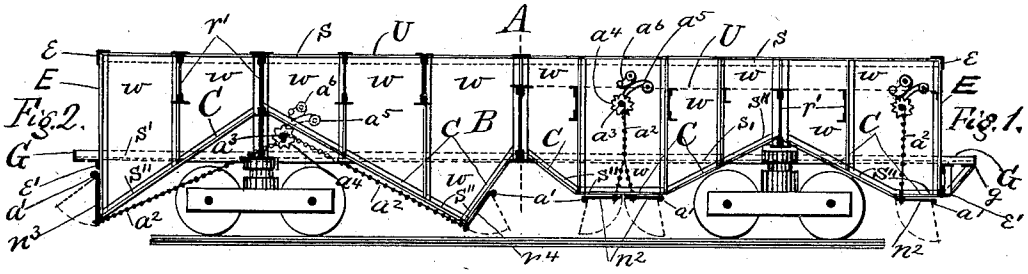
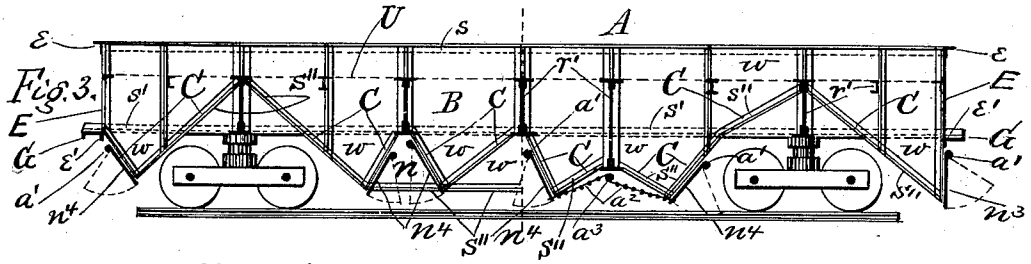
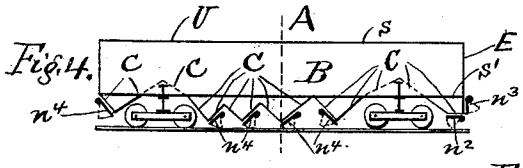
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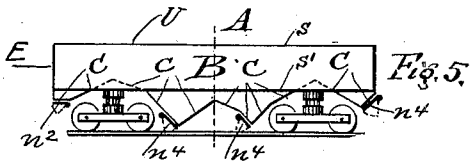
M. A. ZÜRCHER.
RAILWAY CAR.

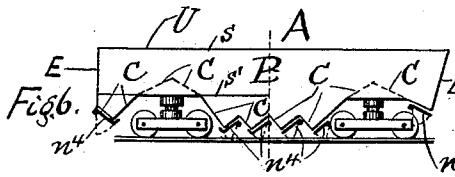
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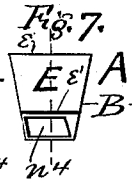


