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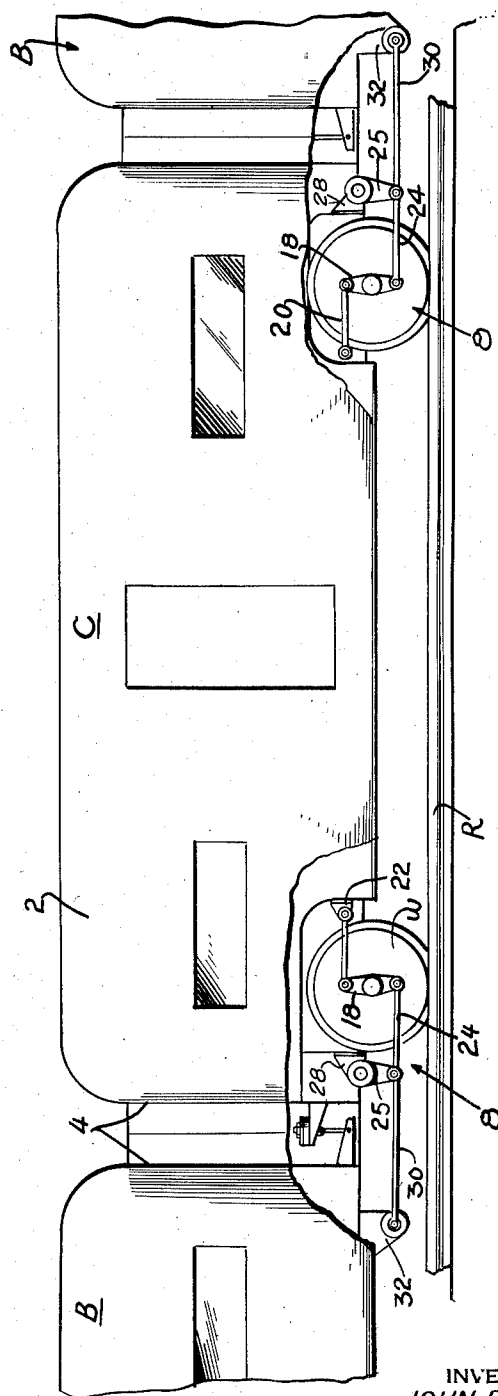
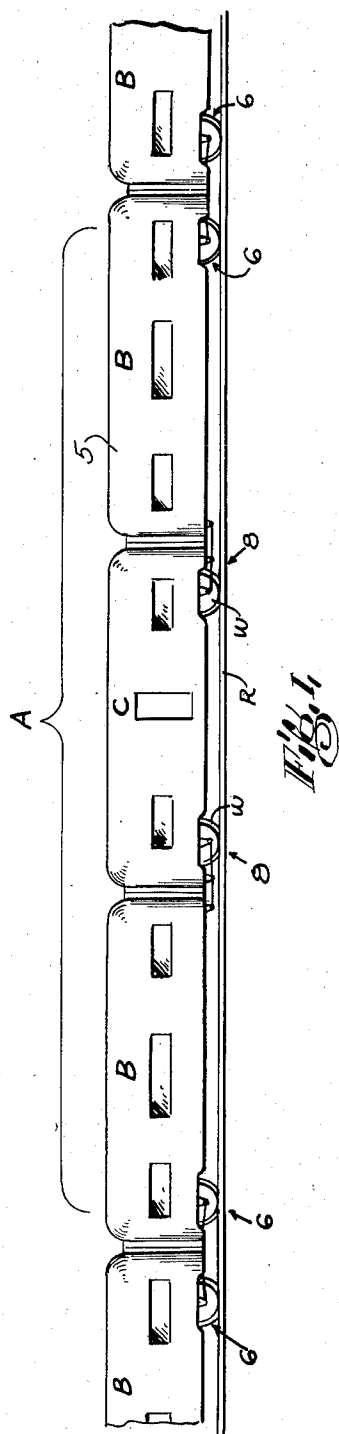
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2,863,401

