Jan. 27, 1942. R. W. JOY 2,271,195

MINE OR SIMILAR CAR

Filed Feb. 20, 1940 4 Sheets-Sheet 1

Fig. 1.

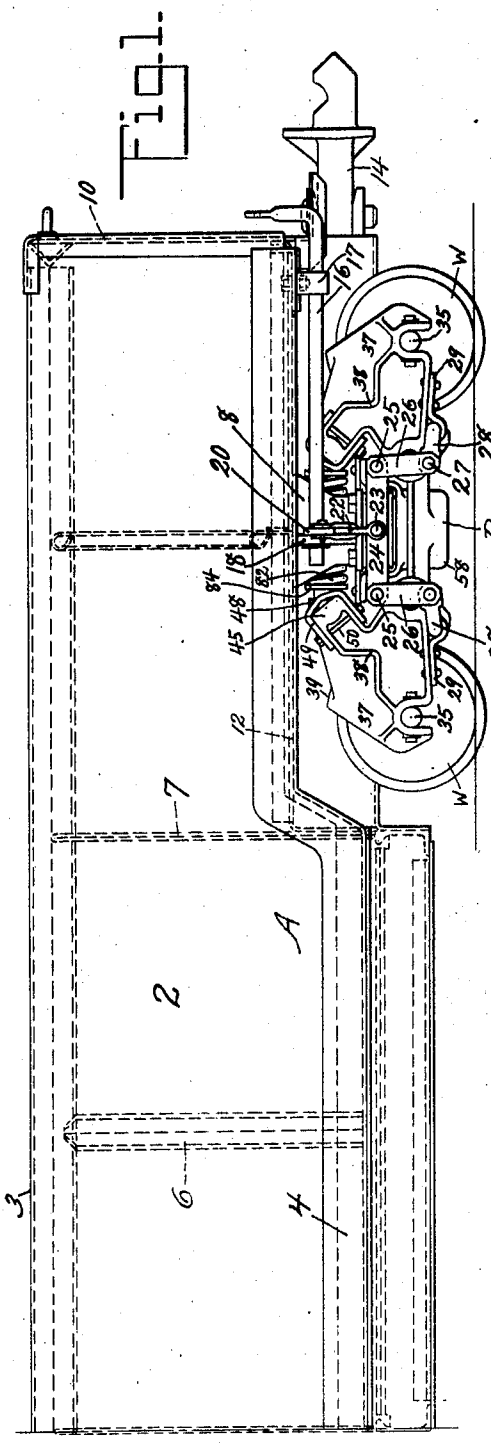
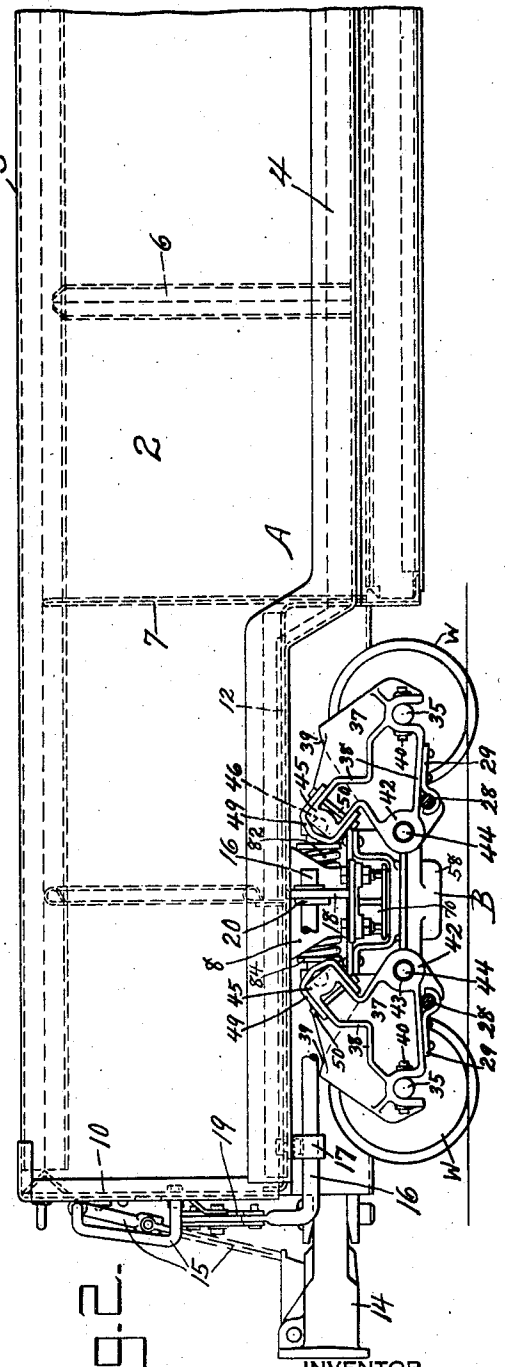


Fig. 2.



