

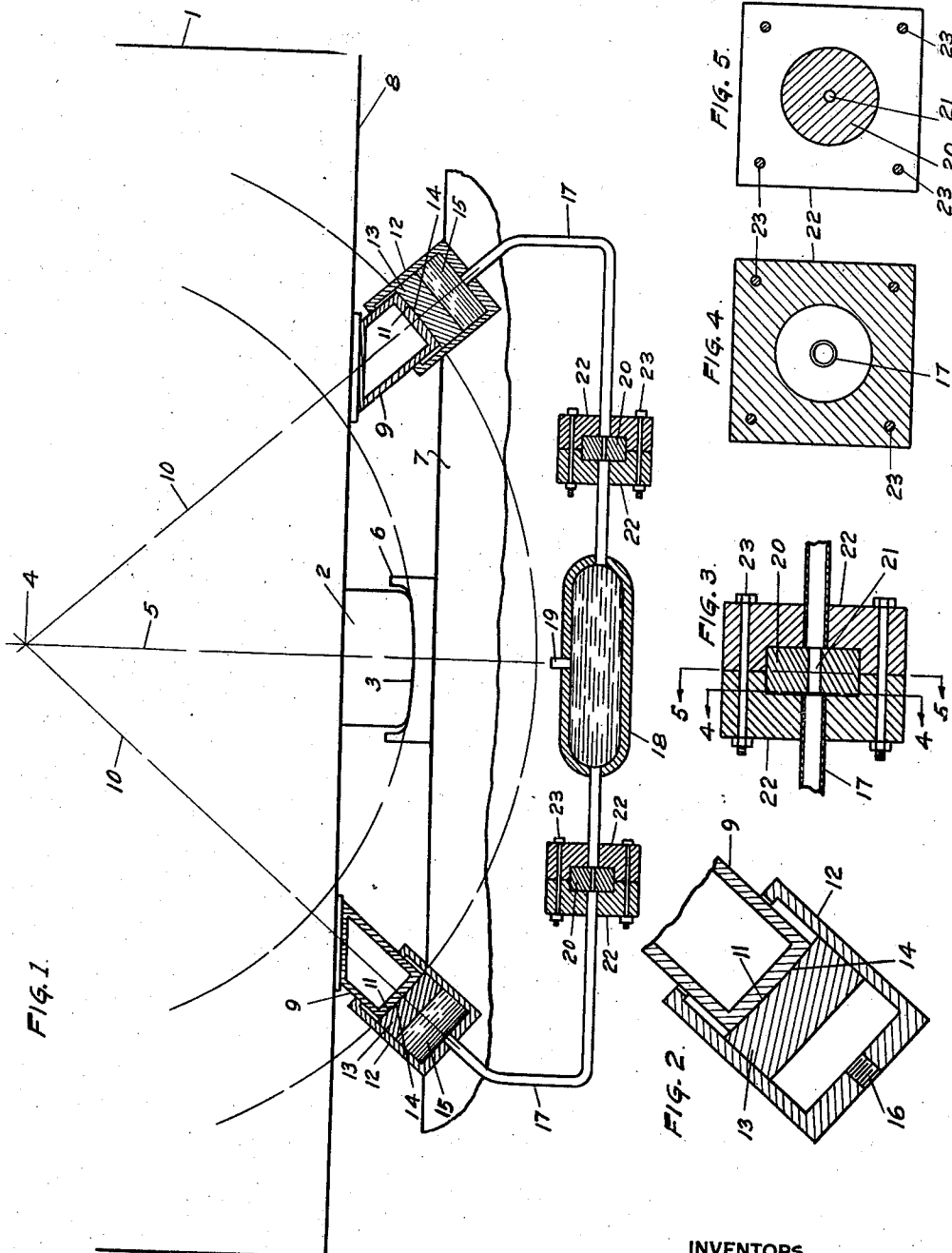
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MEANS OF MAINTAINING RAILWAY CARS IN A HORIZONTAL PLANE

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MEANS OF MAINTAINING RAILWAY CARS
IN A HORIZONTAL PLANE

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This invention relates to a means of maintaining adjacent railway cars in a horizontal plane, irrespective of the torsional twist of one car with respect to the others, breaks in grade or passage around curves.

In particular, this invention relates to articulated cars and a means of maintaining the articulated cars in alignment so their platforms will remain in alignment with one another and will be maintained substantially in a horizontal plane irrespective of the movement of the trucks or the condition of the rails and roadbed.

It is an object of the invention to provide for an articulated construction having trunnions in which the trunnions have their bearing faces described on an arc the center of which is on the vertical axial plane passing through the center of the train, and through the center of gravity of the train; and to also have the faces of the thrust devices constituting the side bearings for the cars also described as arcs about the same center on which the arc of the face of the trunnion is described.