RAILWAY TRAIN WITH COUPLER STEERED AXLES

Filed May 11, 1955

7 Sheets-Sheet 1



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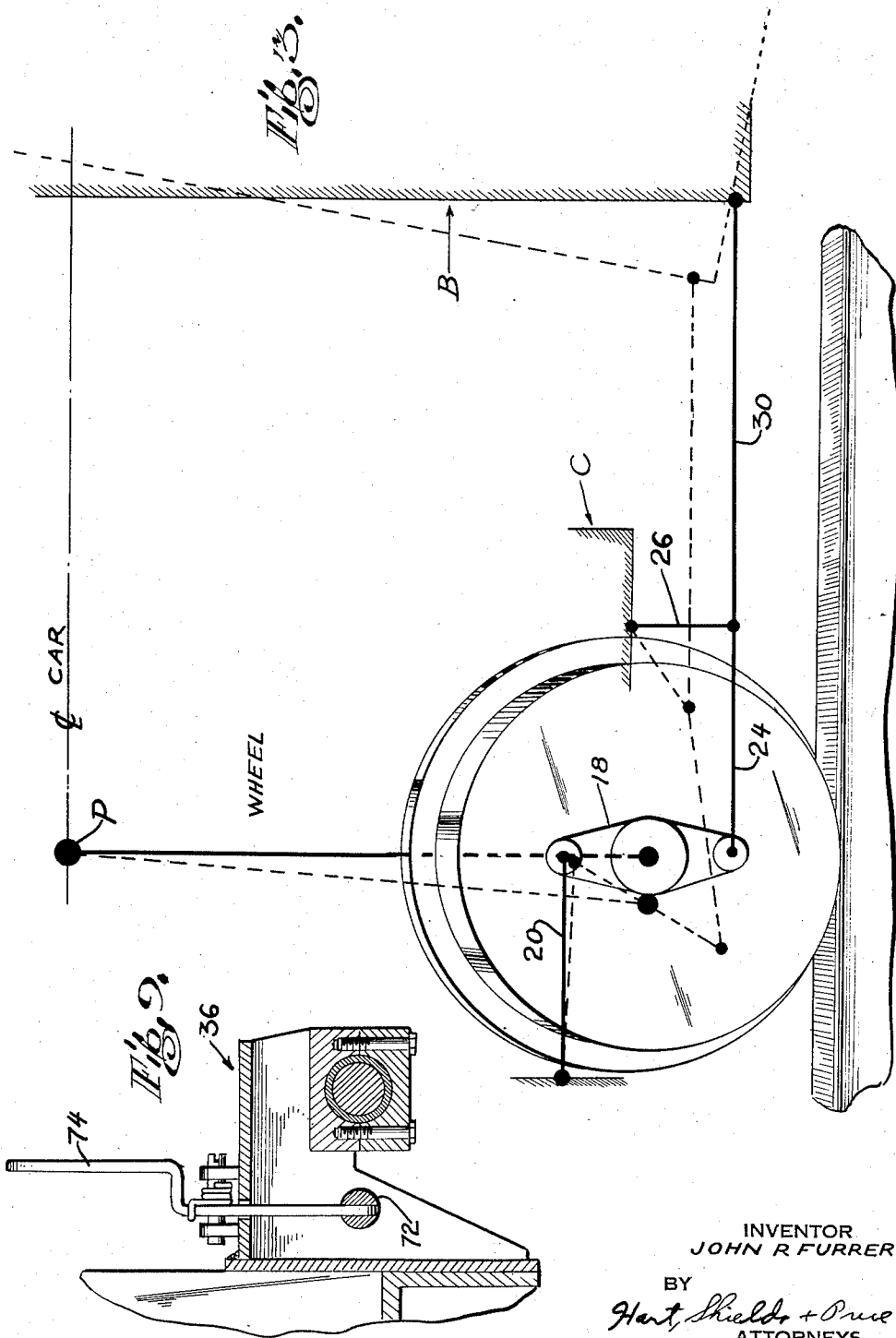
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RAILWAY TRAIN WITH COUPLER STEERED AXLES

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7 Sheets-Sheet 2



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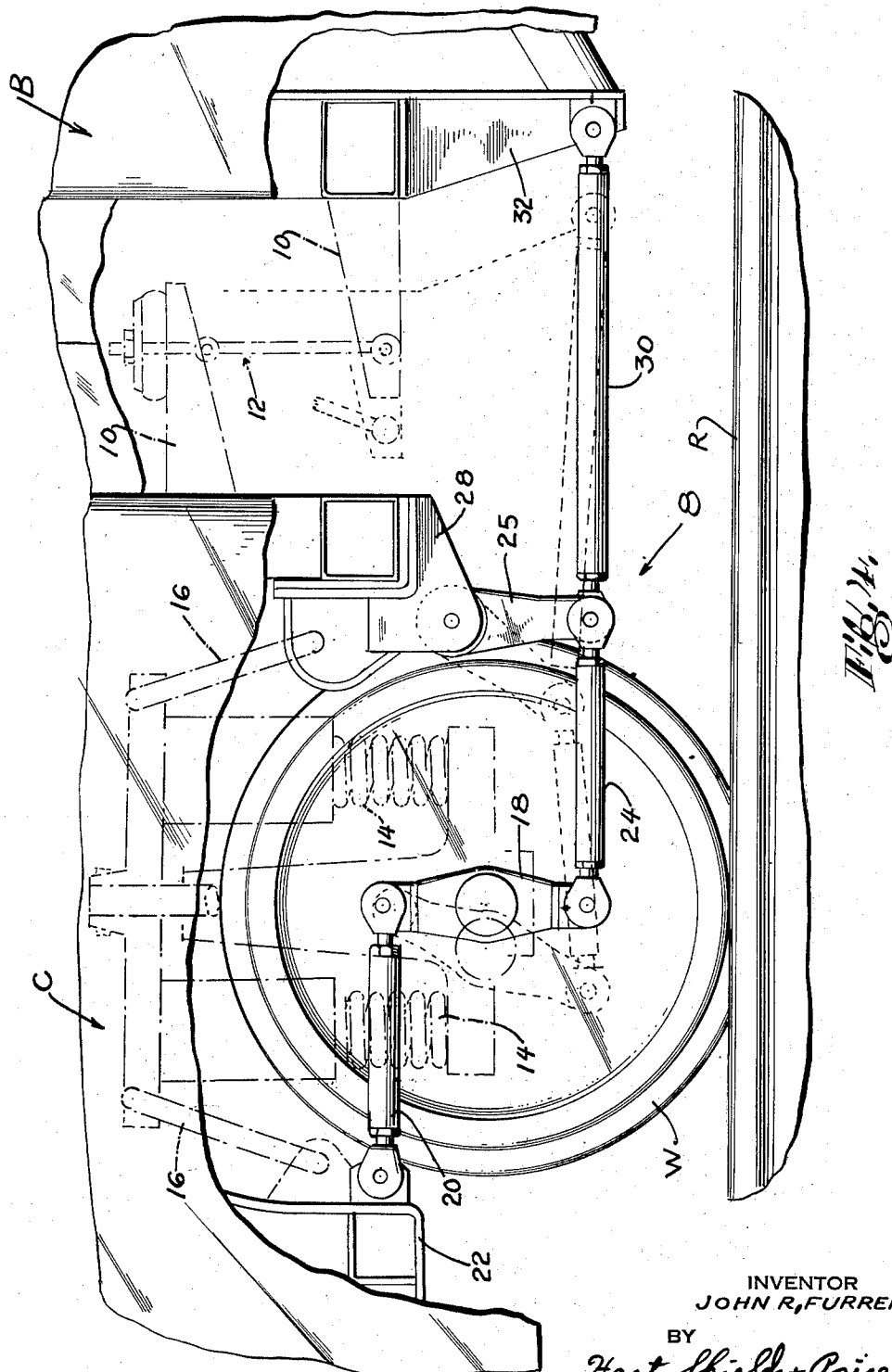
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RAILWAY TRAIN WITH COUPLER STEERED AXLES