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MINE OR SIMILAR CAR

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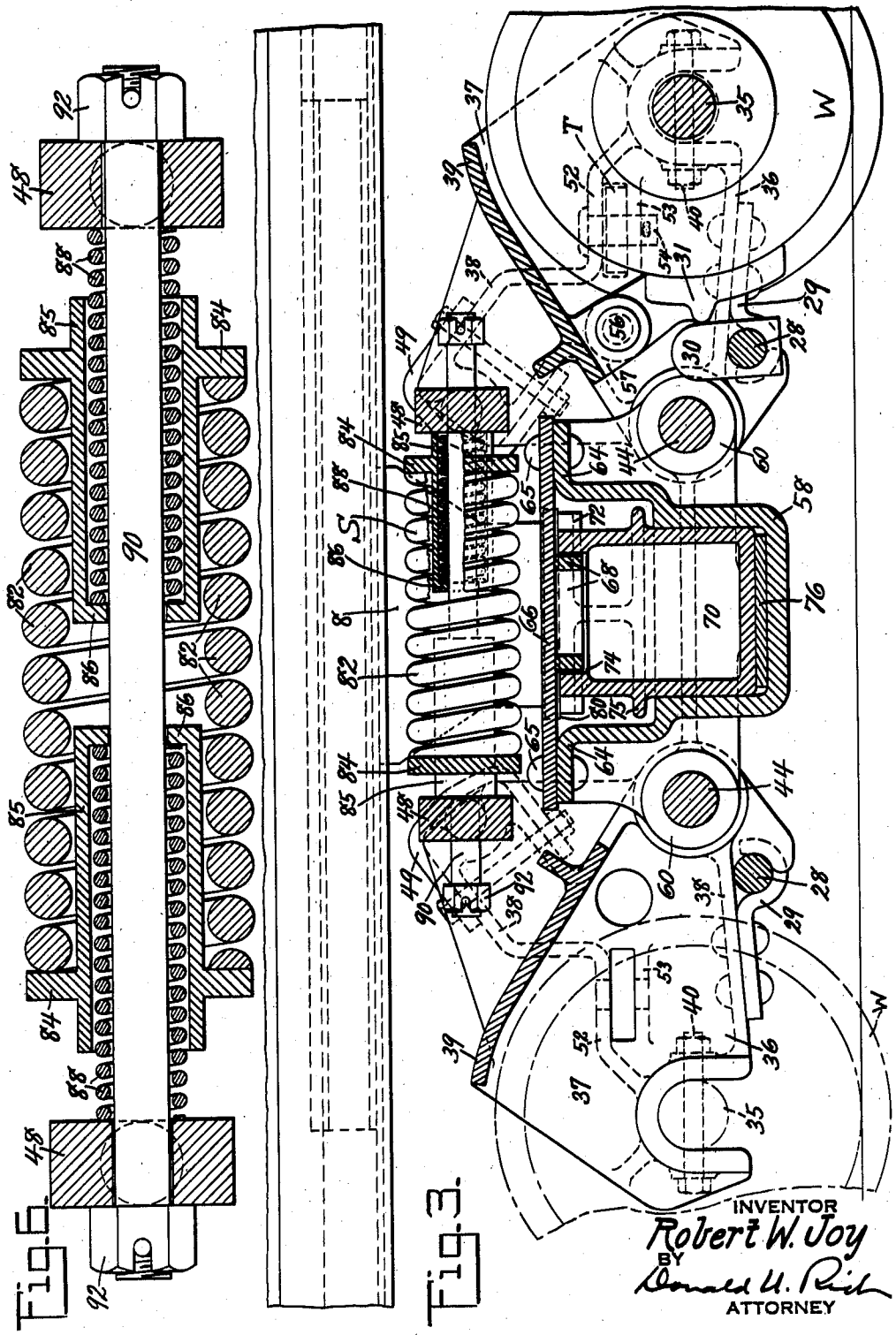


Fig. 5.

Fig. 3.

