J. M. ROHLFING.

HOPPER CAR WITH ARTICULATED TRUCK.

APPLICATION FILED MAY 23, 1914.

1,109,600.

Patented Sept. 1, 1914.

5 SHEETS—SHEET 1.

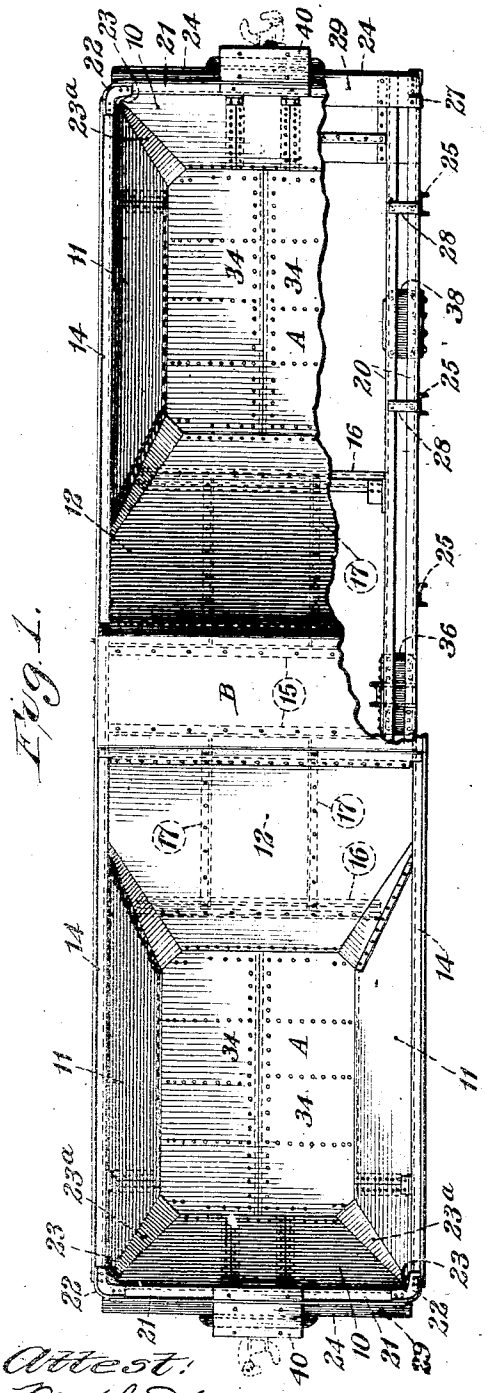

Fig. 1.

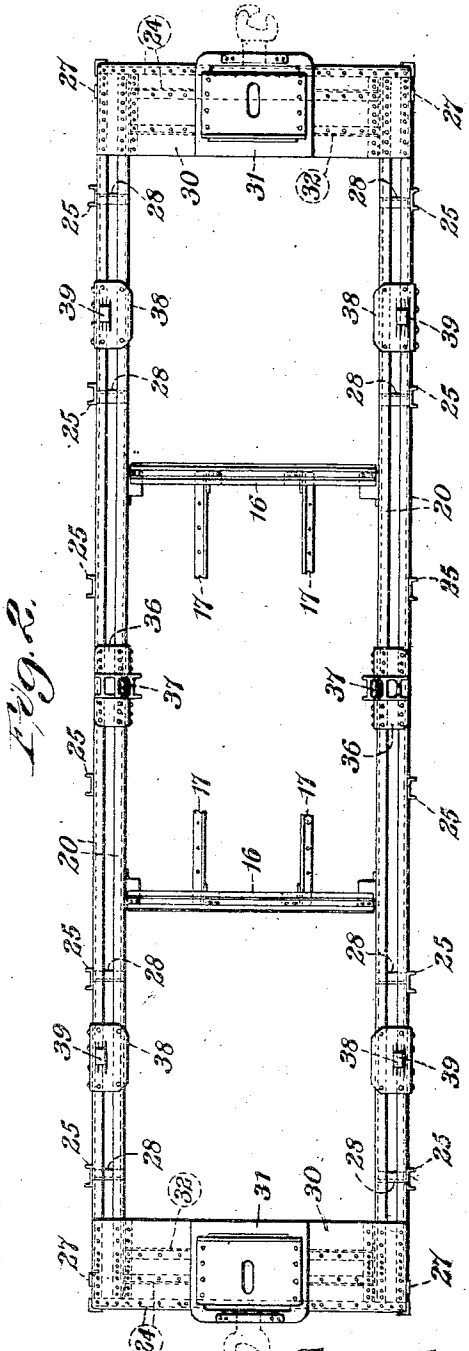

Fig. 2.

Attest:
Wm. H. Fett.
C. L. Belcher

Inventor:
John M. Rohlfing.
by T. H. Gibbs atty

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Fig. 3.