It is an object to provide a hydraulically actuated system, whereby as the car body tilts the tilting of the body will be resisted and delayed so that the tilting movement of the body will be dampened and the floor will be maintained in substantially a horizontal plane.

It is a further object to provide against quick rocking, vibratory movements characteristic in high speed trains, and particularly disadvantageous in articulated trains.

It is a further object to place the side bearing thrust members and the hydraulic cylinders on axial lines which radiate from the common center of description of the arcuate surfaces of the side bearings and trunnions.

Referring to the drawing:

Figure 1 is a diagrammatic view of one end of an articulated car body, showing the trunnion, trunnion socket, side bearing thrust members and the hydraulic system.

Figure 2 is an enlarged section through the thrust bearing constituting the side bearing of the car, the hydraulic cylinder and piston.

Figure 3 is a detail section through the restriction mechanism for restricting the flow of the hydraulic fluid in the system.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a section on the line 5—5 of Figure 3.

Referring to the drawing in detail, the numeral 1 is a car body having a trunnion 2, the arcuate face of which at 3 is described on the surface of an arc drawn about the center 4 located in the

central vertical plane 5, on which lies the center of gravity. This trunnion is mounted in a socket plate 6 carried on the truck generally designated 7. The numeral 8 designates the floor of the car body 1. On either side of this floor, preferably as a part of the end sill casting, there are located the diagonally disposed side bearing thrust members 9, which are axially disposed along the radial line 10 emanating from the center 4 located on the vertical plane 5. The face of this thrust bearing member 9 is arcuate, as at 11, and is described on an arc drawn about the center 4. Thereafter the arcuate face of the trunnion 2 at 3 is described on a circle concentric with the circle of which the arcuate face 11 of the thrust member 9 is a part.

The thrust member 9 works within a radially disposed cylinder 12, which carries a piston 13 that has an arcuate face 14 engaging with the arcuate face 11 of the thrust side bearing 9. This piston is supported against free movement by the fluid 15 which is supplied through the port 16 and pipe 17 from a pressure reservoir 18. This pressure reservoir has an inlet port 19 through which fluid under pressure is supplied so as to maintain a predetermined pressure in the system. Any desired means of accomplishing this may be employed as it forms no part of the present invention.

Located in the line 17 is a restriction device comprising a member 20 having a restricted port 21 for restricting the flow of liquid from one cylinder 12 on one side to the cylinder 12 on the other side in connection with resisting the downward thrust on the liquid due to the tilting of the body. This restriction member is carried within the clamping collars 22, retained together by the bolts 23. These collars are mounted upon the pipes 17.

It will be understood that a companion railway car is mounted upon the same truck 7, with its similar mechanism. The details of the trunnion construction, the articulated connections and the cars are of no importance in connection with the present invention. A typical articulated construction only is shown in the present drawing. A duplicate of the construction shown in Figure 1 is in the adjacent vehicle as the two vehicles, while carried upon a common truck, move independently one of the other, and it is this independent movement which causes the difficulty and the necessity of maintaining the bodies in alignment; particularly in alignment as to the horizontal position of the car floors.

By restricting the rocking movement and

dampening the movements of that character, it is possible to more nearly maintain the adjacent car bodies in alignment. It is also vital to reduce the amount of rocking and side sway, particularly at high speeds. The accumulated rocking becomes very serious when a train is traveling at a high speed and the cars are freely mounted on trunnions as indicated, in which the car body is free to move laterally and vertically, and is free to rock in order to accommodate itself to breaks in grade, super-elevated rails and curves. This rocking, like a sympathetic vibration, has a tendency to increase when it once starts and one of the results of this invention is the reduction of such sympathetic vibrations by interposing in the path of such vibrations a medium such as heavy oil as a dampening factor in order to break up such movements. A further result is achieved in breaking up such vibrations, particularly at high speeds, in that the rate of vibration and rate of movement of the hydraulic fluid are necessarily out of synchronism with the speed of vibration and the rate of vibration set up in the vehicle through its leaf or coil springs which are located in the truck.

Operation

When the car platform 8 with the body 1 rocks on the trunnion surface 3, one of the side bearing thrust members 9 will be depressed and the other elevated. On the side towards which the body rocks the thrust member 9 will descend, and tend to compress the fluid 15. If not restrained this would serve to elevate the opposite side bearing 9, but due to the restriction orifice 21 the flow of the fluid 15 under the impact of the floating piston 13 and pressure of the side bearing 9 the movement is restrained as the fluid is restricted in its movement through the orifice 21. Therefore, the tendency of the body to rock is restricted, and before the full rocking movement can take place the sway of the car will usually be reversed, due to the passage of the car either out of the curve or around a reverse curve because the entrance into a curve is the fundamental cause of the rocking or tilting of the body 1.