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7 Sheets-Sheet 3



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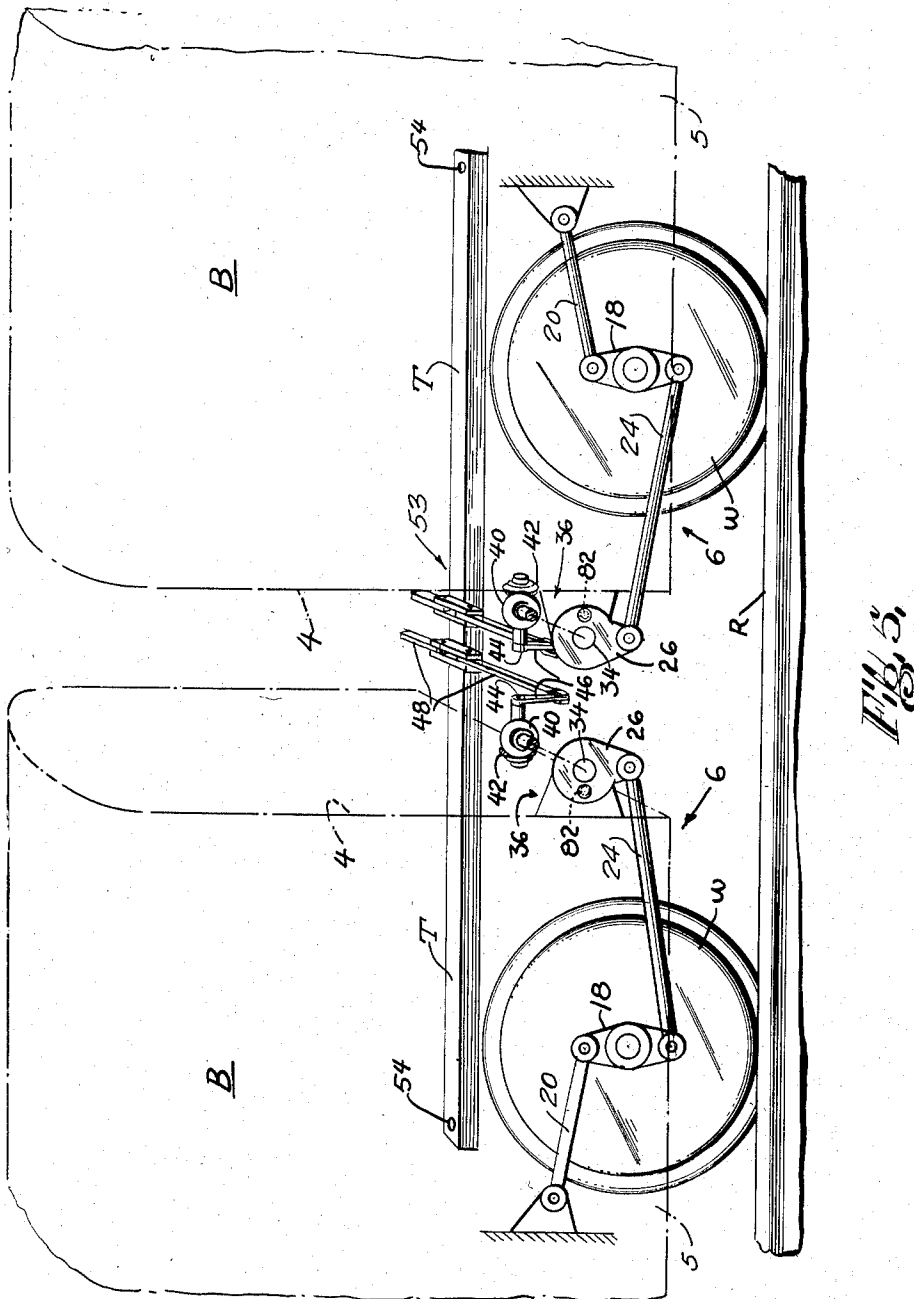
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RAILWAY TRAIN WITH COUPLER STEERED AXLES