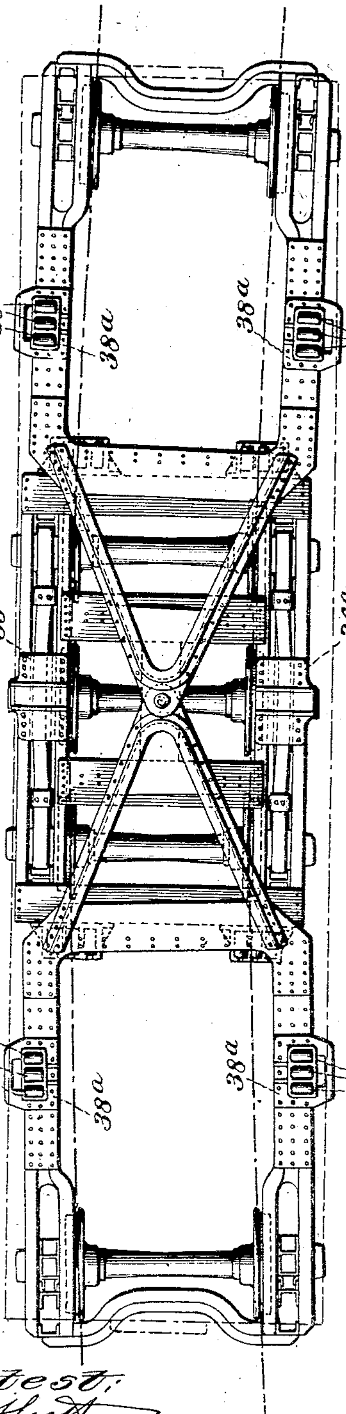
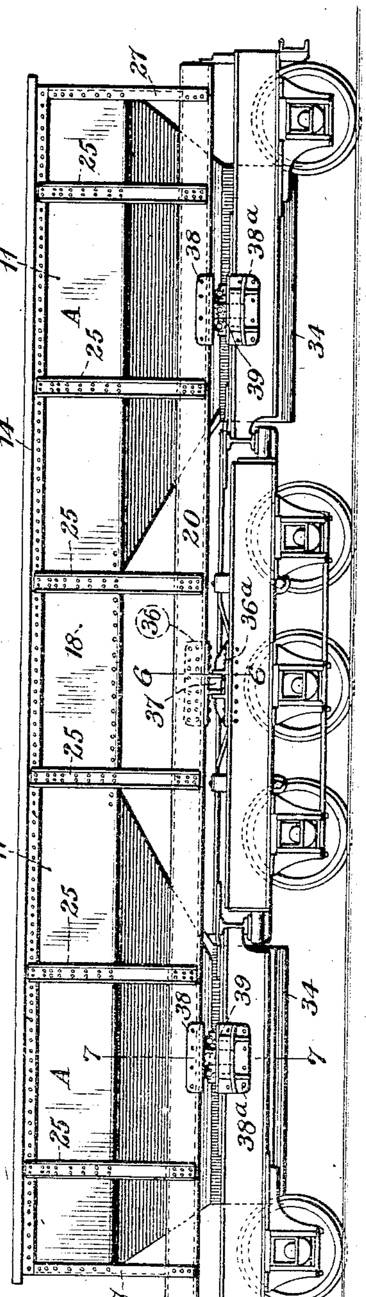


Fig. 4.



Attest:
Wm. H. Scott.
C. L. Belcher

Inventor:
John M. Rohlfing.
by J. H. Gibbs
Atty.