Due to the fact that the adjacent bodies assume an angular position with respect to one another, due to breaks in grade, the side bearings may still freely rock for this purpose because of the fact that the surfaces 11 and 14 of the side bearing members 9 and the floating piston 13 are described on concentric spheres with the surface of the trunnion 3 about the common center 4. As the clearance between the cylinder 12 and the side bearing thrust member 9 is ample, this movement can take place without binding, while at the same time maintaining the thrust uniformly upon the face 14 of the floating piston 13. Any sudden movements vertically, due to the vibration of the springs and the truck, will not affect the adjustment because they are too sudden or the vibration rate is too fast to affect the hydraulic system and its adjustment. Any continued vibration which might have an accumulated effect upon the cars will ultimately encounter the hydraulic system and be dampened.

It will be understood that it is desired to comprehend within this invention such modifications as come within the scope of the claims and the invention.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In combination, a car body, a trunnion hav-

ing an arcuate face described about a given center, a center plate adapted to receive and support said trunnion, laterally disposed side bearing members having arcuate faces described about the same center, hydraulic means for resisting the thrust of said side bearing members as the car body rocks on said trunnion, means of interconnecting said hydraulic means, and means of restricting the flow of hydraulic fluid from one hydraulic means to the other.

2. In combination, a car body, a trunnion supporting said car body, a center plate therefor mounted on a truck, the face of said trunnion and center plate being described on an arc about a point located on a plane vertically disposed to the body and normal to the floor thereof; radially disposed side bearing thrust members mounted on said body axially aligned on radial planes from said center and having their faces described on an arc concentric with the arc describing the surface of the trunnion; radially disposed hydraulic cylinders and pistons adapted to receive said side bearing thrust members, and means of supplying hydraulic fluid under pressure to said cylinders.

3. In combination, a car body, a trunnion supporting said car body, a center plate therefor mounted on a truck, the face of said trunnion and center plate being described on an arc about a point located on a plane vertically disposed to the body and normal to the floor thereof; radially disposed side bearing thrust members mounted on said body axially aligned on radial planes from said center and having their faces described on an arc concentric with the arc describing the surface of the trunnion; radially disposed hydraulic cylinders and pistons adapted to receive said side bearing thrust members, means of supplying hydraulic fluid under pressure to said cylinders, and means of regulating the flow of fluid to and from said cylinders.

4. In combination, a plurality of car platforms having their ends adjacent one to the other, trunnions mounted in the adjacent ends thereof having the same curvature, laterally disposed side bearings on each car body having faces described on the same arc and of the same curvature as the trunnions, and hydraulic thrust means adapted to resist the thrust of said side bearing members.

5. In combination, a plurality of car platforms having their ends adjacent one to the other, trunnions mounted in the adjacent ends thereof having the same curvature, laterally disposed side bearings on each car body having faces described on the same arc and of the same curvature as the trunnions; hydraulic thrust means adapted to resist the thrust of said side bearing members, and means of controlling said hydraulic thrust means to regulate the degree of resistance to movement by said hydraulic means.

6. In combination, a car body, a depending trunnion having an arcuate face described about a point on the center axis of the body, a truck and center plate for receiving said trunnion to permit the trunnion to move in all directions, laterally disposed diagonally arranged side bearing members, hydraulic cylinders for receiving said members, floating pistons adapted to engage said side bearing members, and means of supplying hydraulic pressure to said cylinders to resist the rocking movement of the car body.

7. In combination, a car body, a depending trunnion having an arcuate face described about a point on the center axis of the body, a truck

and center plate for receiving said trunnion to permit the trunnion to move in all directions, laterally disposed diagonally arranged side bearing members, hydraulic cylinders for receiving said members, floating pistons adapted to engage said side bearing members, means of supplying hydraulic pressure to said cylinders to resist the rocking movement of the car body, and means interconnecting said hydraulic cylinders to a common source of hydraulic supply.

8. In combination, adjacent bodies, a common truck, trunnions mounted on said truck to permit said bodies to rock freely with respect to one another, side bearing members on said bodies, and hydraulic means connected to said side bearing members adapted to resist the thrust thereon due to the rocking of the bodies, whereby the bodies are maintained with their floors in substantial alignment.

9. In an articulated car having a car body and

end trunnions and trucks, a center plate on each truck for supporting the trunnions so that the body can freely tilt, and the combination therewith of hydraulic cushioning means including bearing means at each side of the car body and the adjacent truck for controlling the degree of tilt of the body.

10. In an articulated car having a car body and end trunnions connected therewith, and a truck also at each end of the car, each truck having a socket plate for each trunnion, the combination with hydraulic cushioning means at each side of the car body, between it and the adjacent truck, for controlling the degree of tilt of the body, said trunnions having arcuate pivotal faces, and said hydraulic bearing means having arcuate faces, whereby the body can accommodate itself to curves and breaks in grade.

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