United States Patent [19]

Hackbarth et al.

[11] **4,160,420**

[45] **Jul. 10, 1979**

[54] **ARTICULATED SCHNABEL CAR**

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[21] Appl. No.: **831,366**

[22] Filed: **Sep. 8, 1977**

[51] **Int. Cl.**[2] **B61D 3/16**; B61D 49/00; B61F 1/10; B61F 5/22

[52] **U.S. Cl.** **105/367**; 105/183

[58] **Field of Search** 105/159, 183, 367

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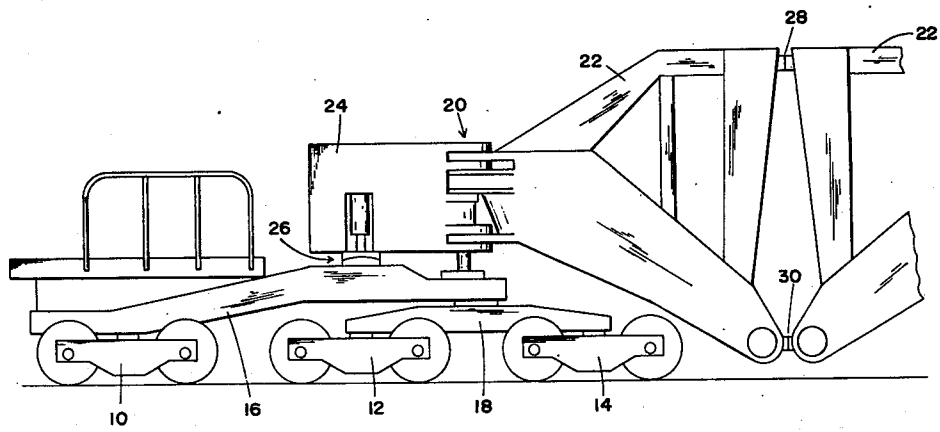
[57] **ABSTRACT**

A schnabel-type railroad car adapted to carry very large loads incorporating articulated end units having a massive hinge at a reduced pivot location so that the weight of the car can be carried at a central location on the trucks while still pivoting about a lesser radius to help negotiate tight turns. Special hydraulic systems permit the car to be raised and lowered and also shifted laterally to provide additional roadbed clearance.