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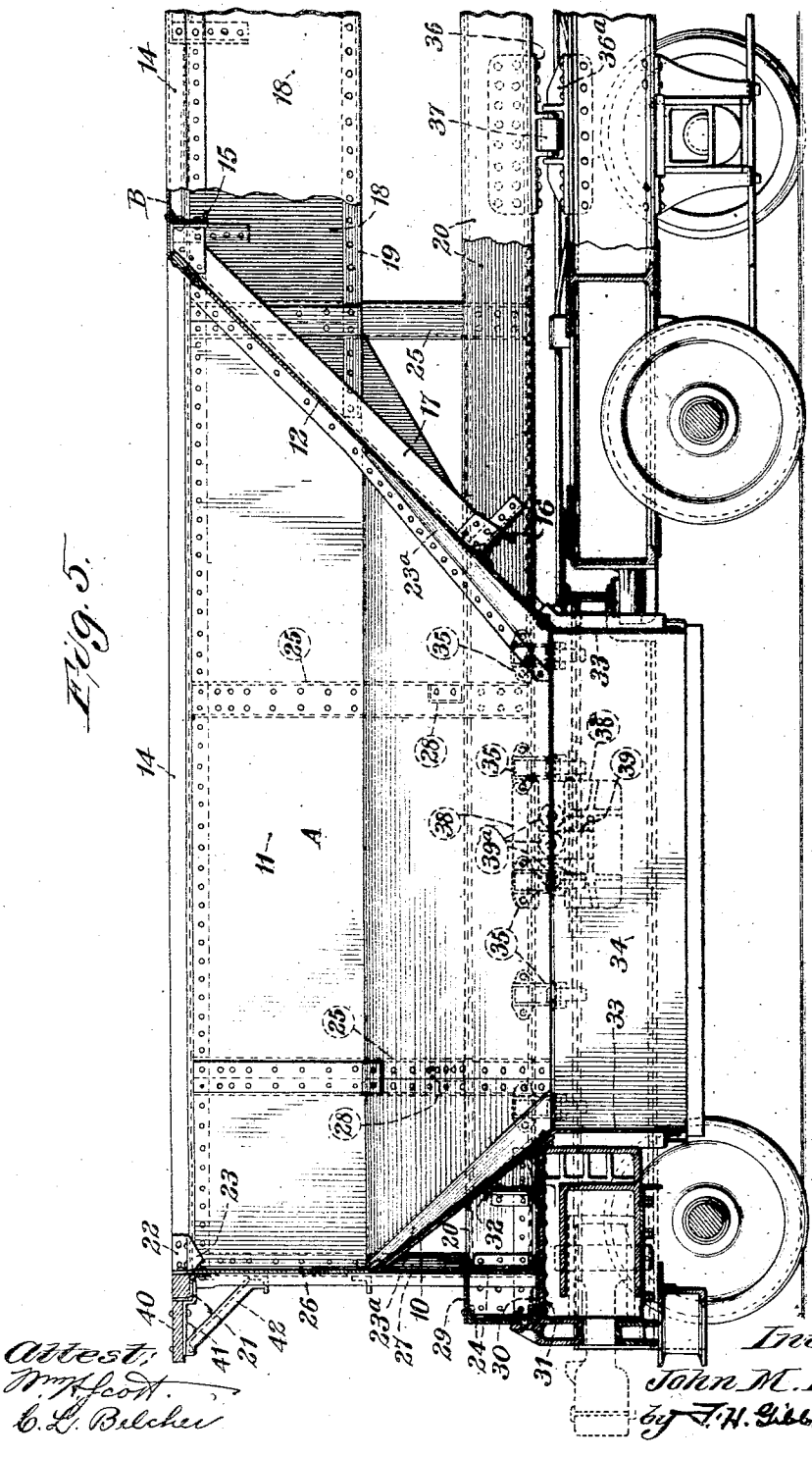

Fig. 5.

Witnesses:
Wm. H. Scott.
C. L. Belcher

Inventor:
John M. Rohlfing,
by F. H. Gibbs
Atty.

J. M. ROHLFING.

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5 SHEETS—SHEET 4.