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MINE OR SIMILAR CAR

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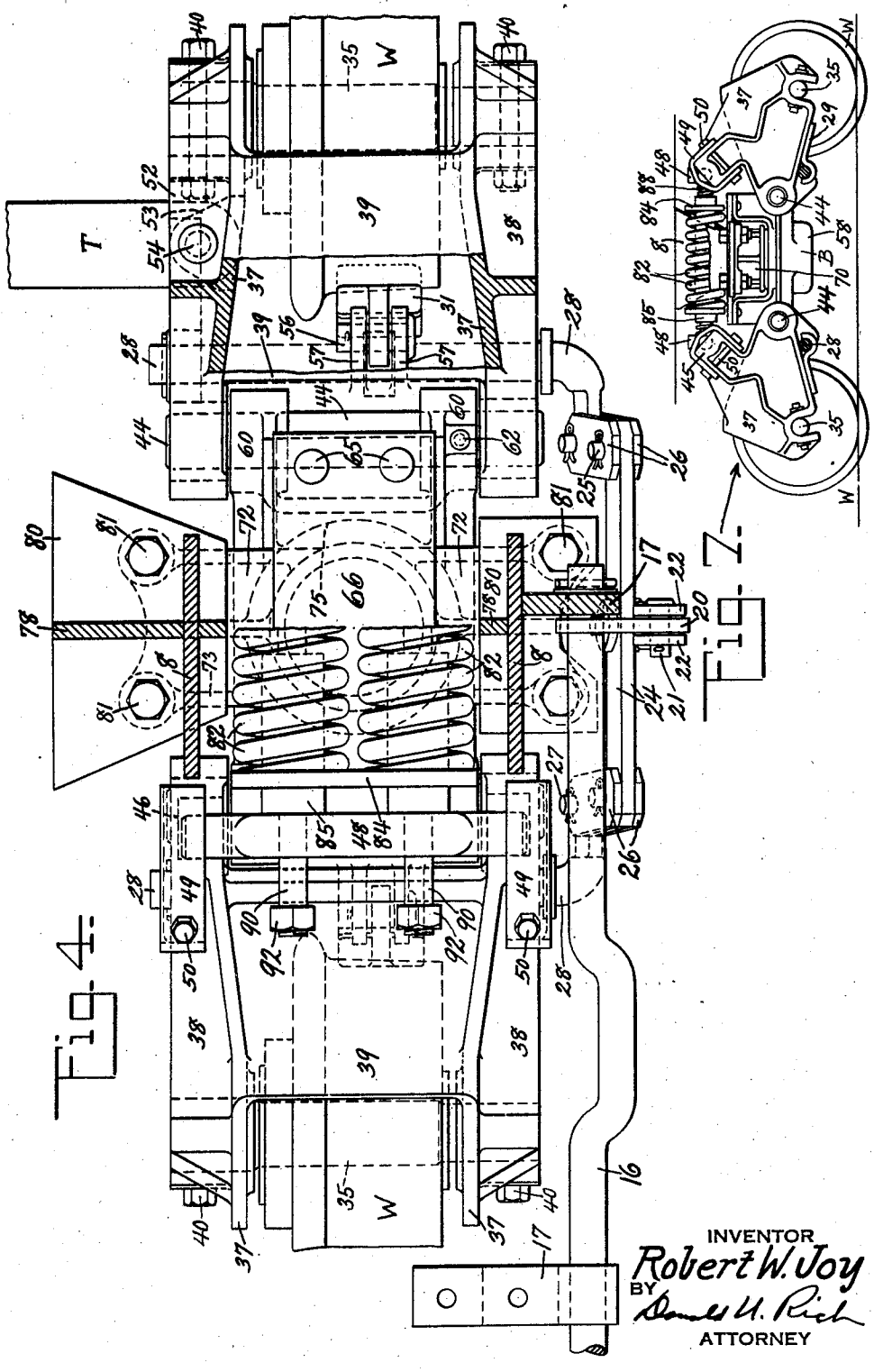


Fig. 4.

Fig. 7.

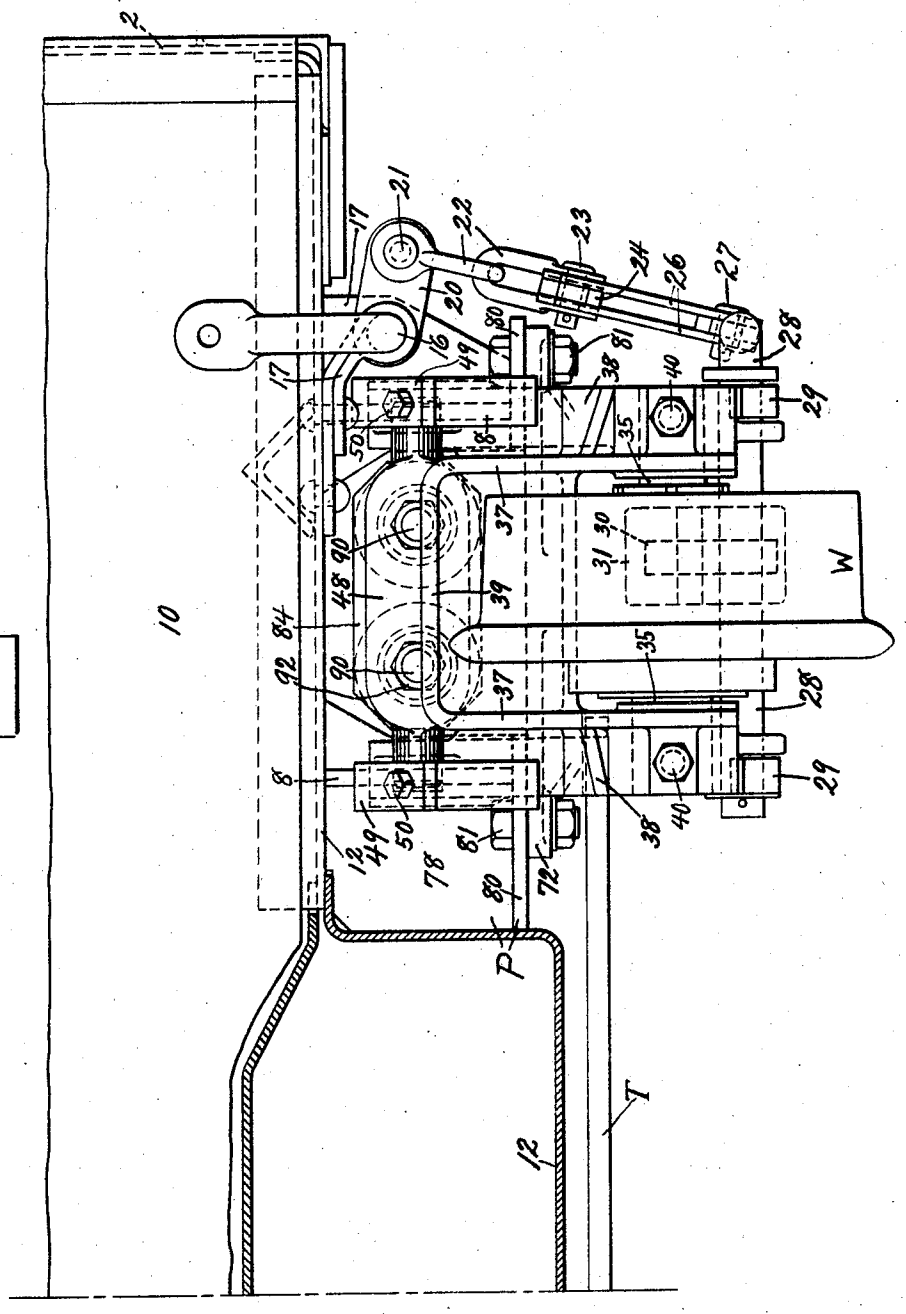
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MINE OR SIMILAR CAR