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7 Sheets-Sheet 4



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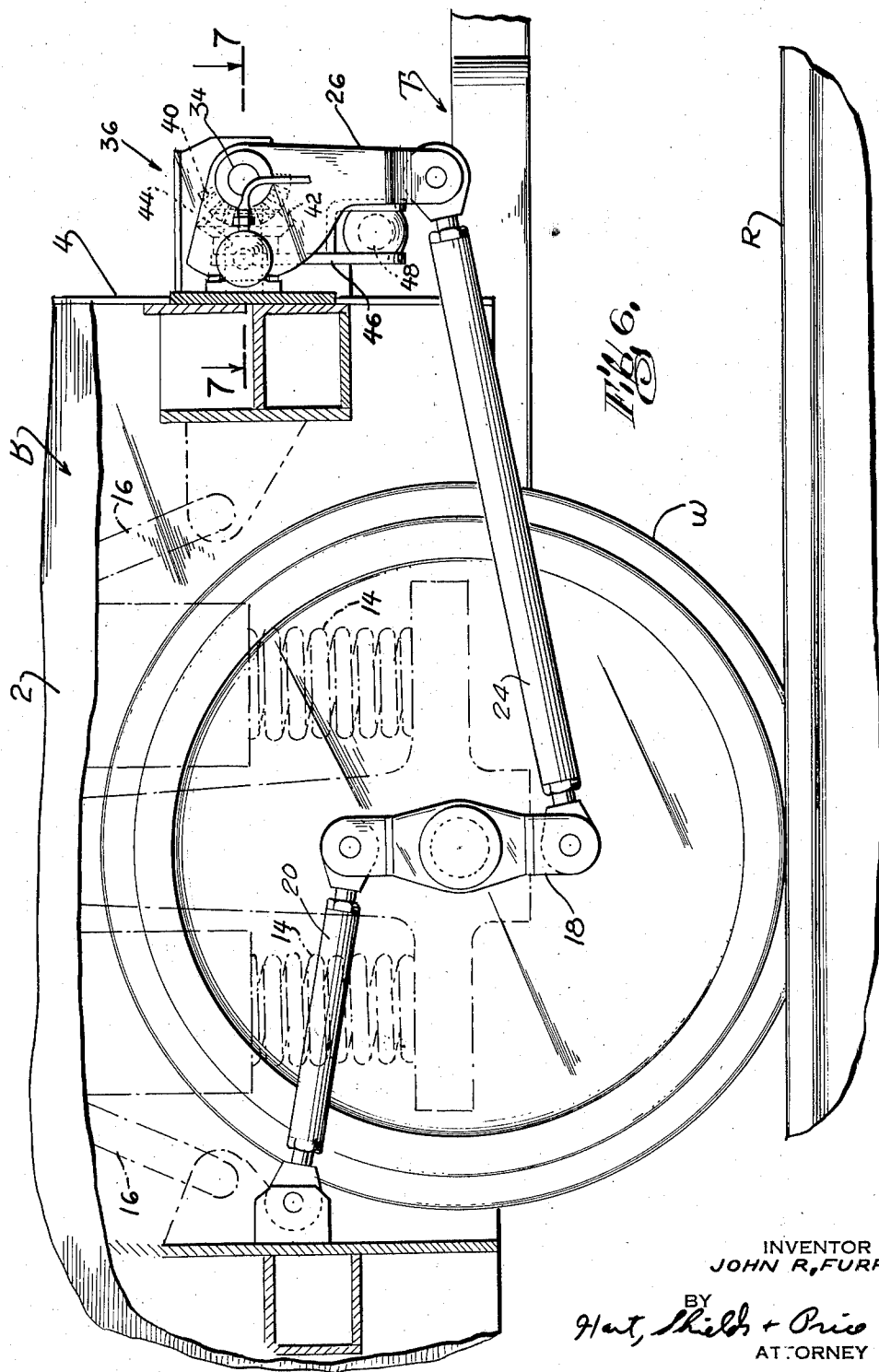
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RAILWAY TRAIN WITH COUPLER STEERED AXLES