Fig. 6

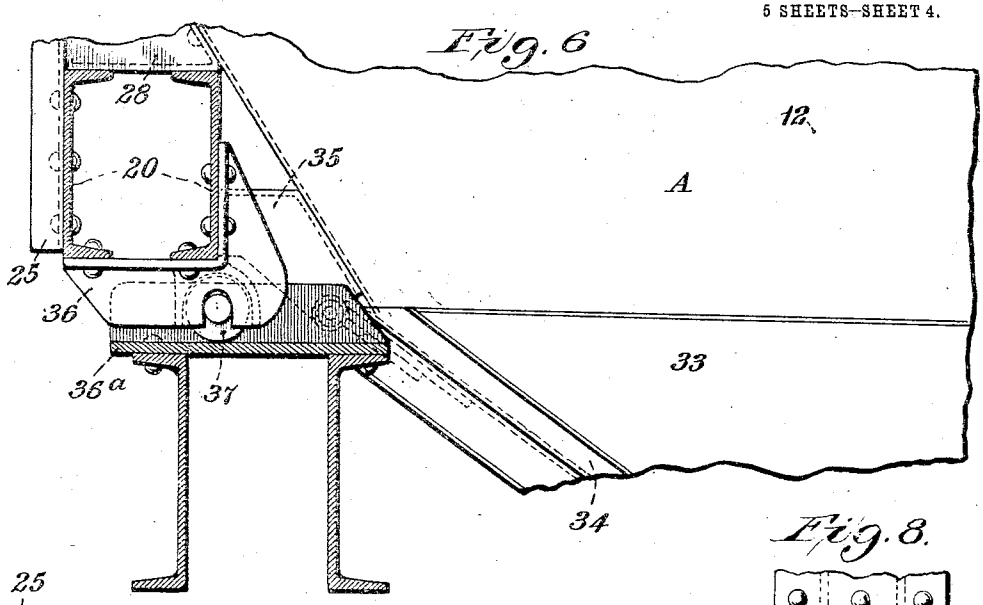
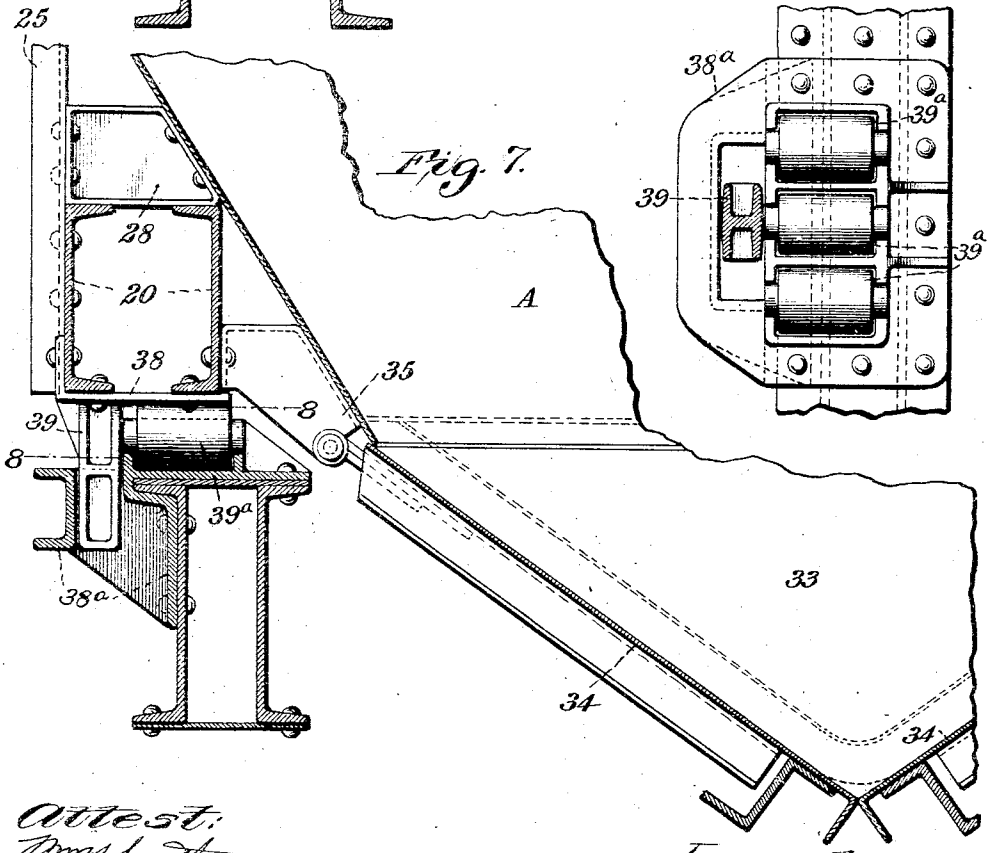


Fig. 8.

Fig. 7.



Attest:
Wm. A. Post.
C. L. Belcher

Inventor:
John M. Rohlfing,
by F. H. Gibbs Atty.

J. M. ROHLFING.

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5 SHEETS—SHEET 5.

Fig. 9.

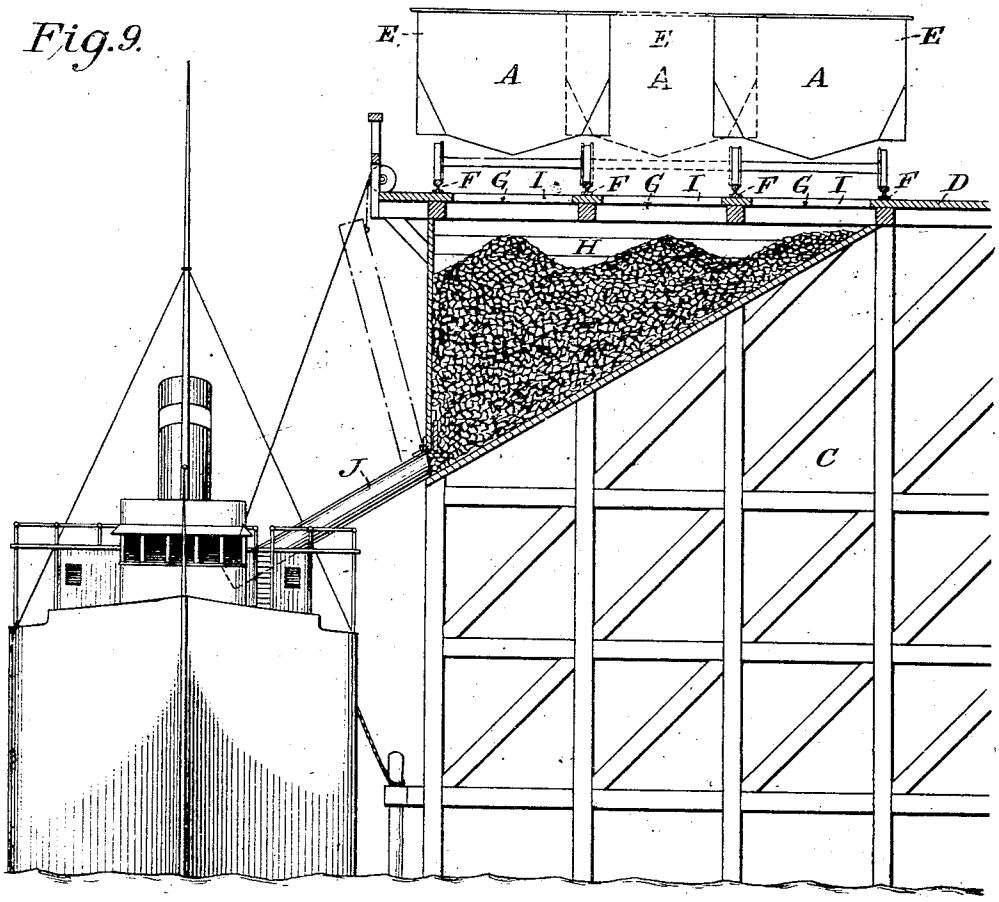
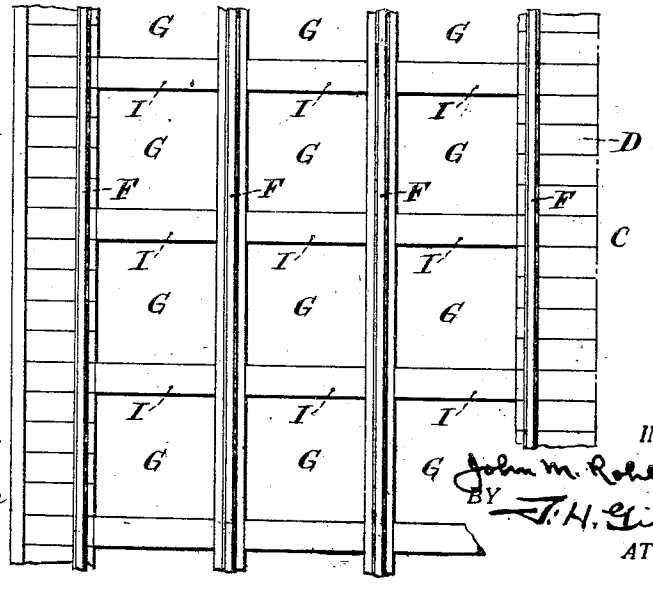