Filed Feb. 20, 1940 4 Sheets-Sheet 4

Fig. 5.



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2,271,195

MINE OR SIMILAR CAR

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Application February 20, 1940, Serial No. 319,898

15 Claims. (Cl. 105—179)

This invention relates to vehicles in general and in particular to such vehicles or cars as are adapted for use in mine or industrial plants.

In the major portion of mine or industrial installations small rigid four-wheel cars are used but the curves both horizontal and vertical limit the wheel base of such cars and with the wheel base limited the capacity of the car is also limited; that is, it would be impossible to build a large capacity four-wheel rigid car, unless it were to run only on straight horizontal track. In mining practice the trend is toward mechanical loading and coal handling equipment and to obtain the maximum benefit from such equipment the cars should be as large as it is possible to handle, since it takes no more time to shift a big car than it does a small car. Also the length of haulage from the coal face or loading point to the tipple or discharge point is constantly increasing as coal is taken out of the mines and a large car is extremely desirable. It is impossible in the small rigid cars as previously constructed to obtain a low ratio between the dead weight of the car and the load carried in the car, but in a large capacity car it is possible to obtain a ratio between the full load and light load condition of the car which is comparable with that obtained in present freight car service. The small rigid type of mine or industrial car has been in most cases rigidly mounted and as a result the car has rapidly pounded to pieces in its travels over the rough trackage. It is an object, therefore, of the present invention to provide a large capacity car which is mounted on spring trucks in order to reduce any possible damage to the truck or car body from track shocks.

A further object of the invention is the provision of a high capacity car mounted on spring trucks with the parts so arranged that only a fraction of the spring capacity is needed as would be required with the conventional type of truck.

A still further object of the invention is the provision of a mine or industrial car mounted on trucks with the parts so arranged that the car can take sharp vertical curves as well as sharp horizontal curves.

Yet another object of the invention is the provision of a high capacity mine or industrial car having independent two-wheel trucks at each end which are extremely flexible and in which the loads on the wheels are completely equalized by more or less direct transmission of load between the wheels.

Yet another and important object of the invention is the provision of an extremely flexible spring mounted truck for high capacity mine or industrial cars in which auxiliary springs are provided which positively retain the wheels on track at all times, thus preventing derailments.

These and other objects of the invention will be apparent to persons skilled in the art from a study of the following description and accompanying drawings, in which:

Figure 1 is an elevational view of substantially half the improved car, with Fig. 2 being a side elevation of the other half of the car;

Fig. 3 is a sectional view of the improved truck with the section being taken substantially on the longitudinal center line thereof;

Fig. 4 is a plan view of the improved truck with parts of the truck broken away to more clearly disclose the construction;

Fig. 5 is an end elevational view of the improved truck and disclosing its position relative to the body;

Fig. 6 is an enlarged sectional view disclosing one of the improved spring units, and

Fig. 7 is a side elevational view of the truck with the parts in the condition they assume when the load is substantially removed from the truck, such as when a single truck strikes a low part in the track.

Referring now to the drawings in detail, it will be seen that the large capacity car body A is mounted upon four independent trucks B, each of the two-wheel type. The exact shape of the body is immaterial, the only requirement being that it be so constructed as to permit proper operation of the supporting trucks. In the present instance the car body is of the side wall girder type with the sides 2 secured at top and bottom to top and bottom chords 3 and 4 respectively and with the side or web sheet stiffened by inverted angle braces 6 and gussets 7. The load from the side girder walls is carried inward for transmission to the truck by means of heavy end gussets 8 which may be considered as internal body bolsters. The sides are connected, of course, by end walls 10 and by floor portions 12, which floor portions may be arranged at various levels in order to obtain maximum load capacity while permitting proper functioning of the truck. Any suitable type of bumper and coupler arrangement may be used but in the present case automatic spring cushion swivel couplings 14 are used which may be released by customary release rigging 15.