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7 Sheets-Sheet 5



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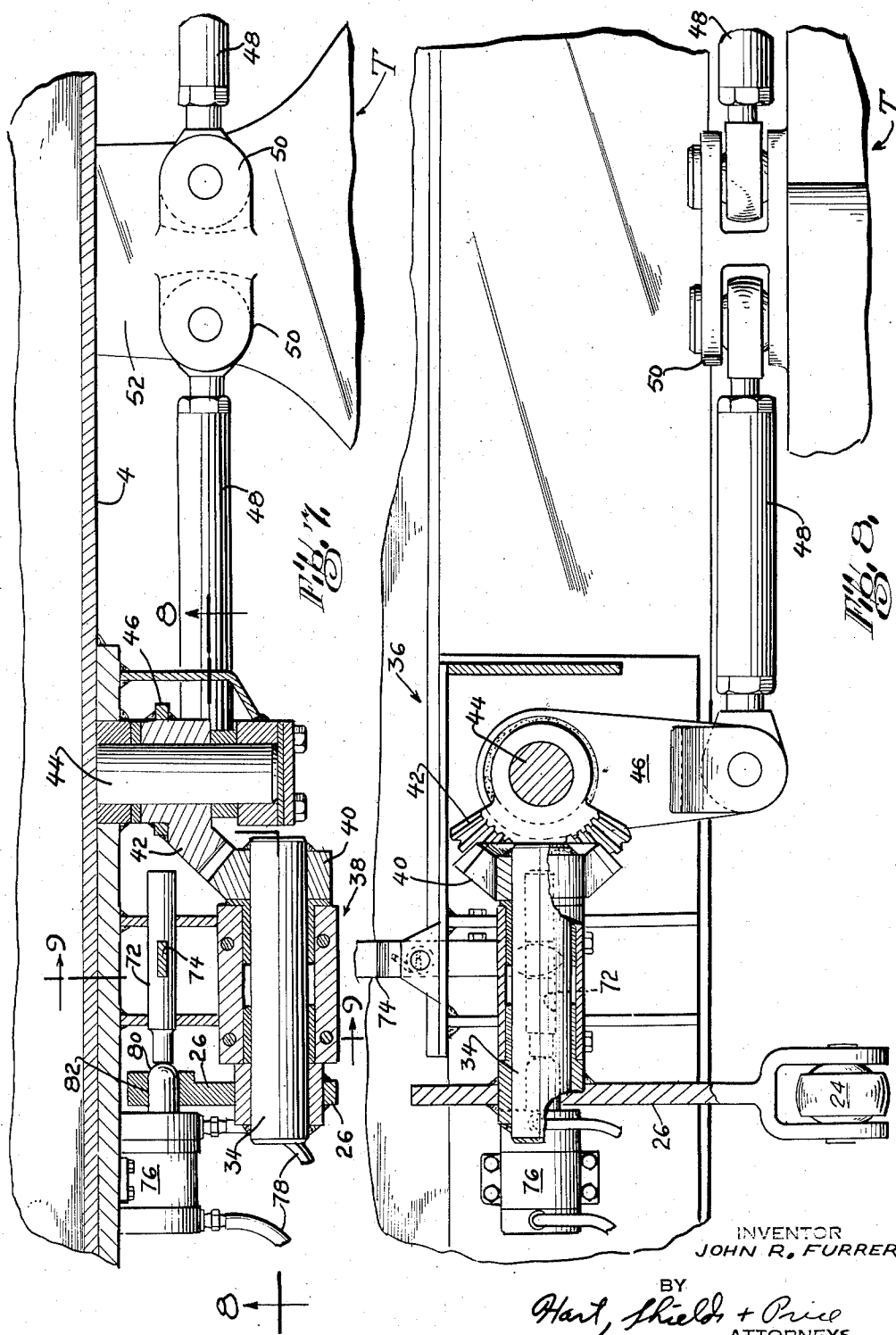
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RAILWAY TRAIN WITH COUPLER STEERED AXLES

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Dec. 9, 1958

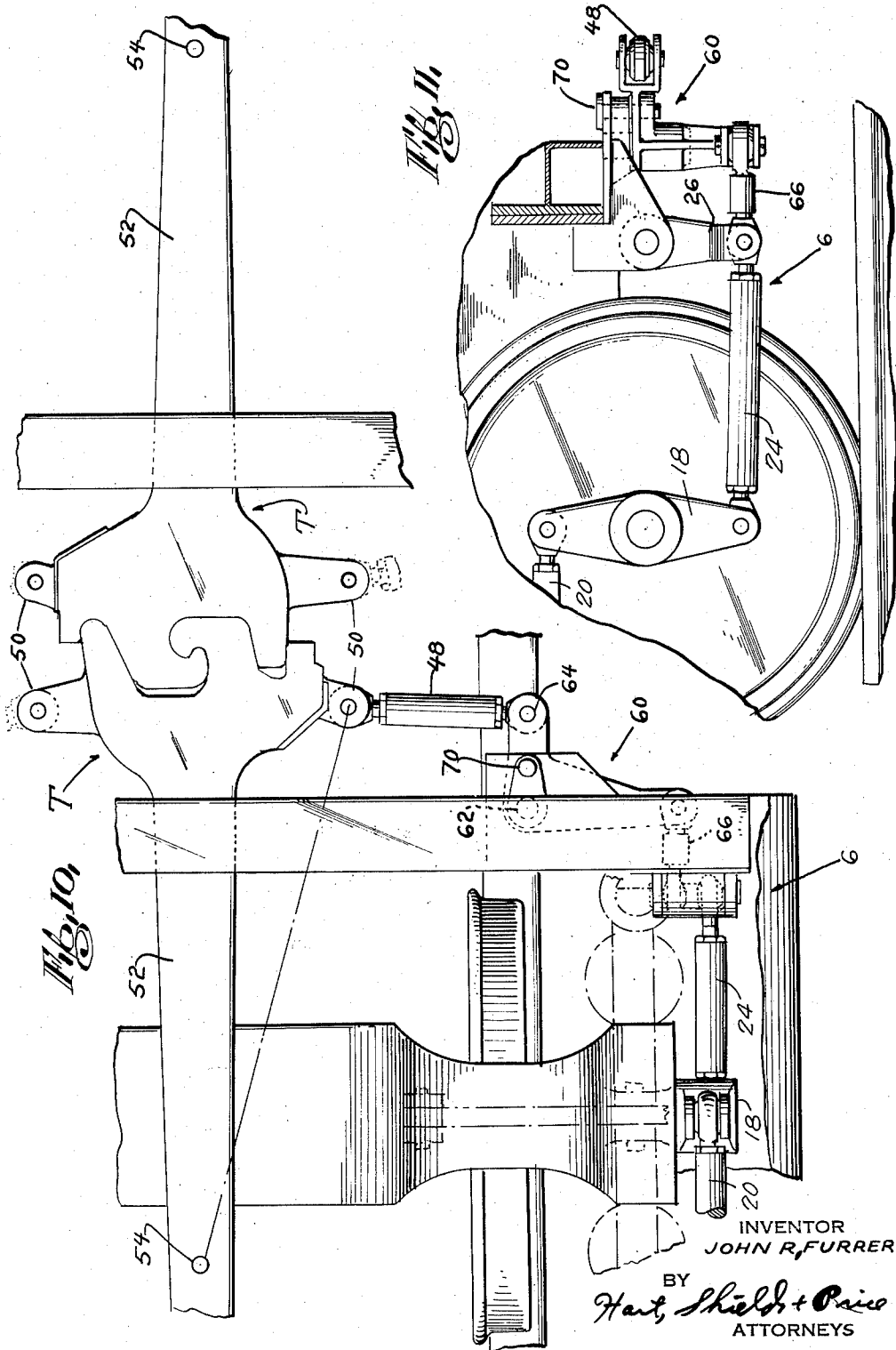
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RAILWAY TRAIN WITH COUPLER STEERED AXLES