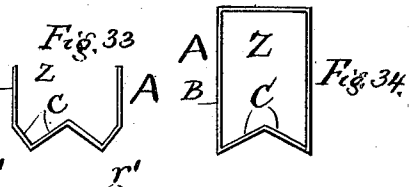


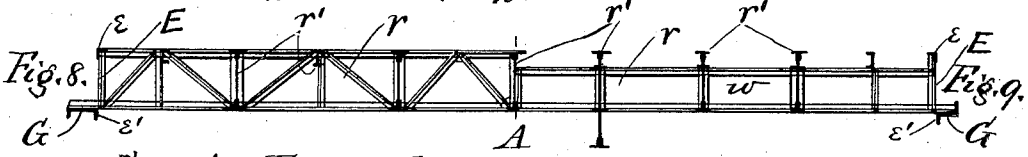


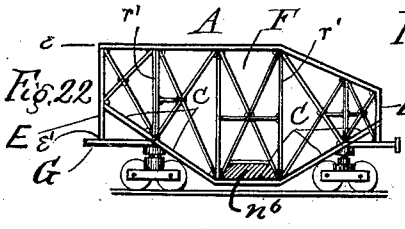


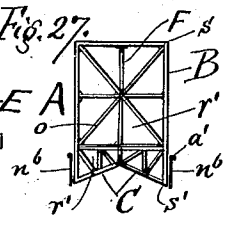


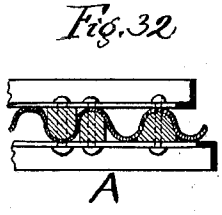


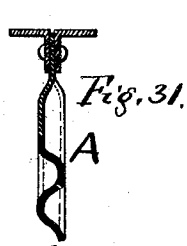


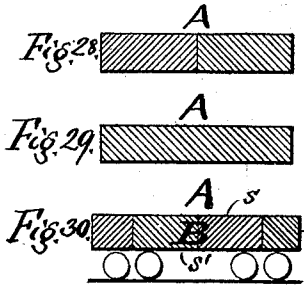












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J. F. Quinn

Inventor:
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(No Model.) 3 Sheets—Sheet 2.

M. A. ZÜRCHER.

RAILWAY CAR.

No. 401,530. Patented Apr. 16, 1889.

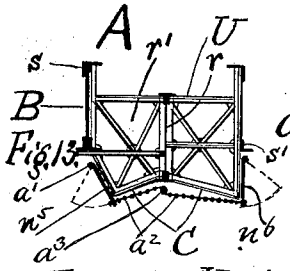


Fig. 13.

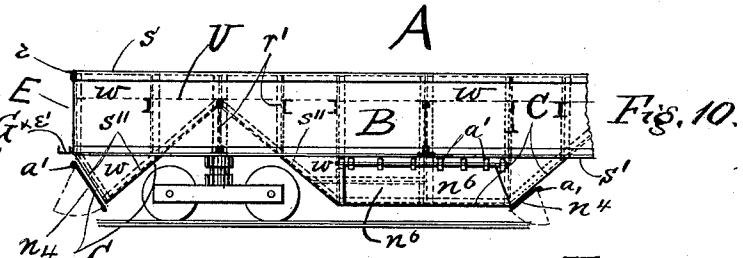


Fig. 10.

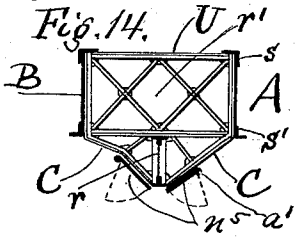


Fig. 14.

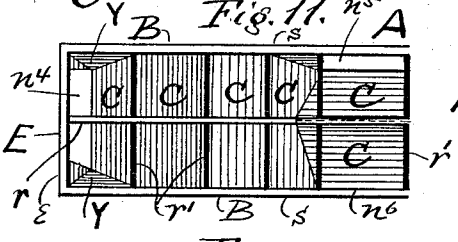


Fig. 11.

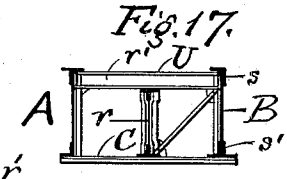


Fig. 17.

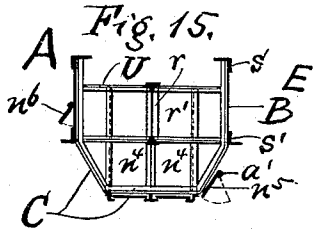


Fig. 15.

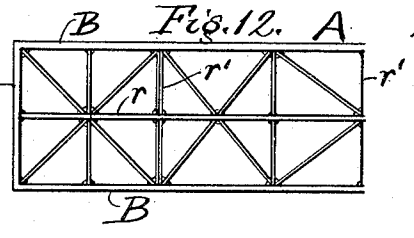


Fig. 12.

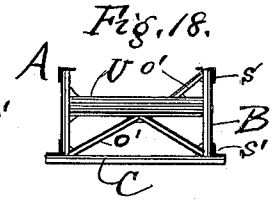


Fig. 18.

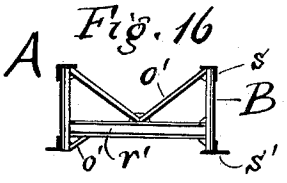


Fig. 16

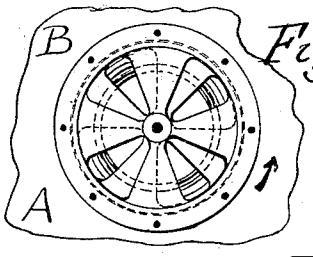


Fig. 37.