In most cases it is desirable to provide the car with a brake and this brake may be applied to both ends or to only one end of the car. The brake in the present instance is shown as applied to both ends of the car and consists of a rock shaft 16 extending longitudinally of the car on each side thereof and carried by bearing bracket 17 and by pedestal web 18 later to be referred to. The longitudinally extending rock shafts are connected together on the end of the car for joint operation by suitable linkages 19 (Fig. 2). The end of the rock shaft adjacent the truck has welded or otherwise secured thereto an arm 20 adapted to be connected by pin 21 to clevises 22, which in turn are connected by pin 23 to a substantially horizontally extending equalizer bar 24. The ends of this equalizer bar are connected by pin 25 to links 26, which in turn are connected by pin 27 to the crank arm of brake shaft 28. This brake shaft is supported on the truck frame by bearing straps 29 and carries an arm 30 adapted to bear against the brake shoe 31 to force the same against the car wheels. It should be noted that when the brakes are applied the pins 27 will be substantially in alignment with the axis of pivot pin 44 (later to be described) in order that the brake shoe pressure will be substantially constant irrespective of the wheel movements about the pivot pin.

The body, as previously stated, is supported on four more or less independent two-wheel trucks and each of these trucks is mounted on wheels W carrying stub axles 35 which extend from either side of the wheel hubs to support the truck wheel members 36. The wheel members or frames are formed with side pieces 37 suitably braced by properly disposed ribs 38 and with the side pieces joined together by a web 39 which partially covers the wheel and effectively ties the side pieces together preventing spreading thereof. The truck wheel members or frames, as shown, have the downwardly directed U-shaped portion straddling the ends of the stub axle and the sides of these U portions, as well as the axle, are pierced to receive bolts or other securing means 40, thus tying the truck wheel members or frames to the axles and preventing any separation. In this manner also the side pieces of the wheel members are tied together not only by web 39 but also by the axle itself, thus it will be seen that the axles support a substantially inverted U shape truck wheel member and additionally assist in tying the sides of the inverted U member together. The ends of the side pieces, remote from the axle, are formed with enlargements 42, which enlargements are pierced as at 43 to provide bearing portions by means of which the wheel members can be rotatably mounted upon pivot pin 44 carried by the truck center bearing member. The ribs 38 of the side pieces merge into and stiffen this bearing portion of the wheel member and also merge into and stiffen an upstanding ear portion 45 which is provided with semi-circular bearings 46 which rotatably receive the ends of a trunnion block 48. This trunnion block may be held in position by any suitable means but in the present instance it is held in position by a U-shaped strap 49 and bolt or other securing means 50 which passes through the ribs 38. One of the bracing ribs is formed with a flat portion 52 and on the inner side of each wheel member a slot through the side piece is provided as is also an outstanding lug 53. The flat portion 52 and lug 53 are pierced to receive a pin 54 (Figs. 3 and 4) which pivotally mounts the ends of tie bar T which extends across the car and ties the trucks on opposite sides together for joint operation. The brake shoes previously referred to are carried by pins 56 extending through an ear on the brake shoe and through lugs 57 formed on the inner surface of the connecting web 39, all as clearly shown in Fig. 3.

The truck center bearing member is preferably formed as a casting with a deep bearing bowl 58 to which is connected by suitable webs and stiffening ribs the spaced pivot bearing members 60 which are pierced and adapted to receive the bearing pins 44 previously referred to. In order to prevent loss of these pivot pins they may be secured either to the truck center bearing member or to the truck wheel members, but in the present case they are shown (Fig. 4) as secured to the truck center bearing member by pins 62, thus relative rotation of the pivot pin in the truck center bearing is prevented. It is obvious, however, that if desired the pins could rotate in the truck center bearing members and be fixed in the wheel members. Portions of the bearing bowl are extended upwardly and then outwardly to provide oppositely disposed angular ears 64 braced by webs extending upwardly from the bearing lugs 60. These upstanding angular shaped ears have holes drilled or punched therein to receive rivet or other securing means 65, by means of which plate 66 may be rigidly secured to the truck center bearing. This plate constitutes what may be termed an upper truck center bearing and is formed with an annular projection 68 extending downwardly from the lower surface thereof and for a purpose later to be described. It is obvious that the annular projection 68 may be solid instead of annular. It is also obvious that the plate and projection may be formed as a casting, but in any event the truck top center bearing will effectively tie the angular shaped ears 64 together, thus strengthening the truck lower center bearing member.