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2,863,401

RAILWAY TRAIN WITH COUPLER STEERED AXLES

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Application May 11, 1955, Serial No. 507,618

11 Claims. (Cl. 105—4)

This invention relates to railway trains in general and in particular to low center of gravity trains having the cars composed of a plurality of units articulated together so as to better follow curves and decrease the cost of car framing. Railway cars in the past have been built as rigid units supported on widely separated trucks. Due to the support on the trucks the center of gravity is high above the rail and the body structure must be made very rigid in order to support the load between the wide points of support on the trucks. In these conventional railway cars the trucks are, in most cases, guided solely by the contact of the wheel flanges on the inside of the rail head. Considerable nosing and hunting of the trucks occurs, resulting in a rough riding car. It is an object, therefore, of the present invention to provide a railway car made up of a plurality of units supported on a minimum of axle assemblies and inter-connected for mutual support and guidance of the axles.

A further object of the invention is the provision of a railway car having axles supporting its ends and with the axles guided and controlled directly from a bar joining adjacent cars.

A still further object of the invention is the provision of a railway car having its remote ends supported on axle assemblies, the rotational movement of which are controlled directly by a coupler of the tight-lock type.

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:

Fig. 1 is an elevational view of a part of the articulated train.

Fig. 2 is an enlarged elevational view with parts broken away to better show the inter-relation of the car units.

Fig. 3 is a schematic view of the linkages controlling the axle movements between the car units.

Fig. 4 is an enlarged elevational view of the axle controlling linkages whereby the swinging of either unit controls the angularity of the axle.

Fig. 5 is a diagrammatic view showing the car end axles and the guiding linkage therefor.

Fig. 6 is an elevational view of the linkages of Fig. 5.

Fig. 7 is a horizontal sectional view taken substantially on line 7—7 of Fig. 6.

Fig. 8 is a sectional view taken substantially on line 8—8 of Fig. 7.

Fig. 9 is a sectional view taken substantially on line 9—9 of Fig. 7.

Fig. 10 is a plan view showing a slight modification of the end axle control, and

Fig. 11 is a partial side elevational view of the mechanism of Fig. 10.

Referring now to the drawings in detail it will be seen that the train is made up of a plurality of cars A, each composed of end units B and an intermediate unit C. Each unit of each car is supported on at least one axle carried by wheels W adapted to run on rails R. Each unit of each car is formed with side walls 2 and end walls 4

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joined together in any suitable manner to produce the necessary rigid body structure 5. As most clearly shown in Fig. 1 the ends of car A are supported on wheel and axle assemblies 6, with the inner ends of the end units B being supported upon the outer ends of central or intermediate unit C both ends of which are supported on wheel and axle assemblies 8. The support between end units B and intermediate unit C may be of any desired type, but is preferably formed by brackets 10 extending outwardly from the adjacent ends of the units and adapted to receive suspension links 12. The car units are preferably supported on the axles by springs 14 and swing links 16 diagrammatically shown in Figs. 4, 6 and 10 and more fully shown and described in my co-pending application Serial No. 487,329, filed February 10, 1955. This suspension tends to hold the wheel and axle assemblies longitudinally while permitting rotation in a substantially horizontal plane, as is necessary to permit guiding of the wheel and axle assemblies on the rails R. Each wheel and axle assembly has levers 18 carried on opposite ends thereof and the upper ends of these levers are pivotally connected by links 20 to brackets 22 carried by the unit structure. The lower ends of the levers 18 are pivotally connected by longitudinally extending links 24 to the lower ends of longitudinally swinging arms 25 mounted on the body 5 of unit C, as by brackets 26. These arms 25 of the intermediate unit C are pivotally connected by links 30 to brackets 32 carried on the inner ends of the end units B.