Fig. 10.



WITNESSES:

C. L. Belcher

H. S. Hennessy

INVENTOR.

John M. Rohlfing

BY T. H. Gibbs

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN M. ROHLFING, OF ST. LOUIS, MISSOURI, ASSIGNOR TO AMERICAN CAR AND FOUNDRY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

HOPPER-CAR WITH ARTICULATED TRUCK.

1,109,600. Specification of Letters Patent. Patented Sept. 1, 1914.

Application filed May 23, 1914. Serial No. 840,552.

To all whom it may concern:

Be it known that I, JOHN M. ROHLFING, residing at St. Louis, Missouri, and being a citizen of the United States, have invented certain new and useful Improvements in Hopper-Cars with Articulated Trucks, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and to use the same, reference being had to the accompanying drawings, which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof will occur to persons skilled in the art.

In said drawings: Figure 1 is a plan view of the car, partly broken away to disclose a portion of the underframe. Fig. 2 is an inverted plan view of the underframe. Fig. 3 is a plan view showing the articulated truck upon which the car body is supported, the outline of the latter being indicated in dot and dash lines. Fig. 4 is a side elevation of the car. Fig. 5 shows approximately one-half the car and is principally a central longitudinal section but is in side elevation at the middle portion of the car. Fig. 6 is a transverse sectional view taken on line 6—6, of Fig. 4, and illustrates the means for imparting the buffing and pulling stresses to the truck. Fig. 7 is another transverse sectional view taken on line 7—7 of Fig. 4, disclosing the means for carrying and guiding the car body upon the truck. Fig. 8 is a detail plan view of that part of the carrying and guiding means which is carried by the truck, a depending portion from the car body bearing plate being also shown in section. Fig. 9 is a diagrammatic view in cross section of a typical ore dock, indicating the method of the transference of the lading from cars to the holds of vessels; and Fig. 10 is a fragmentary plan view of the dock, showing the equally gaged rails of the trackage, and also the openings to the ore pockets arranged therebetween.

The object of the invention is to provide a hopper car which is especially adaptable to the ore-carrying trade, the car being so arranged that its lading may be discharged into pockets or receptacles spaced apart a predetermined distance.