In order to mount the body on the truck a body center bearing is provided which, in the present instance, is formed as a casting with a lower cylindrical projection 70 adapted to closely fit in the bowl 58 of the truck lower center bearing member. The body center bearing member is also formed with outstanding arms 72 suitably braced by ribs 73 to the central bearing portion thereof. The upper surface of these arms is preferably plane and has the center portion removed to provide an opening 74 for reception of the projection 68. In order to stiffen the cylindrical bearing portion and prevent entrance of dirt into the bearing area rib 75 is provided as clearly shown in Figs. 3 and 4. It is, of course, obvious that the bottom of the cylindrical projection 70 may rest directly on the bottom of the truck center bearing bowl 58, but it is preferable that it rest upon some anti-friction material such as a bronze or brass disk 76. The cylindrical projection on the body center bearing member and the opening 74 in the top thereof provide a lower and upper bearing about which the body center bearing may turn. It is, of course, obvious that the axis of the cylindrical projection 70 and bowl 58 as well as of projection 68 and opening 74 coincide, thus permitting ready turning of the body center bearing in the truck or of the truck about the body center bearing. It is also obvious that due to the depth of the bowl and cylindrical projection, together with the spacing of the projection 68 and open-

ing 74 as high as possible above the lower bearing, an extremely rigid bearing is provided of considerable depth, this bearing being formed by the lower bearing in the bowl and by the upper bearing in the recess 74. The body center bearing supports the car body through inner and outer pedestals P. Each of these pedestals are in the present case formed of plate members welded together to produce spaced T shaped elements 78 joined to the body and to a lower plate 80, which lower plate is pierced to receive bolts or other securing means 81, by means of which the arms 72 of the body center bearing may be securely fastened to the pedestals (see Figs. 1, 4 and 5). Thus it will be seen that with the pedestals rigidly secured to the car body and the body center bearing member rigidly secured to the pedestals, the body center bearing may be considered as a rigid part of the car body about which the truck may rotate in a horizontal plane.

In order to support the truck parts as well as the car body spring elements S are interposed between the trunnion blocks 48 previously referred to. In the present instance two spring units are used, each comprising a main load carrying spring 82 having its ends resting against a collar 84 formed on a barrel 85, the ends of which barrel may contact directly with the trunnion block 48. The barrel portions extend inwardly from each end of the main spring toward each other and are partially closed by wall 86, which wall forms a stop for the inner end of springs 88, the outer ends of which bear directly and at all times against the trunnion block 48. A bolt or rod 90 extends through the springs 88 through the inner wall 86 of the barrels and through the trunnion blocks and carries at its ends nuts or other means 92. These bolts form a support directly for the springs 88 and, together with the barrels 85, form a support for the main springs 82. The barrels having their inner ends spaced apart also serve as stops preventing the main spring 82 from ever going solid or being overstressed. The springs 88 are so chosen that their solid height is less than the inside length of the barrel and thus they cannot be overstressed. It will be obvious from the preceding description that the springs 88 and the springs 82 in each unit act in series until such time as the barrel 85 bears against the trunnion block 48, then the springs 88 can assume no further load and the entire load must be absorbed by the main or load springs 82. In actual practice the springs 88 are chosen as to have sufficient strength as to force the wheels into close contact with the rails and prevent derailments. The necessity for these springs will be obvious when it is considered that in a large capacity car of the type shown the body is extremely rigid and with the irregular mine tracks a condition might arise in which the car would tend to be supported on three trucks. If under these conditions the wheels of the fourth truck are not forced onto the rail as shown in Fig. 7, then that end of the car will be derailed. It will be obvious that the springs in each unit act in series to support a portion of the car weight and to force the wheels onto the rail in case the car body tends to lift clear of the rail and that the main springs act alone to absorb the main weight load and shocks to which the car may be submitted.

The assembly of the truck should be apparent from the preceding description, but in order to remove any question of its assembly, the following description is given: The truck lower center bearing can be directly pin connected by pivots 44 to the truck wheel members, after which the wheel and axle assemblies may be mounted in the wheel members, or, if desired, the wheel and axle assemblies may be mounted in the wheel members prior to their attachment to the truck lower center bearing. The body center bearing is mounted in the truck lower center bearing and the truck top center bearing member applied and securely riveted or otherwise fastened in position. This is preferably done prior to attachment of the wheel members but may be done after attachment of the wheel members. After the center members are assembled and the wheel assemblies attached, the entire spring and trunnion block assembly may be applied to the truck and the U-shaped securing straps fastened in place. The truck is now ready for attachment to the car body, such attachment being accomplished by lowering the car body onto the truck and inserting the bolts 81 through pedestal plate 80 and body center bearing arms 72.