As best shown in Figs. 5 to 9 inclusive, the arms 26 of the end units B are pivotally mounted, on the laterally extending pivot shafts 34 on brackets 36 extending outwardly from the end walls 4 of units B adjacent the end corners of car A. The pivot shaft 34 as clearly shown is formed as a rod rotatable in bearings 38 and carrying at its inner end a gear segment 40. This gear segment is adapted to mesh with a gear segment 42 carried by a longitudinally extending pivot rod 44 mounted on the end wall 4 structure and displaced from the car center line. The pivot rod 44 has attached thereto or directly to the gear segment 42 a laterally swingable arm 46 adapted to be pivotally connected by adjustable transversely extending end link 48 to a bracket 50 formed on the shank 52 of the tight-lock coupler T. Since the tight-lock coupler has its inner end pivoted, as at 54, to the car unit and the faces are so designed as to prevent relative movement between the respective couplers the shanks will in effect become a rigid bar 53 pivoted at its ends to and connecting together adjacent ends of two bodies 5 as is diagrammatically shown in Fig. 5 and this bar 53 will in its lateral swinging movements relative to the car end walls 4, swing the arms 46 laterally in unison with itself through links 48, thus through gears 40, 42 translating outward lateral swinging of arms 46 into inward longitudinal swinging of arms 26 and links 24, thereby to control the swinging or pivoting of the adjacent wheel and axle assemblies.

As clearly shown in Figs. 10 and 11 the gearing of Figs. 5 to 8 inclusive may have substituted therefor a bell-crank lever 60 pivotally connected to the car structure, as by the vertically extending pivot shaft 62 and having the laterally swingable arm 63 connected by the pivot shaft 64 to the end link 48. The remaining arms 65 of the bell-crank lever 60 is laterally extending and swings longitudinally as arm 63 swings laterally and is pivotally connected by a link 66 to the lower end of arm 26. In cases where the wheel and axle assembly 6 is at the rear end of a train and no other coupler is mated with the tight-lock, it is necessary to prevent movement of the coupler with consequent hunting of the wheel and axle assembly. This locking is accomplished, as shown in Figs. 10 and 11, by insertion of a pin 70 extending through

a unit carried bracket and through the one arm 63 of the bell-crank 60 thus preventing any swinging movement of the bell-crank 60 and locking the wheel and axle assembly and coupled against movement. In the form shown in Figs. 5 to 9 inclusive, the locking may be accomplished by moving a horizontally carried pin 72 into engagement with the portion of the arm 26, as clearly shown in Figs. 7 and 8. This pin 72 is manually operated by hand lever 74 pivotally carried on the end bracket 36. In addition to the manual lock an air operated lock may be provided consisting of a cylinder 76 supplied by air through hoses 78 whereby the piston rod 80 may be moved into or out of engagement with the hole 82 in arm 26. This same type of air locking may also be used with the modification shown in Figs. 10 and 11.

From the preceding description of the parts it will be seen that as the cars A move into, around or out of a curve the cars will assume an angular relation with respect to each other and the rigid coupler bar 53 indicated by shanks 52 being pivoted at 54 to the units will have its central portion disposed inwardly of the curve. This apparent inward motion will place a thrust in links 48 thereby causing movement of either the arms 46 or 63, 65. Motion of these arms will be transmitted directly either through the gearing or through link 66 to the arms 26. Swinging of the arms 26 longitudinally of the car will cause a similar swinging of levers 18 which having their upper ends anchored to the car by links 20 will cause rotation of the wheel and axle assembly about a virtual pivot P (Fig. 3) located substantially on the center line of the car. The same movement occurs at the opposite side of the car with the exception that the link 48 will be in tension instead of compression. Thus it will be seen that relative movement between the cars A and coupler bar 52 will cause pivotal movement of the wheel and axle assemblies 6 supporting the ends of the cars A. The intermediate wheel and axle assemblies 8 will be guided in similar manner, but by the relative movement between the units B and C which are tied together for axle control purposes by the links 30. As the car units B and C move into, around or out of a curve the links 30 will on the inside of the curve be placed in compression while those on the outside will be in tension and will cause movement of the wheel and axle assemblies, as shown in Fig. 3, due to the swinging of levers 18 about their anchor connections to link 20. Vertical movement of the car bodies on springs 14 will not affect rotational movement of the axle assemblies due to the substantially equal length and pivotal amounts of links 20 and 24. Likewise inward and outward movement of the coupler heads on the draft springs (not shown) will not affect any pivotal movement of the end axle assembly 6 but will result in a very slight longitudinal movement of the assembly this being due to the slight arc movement of links 48 about their pivots.

For economy of illustration and description, only so much of the above described devices have been fully illustrated and described as is located on one side of the cars, however, as clearly indicated in Figures 5, 7, 8, 10 and 11, the illustrated and described structure is duplicated on the opposite side of the car.