6 Claims, 4 Drawing Figures



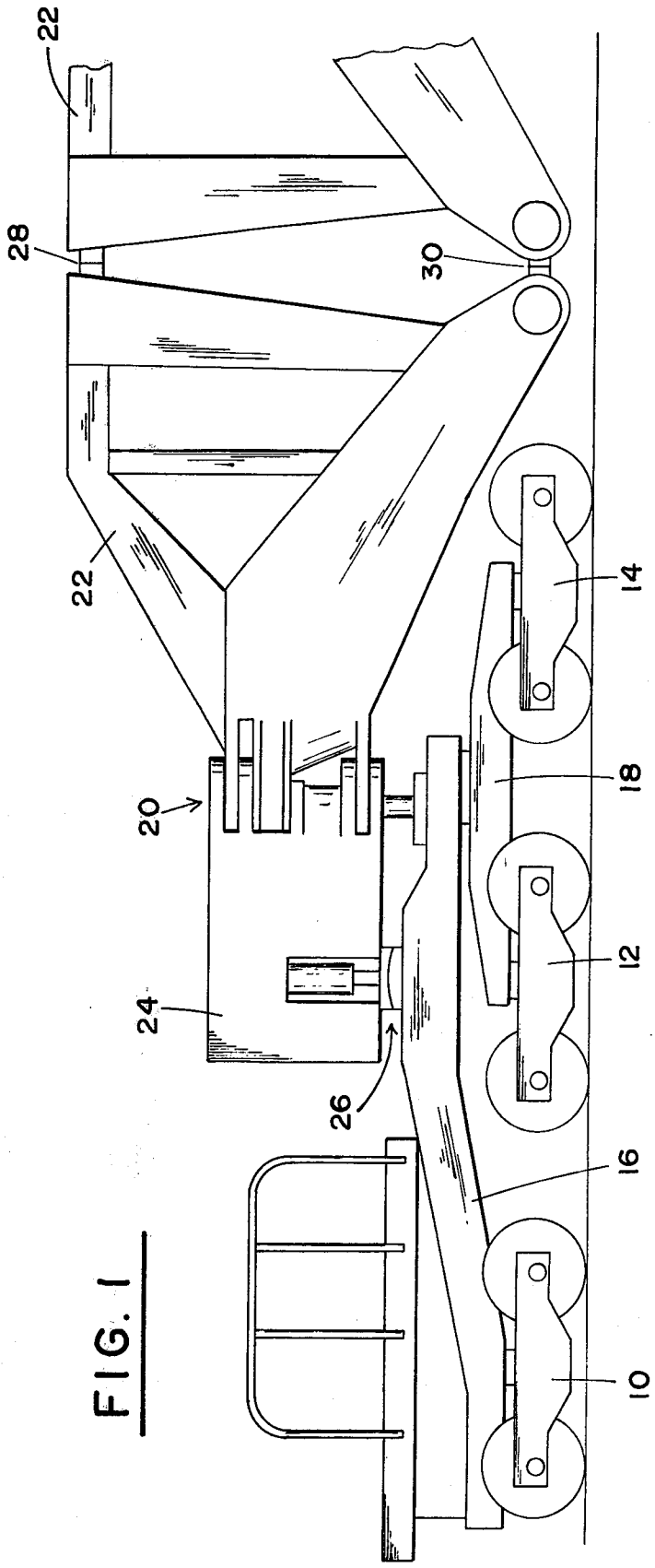


FIG. 1

FIG. 2

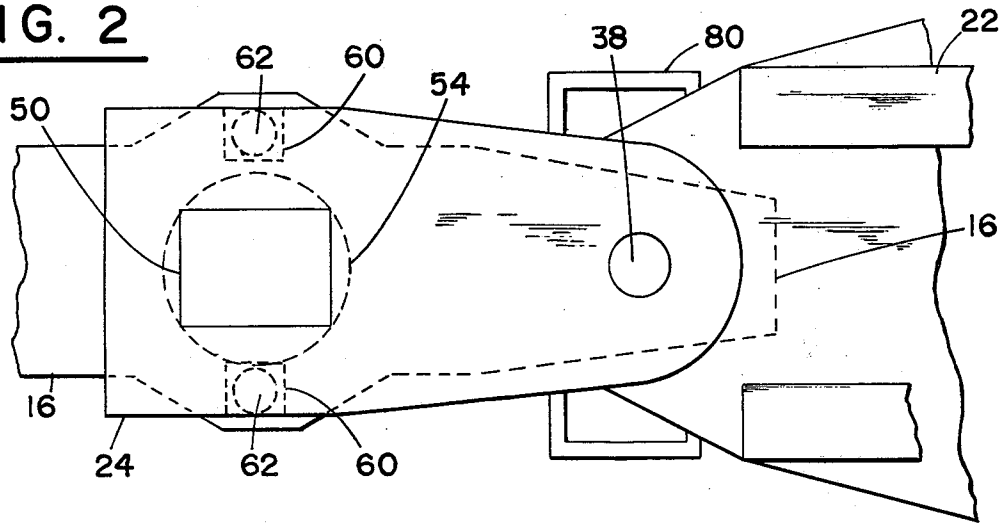


FIG. 3

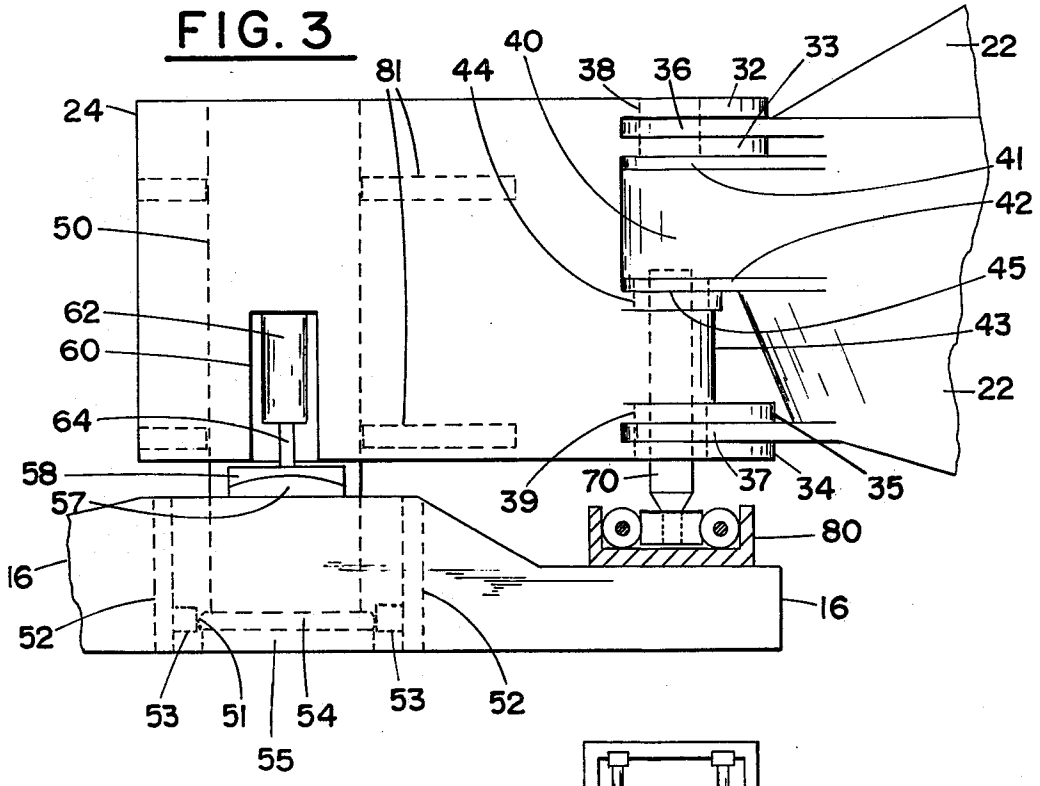
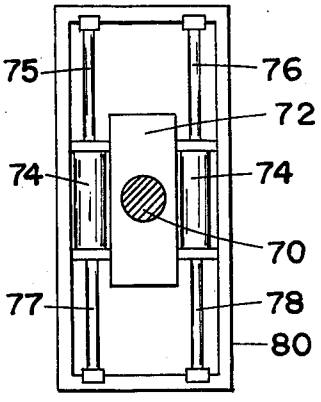


FIG. 4



ARTICULATED SCHNABEL CAR

BACKGROUND OF THE INVENTION

Schnabel-type railroad cars are divisible into two identical parts so that a load can be supported between the two parts and thereby transported at a lower overall height. When the load has been delivered the two divisible portions of the car can be coupled together to form a unitary body which is returned to be used to carry another load.

With the development of ever increasingly large loads such as typified by electrical generators or nuclear reactors schnabel cars have grown ever larger in size presenting increasing problems in roadbed clearance. Car lengths have grown to the point where it may be difficult to negotiate tight turns in roadbeds originally designed for cars of a much shorter length. It thus becomes desirable to be able to pivot the load at the minimum length possible while still carrying the main weight of the load over a larger number of trucks. Accordingly reduced pivot schnabel cars have been developed which pivot at shorter radiuses but carry the load over longer lengths. Prior art designs have been exceedingly complicated and the design complications have been aggravated by the desire to provide vertical adjustment to the load in order to permit the car to negotiate existing underpasses. Our invention provides a much simplified design which permits the desired articulation of the car utilizing reduced pivots, lateral displacement of the load, and vertical displacement of the load.