The transportation of ore from the mines to the docks at the Great Lakes and the unloading of the ore from the cars on the docks into the vessels, or into hoppers which discharge into the vessels, is an important problem in connection with the economical production of iron and steel, and the railroad companies engaged in the transportation of ore have endeavored to simplify the handling of the ore as much as possible. To that end the Duluth, Missabe & Northern Railway has at Duluth large shipping docks, each dock being about 2,300 ft. long, with something less than 400 ore pockets, and the total storage capacity of these pockets is nearly 270,000 tons. The equipment for carrying the ore from the mines to the docks includes a large number of steel and wooden cars, which are especially designed and of such length and width as to facilitate unloading of the ore from the cars into the ore pockets of the docks, and from such ore pockets into the holds of vessels which run alongside of the docks, which vessels are loaded with ore fed by gravity directly into the holds of the vessels. The Duluth and Iron Range Railway and the Great Northern Railway are also equipped with a number of relatively similar ore-shipping docks which have an aggregate storage capacity of more than 500,000 tons. A diagrammatic representation of such docks is shown in Figs. 9 and 10. The docks C are elevated a considerable distance above the water level, and along the upper decks D of these docks tracks are provided on which ore cars E travel, the tracks being so disposed that cars may run upon any two of the rails; that is to say, where four rails F are laid, the inside rails may serve as an intermediate track, or either outside rail and the inside rail next to it may constitute another track. Thus, the gage between all of the rails being of the same standard, with proper switching to avoid interference of cars, the lading may be distributed transversely of the dock in all the pockets to utilize the entire capacity of the latter. Between the rails openings G to the pockets H are provided, which openings are nearly equal to the distance between such rails, and at intervals longitudinally of the tracks, bridges I are provided at fixed intervals, upon which bridges men may stand while engaged in

poling the ore. The men who use the bridges are provided with long poles, which are used in breaking bridges of ore which may form in the pockets while feeding the ore through chutes J into the holds of the vessels used in water transportation. Because of the fixed sizes of the openings and the distance apart of such openings longitudinally of the tracks, and the impracticability of altering the expensive and permanent construction of such docks, it has been found that cars of relatively small capacity were best available for this ore-carrying service. This has largely increased the number of cars necessary, and because of the disadvantages incident to handling a large number of small cars the present invention provides in a single car twin hoppers which are spaced apart a predetermined distance longitudinally of the car, so as to permit both of such hoppers to register with the openings in the docks leading to the ore pockets.

An articulated truck especially adapted to coöperate with the predeterminedly spaced hoppers of the present car is fully disclosed in a companion application filed on an even date herewith, under the title of Articulated Truck, and also partly shown in the drawing of the present application.

By reason of the arrangement shown I am able to carry in one car as much ore as has heretofore been carried in two separate cars, and am able to discharge the lading at the docks with equal or greater facility than where two cars are employed at the same time, and provide a structure which is better adapted to railway service and one which can be used on roads having sharp curves, such as are common in the ore-carrying lines which lead from the mines to and onto the docks.

Because of the construction of the car illustrated in the accompanying drawings, such car will carry heavy loads with a minimum of strains on the body because each pair of the supporting bearing plates for the car body, located toward opposite ends of the car, can be placed at or near the transverse center plane of the load at its respective end, so that the load at each hopper will practically counterbalance itself above the points of support.

Referring specifically to the car body, it will be noted that the car body consists of two hoppers A—A, which are spaced apart by means of the deck plate B, shown in plan in Fig. 1. Each hopper comprises an end plate 10, side plates 11 and sloping inner end plate 12. The plates 10 and 11 are vertical for some distance from their tops and then bent inwardly to a slope suitable for discharging the load within the hopper, while plates 12 have a continuous unbroken slope from top to bottom.

Plates 12 of the spaced hoppers are connected by the deck plate B, which, like the side plates 11, is connected with the top chords 14, which may be Z-bars, of the car sides. Plates 12 and B are stiffened and reinforced by members 15, 16 and 17 of any suitable shape and dimensions, but here illustrated, respectively, as channels and angle irons, these members being secured to the car body substantially as shown.

The hopper side plates 11 are connected by intermediate side plates 18, having at their lower edges strengthening members 19 of suitable shape and dimensions, but preferably angles. See Fig. 5. The side plates 18 terminate vertically some distance above the side sills 20, leaving on each side of the car an opening between the hoppers and the side sills to facilitate inspection of air brake and door operating mechanism, which are usually installed in the open space between the hoppers. Due to this opening the central part of the truck may be inspected when desired.

The side and end plates of the car body are riveted to side top chords 14 and end top chords 21, the latter also preferably made of Z-bars, which chords at the corners are connected by corner pieces 22 with their inner edges on a slope 23, to facilitate the discharge of the load, and, to the same end, the vertices of the inclined portions of the hopper corners are provided with triangular shedding surfaces 23^a.

The side and end plates are connected to side sills 20 and end sills 24 by stakes 25 and 26, respectively, corner posts 27 connecting side plates and end plates and being attached to side sills, and filler posts 28 rest upon the side sills and support sloping parts of the side sheets 11, the whole forming a strong and substantial combination for carrying heavy loads and withstanding severe service stresses.

The side sills 20 and end sills 24 are of box girder construction, preferably made up of commercial channels and plates of suitable sizes connected in a strong and substantial manner, as by top and bottom cover plates or by properly distributed tie plates, the filler posts 28^a and certain castings serving as tie plates, in the car illustrated.