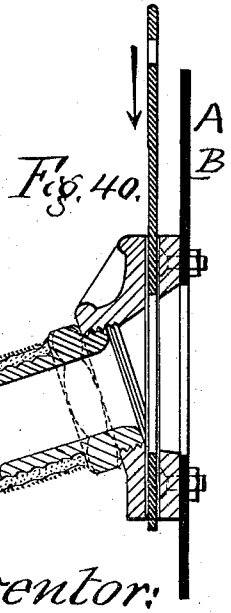


Fig. 40.

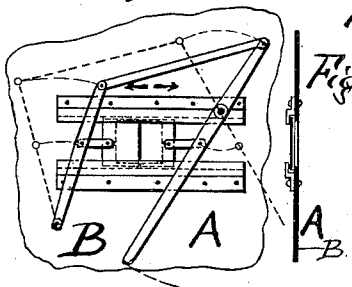


Fig. 35.

Fig. 36.

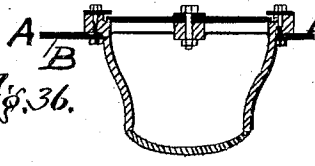


Fig. 38.

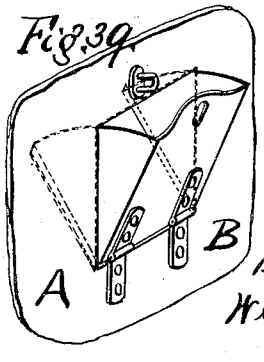


Fig. 39.

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N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 3.

M. A. ZÜRCHER.

RAILWAY CAR.

No. 401,530. Patented Apr. 16, 1889.

Fig. 19.

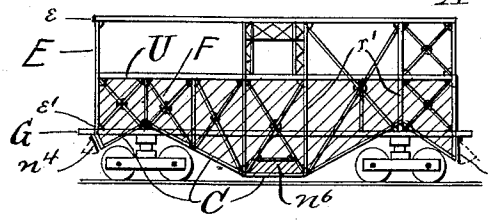


Fig. 24.

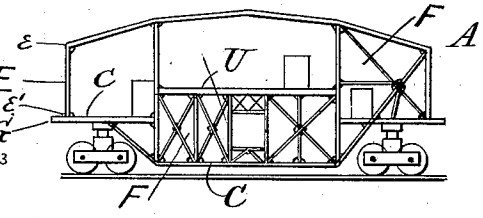


Fig. 20.

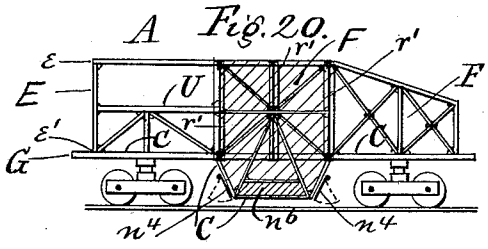


Fig. 25.

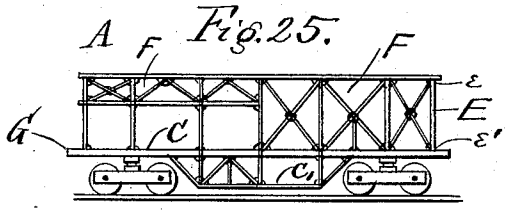


Fig. 21.

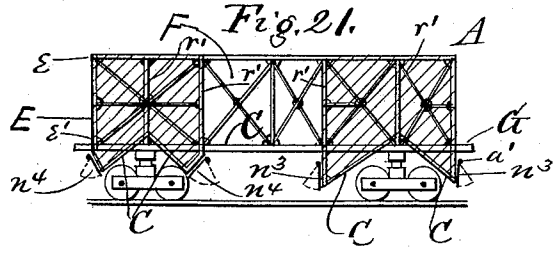


Fig. 26.