In operation the body center bearing is rigid with the car body and the truck center bearing. Both bottom and top portions can move with respect to the body center bearing only by rotation about a substantially vertical axis, but due to the depth and spacing of the bearing portions there can be no tilting of the truck center bearing. The pivot pins 44 provide trunnions about which the wheel members may oscillate or rotate slightly, but their oscillation or slight rotation is controlled by the springs acting directly on trunnion blocks 48. In other words, two triangles with their apices located on the axle axis and on the axis of the pivot pin 44 and on the trunnion block axis are provided. These two triangles have their lower adjacent apices connected together by the rigid truck center bearing assembly, while their upper adjacent apices are urged apart by means of the spring assemblies. Any shock or movement transmitted to one axle will cause the attached wheel supported member to transmit such shock through the spring to the other wheel supported member and subsequently to the body. Since the wheel supported members act directly upon the spring and not against an abutment, it is obvious that the spring capacity need only be sufficient to support the load on one wheel and not the entire load as in conventional trucks. It is obvious that the entire truck may rotate about a vertical axis regardless of the position of the wheel supported members and that the wheel supported members may move freely in a plane perpendicular to pivot 44 regardless of the angular position of the truck. It is also obvious that any shock on one wheel will be directly transmitted to the other wheel, thus obtaining perfect equalization between the wheels and an easy riding car due to this equalization and due to the fact that a comparative spring movement may be obtained without excessive body motion. With the springs placed horizontally as shown, the car floor may be lowered to a position closely adjacent the wheels and yet a large spring motion may be obtained which could not be obtained if the springs were used in a vertical position. The use of the springs in a horizontal position and as a connecting equalizer between the wheel supported frames or members, insures perfect shock absorbing qualities regardless of the angular position of the component truck parts.

While the invention has been described more or less in detail, it is obvious that various modifications and rearrangements of parts may be made and all such modifications and rearrangements of parts are contemplated as will fall within the scope of the appended claims which define my invention.

What is claimed is:

1. A mine or similar rail car comprising a lading body having a floor and side walls, pedestals secured to and extending below said floor adjacent each side and end of the car, center bearings secured to said pedestals for rotation about a substantially vertical axis, and independent wheel carrying frames pivotally connected to each of said center bearings at opposite sides thereof for rotation in substantially vertical planes.

2. A mine or similar rail car comprising a lading body having a floor and side walls, pedestals secured to and extending below said floor adjacent each side and end of the car, center bearing assemblies secured to said pedestals for rotation about substantially vertical axes, a plurality of substantially horizontal pivot means carried by each of said center bearing assemblies at opposite sides thereof and in spaced parallel relationship, and a wheel carrying frame connected to each of said pivot means for substantially independent rotation in substantially vertical planes.

3. A mine or similar rail car comprising a lading body having a floor and side walls, pedestals secured to and extending below said floor adjacent each side and end of the car, center bearing assemblies secured to said pedestals for rotation about substantially vertical axes, a plurality of substantially horizontal pivot means carried by each of said center bearing assemblies at opposite sides thereof and in spaced parallel relationship, independent wheel carrying frames connected to said pivot means for substantially independent rotation in substantially vertical planes, and means independent of the center bearings for connecting the wheel carrying frames carried by each center bearing together to control the substantially independent rotation of the frames.

4. A mine or similar rail car comprising a lading body having a floor and side walls, pedestals secured to and extending below said floor adjacent each side and end of the car, center bearing assemblies secured to said pedestals for rotation about substantially vertical axes, a plurality of substantially horizontal pivot means carried by each of said center bearing assemblies at opposite sides thereof and in spaced parallel relationship, independent wheel carrying frames connected to said pivot means for substantially independent rotation in substantially vertical planes, and means independent of the center bearings for connecting the wheel carrying frames carried by each center bearing together to control the substantially independent rotation of the frames, said last named means including resilient devices to yieldingly control the substantially independent rotation of the wheel carrying frames.

5. A mine or similar car adapted to run on rails and comprising a lading body having a floor and side walls, pedestal structures secured to said car adjacent each side and end of the car, car supporting truck means secured to said pedestal structures and each comprising, a body center bearing rigidly connected to the pedestal structure, a truck center bearing rotatably connected to said body center bearing for rotation about an axis substantially at right angles to the car floor, independent wheel carried frame members rotatably connected to said truck center bearing on opposite sides of said axis, and resilient means interposed between the adjacent wheel carried frame members to control the rotation of said members relative to the truck center bearing.

6. A mine or similar car adapted to run on rails and comprising a lading body having a floor and side walls, pedestal structures secured to said car adjacent each side and end of the car, car supporting truck means secured to said pedestal structures and each comprising, a body center bearing rigidly connected to the pedestal structure, a truck center bearing rotatably connected to said body center bearing for rotation about an axis substantially at right angles to the car floor, independent wheel carried frame members rotatably connected to said truck center bearing on opposite sides of said axis, and resilient means interposed between the adjacent wheel carried frame members to control the rotation of said members relative to the truck center bearing, said resilient means forcing the wheels onto the rails at all times to prevent derailment of the car.

7. A mine or similar car adapted to run on rails and comprising a lading body having a floor and side walls, pedestal structures secured to said car adjacent each side and end of the car, car supporting truck means secured to said pedestal structures and each comprising, a body center bearing rigidly connected to the pedestal structure, a truck center bearing rotatably connected to said body center bearing for rotation about an axis substantially at right angles to the car floor, independent truck frame members roughly triangular shape in outline and having one of the adjacent apices rotatably connected to said truck center bearing and on parallel axes located on opposite sides of said axis, wheel and axle assemblies supporting the remotely disposed apices of said frame members, and equalizer means connected to the remaining apices of said frame members whereby said center bearing will be supported and wheel loads equalized.