The end sills are covered on top by plate 29, through which pass end stakes 26, as shown in Figs. 1, 3 and 7.

To the bottom of the end sills and the extremities of the side sills are secured strong plates 30, to which are riveted castings 31, which serve as striking plates and also as containers of the draft rigging. The castings 31 are designed to carry twin draft riggings of suitable construction and size, though such draft rigging is not material to the present invention and is not illustrated.

Members 32 of suitable shape and size, commercial channels serving well, are secured to the side sills and plates 30 to stiffen these plates and to prevent buckling. The members 32 are disposed in such position as to serve as a support for the sloping lower portions of the end sheets of the hoppers. Below the sloping parts of the outer hopper end sheets 10 and the inner sloping hopper sheets 12 are vertical sheets 33, best shown in Figs. 5 and 6, which vertical sheets are secured to the lower portions of said hopper sheets 10 and 12 and serve as guides for the discharging load in unloading the car.

Each hopper opening is closed by a pair of doors 34, which doors are hung on hinge butts 35, or the like, which are secured to the side sills and side hopper plates, substantially as shown in Figs. 5 and 7, and the door operating mechanism may be of any suitable kind.

To the bottom portion of the side sills, approximately at the longitudinal center thereof, are secured one on each side of the car strong castings 36, which are used in transmitting pulling and buffing stresses from the car body to the truck. These castings fit and slide transversely in castings 36^a on the truck and control rollers 37, which rest on the truck castings, but as such castings are not intended to carry any material part of the load under normal conditions, some vertical clearance is left between the car body castings and truck castings, and also between the rollers and car body castings. If for any reason the side sills of the car should sag so much that the castings bear against the rollers, it will bring such rollers into action and prevent jamming. To the side sills are also secured four bearing-plate castings 38, having vertical downward projections 39, which castings constitute carrying and guiding means between the car body and truck, as they rest upon and slide over the rollers 39^a in the truck-bearing castings 38^a, while projections 39 slide longitudinally in the truck castings which thus control transverse movements of the car body. So-called bearing plate castings 38 are secured to the side sills at points to correspond with locations of truck-bearing plate castings, which thus equalize the load on the truck wheels. The details are shown in Figs. 1, 4 and 5. At the ends of the car even with the top chords of the car body are placed wooden platforms 40 secured to and supported on bars 41 and brackets 42, which are secured to the ends of the car body. See particularly Fig. 5.

What I claim is:

1. In a dumping car, a car body provided with hoppers at each end with an intermediate connecting portion, in combination with continuous side sills, a truck intermediate said hoppers, and means for connecting the car body and truck.

2. In a dumping car, a rigid car body provided with hoppers at each end with an intermediate connecting portion, in combination with a truck intermediate said hoppers, and means for connecting the car body and truck.

3. In a dumping car, a car body provided with hoppers having discharge openings in each end portion thereof, supports near each end of said body and a truck slidably connected with said body intermediate the discharge openings of said hoppers.

4. In combination, an articulated truck and a hopper car body movable longitudinally with relation to a part of said truck and transversely relative to another part of said truck.

5. In a car, an articulated truck comprising an intermediate section and two end sections supported at their end portions on said intermediate section, in combination with a rigid body portion having hoppers in each end thereof adapted to discharge within said truck end portions and to move transversely of said intermediate truck portion.

6. In a car, a car body provided with longitudinally spaced hoppers, a truck substantially coextensive with said body, and means slidably connecting a side frame of said truck with a rigid part of said car body.

7. In a car, a car body provided with longitudinally spaced hoppers, a truck substantially coextensive with said body, and means slidably connecting a side frame of said truck with a rigid part of said car body intermediate said hoppers.

8. In a car, side sills and longitudinally spaced hoppers, in combination with an articulated truck provided with side frame members, and slidable connecting means intermediate said sills and members.

9. In a car, longitudinally spaced hoppers in combination with connected means supporting said hoppers, and an articulated truck directly supporting said means.

10. In a car, a car body comprising a bottom chord, a top chord, members extending between said chords, longitudinally spaced hoppers having discharge openings below said bottom chords, in combination with an articulated truck provided with a side frame.

11. In a car, a bottom chord, a top chord and longitudinally spaced hoppers having discharge openings below and between said bottom chords, in combination with an articulated truck, and slidable means connecting said bottom chord and said truck.

12. In a hopper car, spaced side supporting members, an articulated truck compris-

ing side frames, and slidable connecting means intermediate said supporting members and said side frames.

13. In a car, a car body comprising spaced apart connected hoppers, side sills connected therewith, an articulated truck with side frames below said side sills, and connected car body supporting means between each side sill and truck side frame within or near the transverse central plane of each hopper.

14. In a car, a car body having side sills, an articulated truck having side frames therebelow, and slidably connected body guiding, supporting and retaining means secured to said sills and truck frames.

