing pins, 7^a, on which the top rails of the frame members bear, and the spring hangers, 7, of the adjoining ends of the springs, extend downwardly below the top rails of the frame members, and are coupled, at their lower ends, to equalizers, 8, which are pivoted centrally, by pins, 8^a, to vertical standards or bearing pieces, 1^b, bolted to the frame. The frame and the weight carried thereon, is thus suspended, through the vertical system of springs, 5, and equalizers, 8, on the journal boxes, 4, and axles, 3, with the capacity of vertical movement relatively thereto, in substantially the ordinary manner.

A plate or leaf spring, 9, having its set or curvature in a horizontal plane, is located adjacent to the outer end of each of the journal boxes, 4, the central bands, 9^a, of said springs, bearing on vertical rollers, 10^a, set

in the inner ends of swivel supports, 10, which are coupled, at their outer ends, by pivot pins, 11[a], to supports, 11, each having two vertical arms bolted to the opposite sides of a journal box, and a horizontal base extending below said journal box and the swivel support, 10.

By reference to Figs. 4 and 5, it will be seen that the swivel supports and connected springs, 9, are adapted to swing in a vertical plane relatively to the journal boxes, and that the springs, 9, are adapted to swing in a horizontal plane relatively to the journal boxes, thus affording means for maintaining proper bearing of the springs on the journal boxes in both vertical and lateral movements of the frame members and the parts supported thereon. The ends of the springs, 9, are coupled, by rods, 12, having ball or swiveling joints at their ends, to the ends of equalizers, 13, which are pivoted by pins, 14, to the lower portions of the supports which carry the equalizers, 8. A proper amount of end play or lateral traverse is allowed between the flanges of the journal box shoes, 4[a], and the side frame members, 1, and between the inner ends of the journal boxes and the outer faces, 2[a], of the wheel hubs, and the shocks due to lateral motion are thus taken up and distributed over all the axles by the horizontal spring and equalizer system just described.

Figs. 7 to 9 inclusive illustrate a structural modification of the horizontal spring and equalizer system, in which the positions of the springs and equalizers are relatively reversed, that is to say; the springs, 9, in this instance, bear centrally on the supports, 1[b], fixed to the frame members, and their equalizers, 13, to which they are coupled by links, 12[a], are pivoted, by pins, 14[a], to pairs of upper and lower bearing bars, 15, which are connected by horizontal arms, 16, to the journal box shoes, 4[a].

The relation and operation of the vertical and horizontal spring and equalizer systems are similar in the two constructions above described. In each case, in striking a curve or a rough piece of track, the flange of the leading driver may bear hard against the rail. The springs of the horizontal system permit lateral movement, against spring resistance, of the journal box and shoes in the pedestal, thus allowing the next wheel to bear against the rail, and the equalizers of the horizontal system distribute the pressure equally between these two wheels, or between as many wheels as the system may be applied to. If the spring supported mass acquires a lateral motion, either on rough track or upon entering or leaving curves, the lateral pressure will be distributed over two or more wheels and axles, instead of being absorbed by one wheel and axle, as would be the case when no horizontal equalizing system is used, as in the ordinary practice. In the operation of my improvement, by reason of the conjoint action of the deflection of the springs in the vertical and the horizontal systems, a greater movement of the spring supported mass is permitted, involving a longer period of time and thus reducing the pressure per unit length of track.

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

1. In a locomotive, the combination of a main supporting frame, a plurality of axles on which said frame is carried with the capacity of relative vertical and lateral movement, a vertical spring and equalizer system through which the weight carried by the frame is applied to and distributed over the several axles, and a horizontal spring and equalizer system through which lateral pressure exerted by the frame is applied to and distributed over the several axles.

2. In a locomotive, the combination of a main supporting frame, a plurality of axles, journal boxes fitted in said frame with the capacity of relative vertical and lateral movement and providing bearings for said axles, springs bearing vertically on said journal boxes, equalizers pivoted on the frame and connected to said springs, springs imparting their bearing horizontally to said journal boxes, and pivoted equalizers connecting said last specified springs.

3. In a locomotive, the combination of a main supporting frame, a plurality of axles, journal boxes fitted in said frame with the capacity of relative vertical and lateral movement and providing bearings for said axles, vertically acting springs bearing on said journal boxes, equalizers pivoted on the frame and connected to said springs, horizontally acting springs bearing on said journal boxes, and equalizers pivoted on the frame and connected to said horizontally acting springs.

4. In a locomotive, the combination of a main supporting frame, a plurality of axles, journal boxes fitted in said frame with the capacity of relative vertical and lateral movement and providing bearings for said axles, vertically acting springs bearing on said journal boxes, equalizers pivoted on the frame and connected to said springs, horizontally acting springs bearing on said journal boxes, equalizers pivoted on the frame and connected to said horizontally acting springs, and means for permitting oscillatory movement of said horizontally acting springs upon their bearings on the journal boxes.

5. In a locomotive, the combination of a main supporting frame, a plurality of axles, journal boxes fitted in said frame with the capacity of relative vertical and lateral movement and providing bearings for said axles, a vertical spring and equalizer system

through which the weight carried by the frame is applied to and distributed over the several axles, swivel supports pivotally connected to the journal boxes, horizontally acting springs having an oscillatory bearing on said swivel supports, and equalizers pivoted on the frame and connected to said horizontally acting springs.

6. A horizontal spring and equalizer system for locomotives, comprising a plurality of horizontally acting springs interposed between the frame and a plurality of journal boxes of a locomotive, and transmitting and distributing lateral pressure to and among the several journal boxes through the intermediation of pivoted equalizers and links by which the springs are connected.

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