8. A mine or similar car adapted to run on rails and comprising a lading body having a floor and side walls, pedestal structures secured to said car adjacent each side and end of the car, car supporting truck means secured to said pedestal structures and each comprising, a body center bearing rigidly connected to the pedestal structure, a truck center bearing rotatably connected to said body center bearing for rotation about an axis substantially at right angles to the car floor, independent truck frame members roughly triangular shape in outline and having one of the adjacent apices rotatably connected to said truck center bearing and on parallel axes located on opposite sides of said axis, wheel and axle assemblies supporting the remotely disposed apices of said frame members, and equalizer means connected to the remaining apices of said frame members whereby said center bearing will be supported and wheel loads equalized, said equalizer means including resilient devices permitting controlled independent motion of said frame members relative to each other and to the center bearing.

9. A mine or similar car adapted to run on rails and comprising a lading body having a floor and side walls, pedestal structures secured to

said car adjacent each side and end of the car, car supporting truck means secured to said pedestal structures and each comprising, a body center bearing rigidly connected to the pedestal structure, a truck center bearing rotatably connected to said body center bearing for rotation about an axis substantially at right angles to the car floor, independent truck frame members roughly triangular shape in outline disposed on opposite sides of said axis and each having its base located adjacent the truck center bearing, wheel and axle assemblies supporting the remotely disposed apices of the frame members, means connecting one of the base apices to said truck center bearing whereby said frame members may rotate in substantially vertical planes relative to the truck center bearing, and equalizer means connected to the other base apices of the frame members for controlling the rotation of said frame members relative to the truck center bearing.

10. A mine or similar car adapted to run on rails and comprising a lading body having a floor and side walls, pedestal structures secured to said car adjacent each side and end of the car, car supporting truck means secured to said pedestal structures and each comprising, a body center bearing rigidly connected to the pedestal structure, a truck center bearing rotatably connected to said body center bearing for rotation about an axis substantially at right angles to the car floor, truck frame members roughly triangular shape in outline disposed on opposite sides of said axis and each having its base located adjacent the truck center bearing, wheel and axle assemblies supporting the remotely disposed apices of the frame members, means connecting one of the base apices to said truck center bearing whereby said frame members may rotate in substantially vertical planes relative to the truck center bearing, and equalizer means connected to the other base apices of the frame members for controlling the rotation of said frame members relative to the truck center bearing, said equalizer means including a plurality of resilient means of varying strength arranged in series and resiliently controlling independent rotation of the frame members relative to each other and to the truck center bearing.

11. A mine or similar car adapted to run on rails and comprising a rigid lading body having a floor, side walls and end walls, supporting structures secured to said floor and comprising in part, a lower bearing member rotatably connected to the remaining structure for rotation about a substantially vertical axis, independent frame members independently connected on parallel axes to said lower bearing member at opposite sides of said axis and freely rotatable relative thereto, wheel and axle assemblies supporting at least a portion of said frame members, and means connected to said frame members and acting to control relative movement between said frame members.

12. A mine or similar car adapted to run on rails and comprising a rigid lading body having a floor, side walls and end walls, supporting structures secured to said floor and comprising in part, a lower bearing member rotatably connected to the remaining structure for rotation about a substantially vertical axis, frame members independently connected on parallel axes to said lower bearing member at opposite sides of said axis and freely rotatable relative thereto, wheel and axle assemblies supporting at least a portion of said frame members, and means connected to said frame members and acting to control relative movement between said frame members, said means including a plurality of springs acting in compression and resiliently supporting upon the wheel and axle assemblies the remaining supporting structure and car body.

13. A car supporting structure comprising wheel and axle assemblies arranged in tandem, independent wheel frame members supported on said assemblies, a lower bearing member rotatably connected to and joining said frame members, means rotatably connecting said bearing member to the car to support the same, and common resilient means located above said lower bearing member and directly connecting said frame members together independently of the lower bearing member, said means including resilient members resiliently controlling relative motion between said frame members whereby the car is resiliently supported on the wheel and axle assemblies.

14. A car supporting structure comprising wheel and axle assemblies arranged in tandem, wheel frame members supported on said assemblies, a lower bearing member rotatably connected to and joining said frame members, means rotatably connecting said bearing member to the car to support the same, and resilient means located above said lower bearing member and directly connecting said frame members together independently of the lower bearing member, said means including resilient members resiliently controlling relative motion between said frame members whereby the car is resiliently supported on the wheel and axle assemblies, and said resilient members including a plurality of different strength springs acting in series thereby permitting said means to resiliently control large movements of the frame members.

15. As an article of manufacture, a supporting frame member for mine or similar rail cars comprising, spaced apart side pieces roughly triangular shaped in elevation, a web connecting said spaced apart side pieces together, and bearing portions formed on each spaced apart side piece adjacent each apex thereof, the bearing portions of one side piece being substantially in transverse alignment with the corresponding bearing portions of the other side piece thereby forming pairs of transversely aligned bearing portions, one pair of said bearing portions being adapted to receive a wheeled axle, another pair of said bearing portions being adapted to receive therebetween means connecting the member to the car, and the third pair of said bearing portions being adapted to receive therebetween means controlling the movement of the frame member.

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