While the invention has been described more or less in detail with specific reference to the drawings, it will be apparent that various modifications and rearrangements of parts may be made without departing from the scope of the invention as defined by the following claims.

What is claimed is:

1. In a railway train having two cars, each car having a body and a wheel and axle assembly at each end of said body operatively connected thereto for rotation in a horizontal plane, each body further having side and end walls and a coupler pivotally connected to said body inwardly of said end walls and interengaged at its outer end with the coupler of the other car to form a substantially rigid bar connecting together adjacent ends of said bodies, the improvement constituting axle steering means for said

cars and comprising on each of said cars a laterally swingable arm pivotally mounted on an adjacent end wall and displaced from the car center line, a substantially laterally extending link pivotally connected to said coupler and to said arm and laterally swingingly actuating the latter in unison with said coupler, a longitudinally swingable arm pivotally mounted on said body, a link pivotally connected to said last mentioned arm and to said wheel and axle assembly adjacent a wheel thereof, and means interconnecting said two arms and translating outward lateral motion of said first mentioned arm into inward longitudinal motion of said second mentioned arm.

2. A structure according to claim 1 and further including means mounted on said body and engageable with one of said arms to lock the same against swinging and thereby to lock the associated wheel and axle assembly against steering.

3. A structure according to claim 1, said laterally swingable arm being mounted on a substantially vertical pivot shaft and having firmly connected thereto a laterally extending arm constituting jointly therewith a bell crank lever, said laterally extending arm having longitudinal swinging movement as said first mentioned arm swings laterally, and said longitudinally swinging arm of said lever being connected to said first mentioned longitudinally swingable arm.

4. A structure according to claim 1, said last mentioned means including a pair of intermeshed gears, one of said gears being firmly connected to said laterally swingable arm and the other of said gears being firmly connected to said longitudinally swingable arm.

5. A structure according to claim 1, said last mentioned means including a shaft mounting said laterally swingable arm for said lateral swinging motion, a gear mounted on said shaft, a shaft mounting said longitudinally swingable arm for said longitudinally swinging motion, and a gear mounted on said last mentioned shaft and intermeshed with said first mentioned gear.

6. In a railway train having two cars, each car having a body and a wheel and axle assembly at each end of said body operatively connected thereto for rotation in a horizontal plane, each body further having side and end walls and a coupler pivotally connected to said body inwardly of said end walls and interengaged at its outer end with the coupler of the other car to form a substantially rigid bar connecting together adjacent ends of said bodies, the improvement constituting axle steering means for said cars and comprising on each of said cars a longitudinally extending pivot shaft mounted on the adjacent end wall and displaced from the car center line, a laterally swingable arm mounted on said shaft, a substantially laterally extending link pivotally connected to said coupler and to said arm and laterally swingingly actuating the latter in unison with said coupler, a laterally extending pivot shaft mounted on said car body, a longitudinally swingable arm mounted on said last mentioned shaft, a link pivotally connected to said last mentioned arm and to said wheel and axle assembly adjacent a wheel thereof, and means interconnecting said laterally and said longitudinally swingable arms and actuating the latter from the former to steer said wheel and axle assembly from movement of said coupler relative to said adjacent end wall.

7. A structure according to claim 6, said last mentioned means being a gear mounted on each of said shafts, said gears being intermeshed.

8. A railway car comprising the combination with a body and a pair of axles, said body having side and end walls, each axle having a wheel at each end thereof and being dirigibly mounted adjacent an end of said body, of a swingable arm mounted for longitudinal swinging motion on said body adjacent each end corner thereof, a link located adjacent each end corner of said car and extending substantially longitudinally of said body and connecting the adjacent axle end to the adjacent swing-

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able arm, a draft means at each end of said body and including a coupler pivotally connected to said body for swinging in a horizontal plane laterally of said body, said coupler being of a type which when interengaged with a similar coupler forms together therewith a substantially rigid bar, said coupler having a portion projecting longitudinally beyond the adjacent end wall for coupling said car to an adjacent car, an arm located on each side of each said coupler and laterally displaced therefrom, said last mentioned arms being pivotally mounted on said end walls for lateral swinging movement relative thereto and being linked to said projecting portions of the respective adjacent couplers for motion in unison therewith, and means connecting said last mentioned arms to the respective adjacent longitudinally swingable arms and actuating the latter longitudinally inwardly as the former swing laterally outwardly.

9. A structure according to claim 8, said last mentioned means being a pair of intermeshed gears operatively arranged between each said laterally swingable arm and its respective longitudinally swingable arm, one of said gears of each pair being connected to said arm laterally swingable and the other gear of said pair being connected to said longitudinally swingable arm.

10. A structure according to claim 8, said last men-

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tioned means including a shaft mounting said laterally swingable arm for said lateral swinging motion, a gear mounted on said shaft, a shaft mounting said longitudinally swingable arm for said longitudinal swinging motion, and a gear mounted on said last mentioned shaft and intermeshed with said first mentioned gear.

11. A structure according to claim 8, said last mentioned means including a laterally extending arm firmly connected to said laterally swingable arm and constituting together therewith a bell crank lever and said laterally extending arm swinging longitudinally as said other arm of said lever swings laterally, and a link connecting said longitudinally swinging arm of said lever to said first mentioned longitudinally swingable arm.

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