BRIEF SUMMARY OF THE INVENTION

Briefly, the present invention contemplates a massive hinge utilizing top and bottom flanges to carry the horizontal bending loads and a central cantilevered arm to carry the vertical shear load. This massive hinge is located at the reduced pivot point and permits the bending and vertical shear loads to be carried through past the reduced pivot point to a position more centrally located on the trucks. It may therefore be seen that it is an object of our invention to provide an improved schnabel car design which is less complicated and therefore easier to maintain and operate. Further objects and advantages will become apparent from the following detailed description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an overall schematic drawing of one of the two divisible units of the schnabel car.

FIG. **2** is a top fragmentary view of the new and novel hinge portion of the car.

FIG. **3** is an elevational fragmentary view of the hinge portion shown in FIG. **2**.

FIG. **4** is a detail drawing showing the hydraulic mechanism for moving the load laterally.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. **1** one-half of the schnabel car is shown along with a fragmentary portion of the other half. Since both halves are mirror images of each other all of the structure explained hereinafter may be considered to be a portion of the other half of the car as well. Several wheeled trucks **10**, **12**, and **14** are connected together by suitable span bolster members **16** and **18** forming articulated end units in a manner well known to those skilled in the art. The massive hinge contemplated by the present invention is shown generally at **20**. Hinge **20** permits the loads carried by schnabel frame **22** to be carried through into a torque box **24** which is supported on bolster **16** by means of a pair of suitable bearings **26**. In service, a load is carried between the two schnabel frames **22**. The load is provided with mating fasteners which engage the two compression fastening devices **28** at the top of schnabel frames **22** and the two tension fastening members **30** at the bottom of schnabel frames **22**. In FIG. **1** fasteners **28** and **30** are simply connected to each other to permit the entire schnabel car to be moved without a load.

The design of torque box **24** and hinge **20** may be better seen by reference to FIGS. **2** and **3**. Hinge **20**, as shown in FIG. **1**, is constructed generally on the right hand portion of torque box **24** and comprises a top pair of flanges **32** and **33** which engage therebetween a flange **36** from support structure **22**. These flanges pivot relative to each other about a hinge pin **38** permitting the horizontal compression bending forces caused by the car and load weight to be transferred from the schnabel frame **22** to torque box **24**. Torque box **24** includes another pair of flanges **34** and **35** at the bottom which engage a flange **37** extending from support structure **22**. Another hinge pin **39** permits pivoting movement between these two members to absorb horizontal tensile bending forces. The hinges are adequate to transmit the longitudinal coupler loads and transverse torque loads as well as the bending loads. The combination of the two pins **38** and **39** are vertically separated and therefore very strong.

Vertical force from the schnabel frame **22** is carried through a centilevered arm **40** which may be reinforced by additional flanges **41** and **42**. Arm **40** rests on a suitable mating arm **43**. Arm **43** extends out from torque box **24**. If desired an additional thrust pin **44** may be incorporated to hold a pin **70** in alignment. In the preferred embodiment it is contemplated that a suitable bearing surface **45**, such as polytetrafloroethylene may be provided to assist relative movement between arms **40** and **43**.

The forces in torque box **24** are transferred to span bolster **16** by means of a very large pin **50** which is generally rectangular in configuration where it passes through torque box **24**. Pin **50** has a circular bearing plate **54** at the bottom within the span bolster **16**. Thus, pin **50** can pivot within bolster **16** through a small arc although it should be understood that the main pivoting action on the car takes place about the reduced pivot location formed by hinge **20**. Horizontal thrust loads are transmitted between pin **50** and bolster **16** by means of suitable internal support structure **52** which includes an edge bearing surface **53** and a support plate **55**.

Bearing plate **54** has rounded edges **51** to permit pin **50** to tip laterally and longitudinally with respect to the span bolster **16**. No vertical loads are carried by pin **50**. Torque box **24** is free to move up and down on pin **50**. Plate **55** supports pin **50** in position to receive horizontal loads on bearing plate **54**. Bearing flanges **81** transmit the horizontal car loading from the pin **50** to the torque box **24**. Bearings **26** comprise a lower convex bearing block **57** which supports a closely mated upper concave bearing block **58**. Torque box **24** includes recesses **60** on each side which contain a pair of hydraulic cylinders **62** connected to bearing blocks **58** on each side by means of an extensible actuating rod **64**. Accordingly, a hydraulic power system may be utilized in a manner well known to those skilled in the art to raise and lower the car to

any desired position. As torque box **24** slides up and down along pin **50** it will be seen that all vertical forces on torque box **24** will be transmitted to span bolster **16** through the hydraulic cylinders and the mated bearing blocks **57** and **58**. The curved mating surface between blocks **57** and **58** permit the car to tilt fore and aft to accommodate unevenness in the roadbed and differential vertical lifting from end to end while still supporting the vertical forces.