15. In a hopper car, a car side comprising a top chord, a box girder bottom chord, side and corner stakes, and sheet plates connected with said top chord and portions of said stakes, certain of said sheet plates being bent inwardly below their points of attachment to said stakes and forming sides of hoppers, said bottom chord being slidably supported upon pivotally connected members of an articulated truck.

16. In a hopper car, side and end top chords, lading-shedding corner pieces connecting the same, box girder side and end sills, the former being adapted to have movement relatively longitudinal to certain members of an articulated truck and transverse movement respecting another part thereof, side and corner stakes connecting said side top chords and side sills, end stakes connecting said end top chords and end sills, and hoppers at each end of the car secured to said top chords and stakes and having unobstructed discharge openings substantially laterally coextensive with the distance between the side sills.

17. In a dumping car, a car body comprising top side and end chords, lading-shedding corner pieces connecting the same, side sills substantially coextensive with said body, the latter being adapted to have combined longitudinal and transverse movement with respect to an articulated truck, end sills connected with said side sills, spaced apart hoppers, a deck plate and intermediate side sheets connecting the same, and strengthening members for said intermediate sheets.

18. In a dumping car, a car body adapted to have combined longitudinal and transverse movement with respect to an articulated truck and comprising spaced apart hoppers joined by an intermediate reinforced plate structure, each hopper adapted to discharge between side sills and comprising vertical side and outer end plates, the lower portions of which converge inwardly, and an inner inwardly inclined end plate, downwardly extending discharge-guiding plates secured to said outer and inner end plates, and suitable doors for the discharge opening, the inverted pyramidical portion of the hopper having lading-shedding corners.

19. In a dumping car, a car body comprising connected side and end top chords, connected open box girder side sills and box girder end sills, side and end stakes joining said top chords and sills, spaced apart hoppers secured to said top chords and stakes and having inverted pyramidical bottom portions, filler posts resting upon said side sills and supporting sloping side sheets of said hoppers, car body carrying and guiding means slidably connected to an articulated truck and stress transmitting members both secured to said side sills, said filler posts, carrying means and stress transmitting members tying together elements of said box girder side sills.

20. In a car, a car body comprising side sills including tied-together spaced longitudinal members, end sills comprising spaced longitudinal members, top plates and bottom plates, the latter extending rearwardly beyond said end sill and being secured to said side sills, combined striking plate and draft rigging containing structures supported by said bottom plates, stiffeners for said bottom plates adapted also to support hopper end sheets, and end stakes passing through said top plates and secured to the end sills, said car body being slidably connected to and having relatively longitudinal and transverse movement with respect to different articulated truck members.

21. In a hopper car, a car body mounted upon an articulated truck and comprising continuous side sills coextensive with said body, spaced apart hoppers with outwardly and downwardly extending inner end plates, a deck plate and intermediate side sheets connecting the same, the bottom of said sheets being materially spaced above said side sills, whereby space is provided between said hoppers for the installation of air brake equipment and door operating mechanism and for the inspection thereof and of said articulated truck.

22. In a hopper car, a car body mounted upon and guided by an articulated truck, said body comprising connected top side and end chords, connected side and end sills, bottom plates secured to said end sills, extending rearwardly thereof and attached to said side sills, stakes connecting said top chords and the sills, spaced apart hoppers having inner and outer end sheets and connected at the central car body portion by a deck plate and intermediate side sheets, reinforcing members on said end sill bottom plates adapted to support the outer end hopper sheets, transverse inner hopper sheet-stiffening and supporting members attached to said side sills, deck-supporting and stiff-

ening members, tying together said top side chords, inner hopper end sheet reinforcing members connecting said transverse supporting members and said deck supporting members, and stiffeners for the lower part of said intermediate side sheets.

23. In a dumping car, a car body mounted to move longitudinally of oscillatory articulated truck members and laterally of a transversely slidable truck member, said body comprising spaced hoppers and intermediate means connecting the same, said hoppers having discharge openings predeterminedly spaced in accordance with lading-receiving openings in an affiliated structure distinct from said car, and said hoppers being adapted to discharge their loads through and within said oscillatory truck members.

24. In a dumping car, a car body adapted to be supported upon an articulated truck and comprising side sills, spaced apart but connected hoppers with inwardly inclined wall portions forming discharge openings within and below said side sills, doors for closing said openings, and hinge butts for hanging said doors, said hinge butts being secured to said side sills and adapted to support certain of said inclined hopper wall portions.

25. In combination, a car body adapted to be supported upon oppositely extending members of an articulated truck, which members are commonly pivoted with an intermediate member adapted to slide transversely of said body, sills included in the body, pulling and buffing stress-transmitting elements secured centrally of said sills, and adapted to co-act with stress-receiving elements carried by said intermediate truck member, said stress and receiving elements normally being adapted to have frictionless movement transversely of the sills, and anti-friction means between said elements operable under abnormal stress.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JOHN M. ROHLFING.

Witnesses:
JAMES J. COOPER,
ROBERT J. SCHEIBLI.