Lateral movement of the load at the reduced pivot point is made possible by a pair of double acting hydraulic cylinders **74** which may be seen in FIGS. **3** and **4**. A side shift pivot pin **70** is inserted at hinge **20** through thrust pins **39** and **44** so as to be free to slide vertically relative to torque box **24**. The lower end of pin **70** engages a support member **72** which is firmly attached to the double acting hydraulic cylinders **74**. Cylinders **74** can be caused to move hydraulically along their actuating rods **75, 76, 77,** and **78** so as to move pin **70** laterally left or right to displace the load and articulate the car around tight turns and other obstructions. Actuating rods **75** through **78** are mounted in a suitable support structure or box **80** which is welded or otherwise secured to the top of span bolster **16**. Thus, pin **70** carries no vertical or longitudinal loads but serves only to locate the pivot axis of hinge **20**. It therefore may be seen that our invention provides a simple straight forward schnabel car design in which a massive hinge structure of new and novel configuration permits all horizontal and vertical forces to be transmitted through torque box **24** to bolster **16** at a convenient location central to the truck assemblies while still maintaining a reduced pivot point which if desired can be moved laterally to articulate the car and increase the car's utility. Vertical adjustment is also possible in our invention without the necessity of removing or adding components since the vertical and lateral movements do not interfere with the normal hinge action of torque box **24**.

We claim:

1. A schnabel-type railway car comprising a pair of separable end units adapted to be interconnected and to be connected to each end of a load carried therebetween in which each end unit comprises:

load support members;

a plurality of trucks connected together by span bolster members;

a torque box carried at a first end on said span bolster members, said torque box including a massive hinge at the other end adapted to engage the load support members, the pivot axis of said hinge forming a reduced longitudinal distance of pivoting between the end units;

load force transfer means at the first end of the torque box including a vertical pin rotatably carried by said span bolster and slidably inserted into said torque box so as to transfer horizontal forces and further including bearing pad means between said bolster members and said torque box so as to transfer vertical forces; and

lateral position determining means on said bolster members connected to said hinge at said reduced pivot axis so as to adjust the lateral position of said reduced pivot axis.

2. The car of claim **1** in which said lateral position determining means comprises hydraulic cylinder means connected to move a second vertical pin, which second pin is slidably inserted in said torque box along an axis coincident with said reduced pivot axis.

3. The car of claim **1** in which said bearing pad means comprise on each side of the torque box a lower convex bearing surface carrying an upper concave bearing surface, said upper surface supporting vertically operating hydraulic cylinder means mounted to said torque box to permit the box to be vertically adjusted relative to the span bolster, and said convex and concave bearing surfaces permitting the torque box and the load to tilt relative to the span bolster.

4. The car of claim **1** in which said hinge comprises upper and lower flanges on the torque box which pivotally engage upper and lower flanges on the load support members so as to transfer horizontal forces and a central cantilevered arm on the torque box carrying a cantilevered arm from the load support member with a bearing surface therebetween so as to transfer vertical forces.

5. The car of claim **4** in which said lateral position determining means comprises hydraulic cylinder means connected to move a second vertical pin, which second pin is slidably inserted in said torque box along an axis coincident with said reduced pivot axis.

6. The car of claim **5** in which said bearing pad means comprise on each side of the torque box a lower convex bearing surface carrying an upper concave bearing surface, said upper surface supporting vertically operating hydraulic cylinder means mounted to said torque box to permit the box to be vertically adjusted relative to the span bolster, and said convex and concave bearing surfaces permitting the torque box and the load to tilt relative to the span bolster.

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