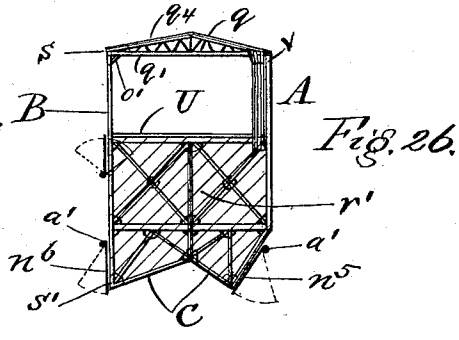
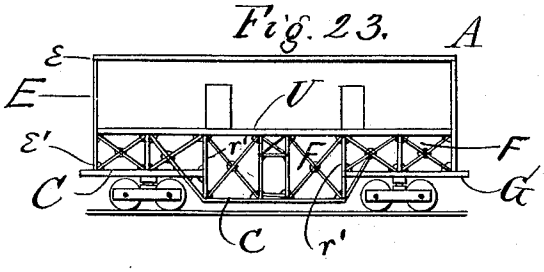


Fig. 23.



Witnesses:

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L. F. Quinn.

Inventor:

Max A. Zurcher

By his attys

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UNITED STATES PATENT OFFICE.

MAX A. ZÜRCHER, OF PHŒNIXVILLE, PENNSYLVANIA.

RAILWAY-CAR.

SPECIFICATION forming part of Letters Patent No. 401,530, dated April 16, 1889.

Application filed July 21, 1888. Serial No. 280,671. (No model.)

To all whom it may concern:

Be it known that I, MAX A. ZÜRCHER, a citizen of the United States, residing at Phœnixville, in the county of Chester and State of Pennsylvania, have invented a new and useful Improvement in Railway-Cars, of which the following is a specification.

My invention relates particularly to the construction and arrangement of the frames and bodies of railway-cars, and is an improvement on my previous inventions of the same nature described, shown, and claimed in a prior patent granted to me June 5, 1888, No. 384,225, and in a prior application for a patent in the United States Patent Office, May 25, 1888, bearing Serial No. 275,121, which application is directed more specially to improvements in railway-car-floor frames, as well as another application filed July 6, 1888, Serial No. 279,221, and it is upon these two inventions that the present invention has more especial bearing.

The objects of the invention herein disclosed are, first, to construct a composite car of a single or multiple deck construction wherein the various decks or parts of each or of the car may be adapted to carry loads of different nature, and thereby prevent the haulage of empty cars either wholly or partly in any one direction; second, to give increased strength and lightness and to construct such car without increasing the weight materially, if any, over that of the present cars, thereby allowing a maximum car-load in any one compartment, while any or all others are unloaded or partly so; third, to permit loading to the full car capacity such materials as will make up only a fraction thereof if loaded in the present style of car; fourth, to construct compartments with hopper-bottom doors which are either vertical or inclined when closed, or horizontal slide-doors, all so arranged to enable the bringing the center of gravity of the load closer to the rails, resulting in increased carrying capacity and stability; fifth, to construct a complete self-discharging car adapted to transport various kinds of materials shipped in bulk, of an open partly or wholly closed car construction, being adapted to transport a maximum car-load.

My invention will be better understood by referring to the drawings which accompany this specification, and to the claims which follow.

In the drawings like letters of reference, wheresoever used, refer to like parts; also, the detailed constructions of each complete view are generally shown different for each end or side, but may be constructed symmetrically.

Figure 1 is a sectional longitudinal view of half of a single or multiple deck hopper-bottom car, showing the longitudinal side girders, B, in elevation and the transverse girders E and r' in section, having, when closed, horizontally-hinged hopper-doors n^2, of a construction as is now generally in vogue. Fig. 2 is a similar view having my improved transversely-located doors, which are vertical, as at n^3, or inclined, as at n^4, when closed. Fig. 3 is a similar view of a whole car. Figs. 4 and 5 are elevations showing variously-arranged doors. Fig. 6 is an elevation with end girder, E, shown inclined at one end. Fig. 7 is an end view of any of the above figures, in which the side trusses, B, are inclined. Figs. 8 and 9 are sectional elevations showing the interior vertical longitudinal girders, r, as lattice and plate girders, respectively. Fig. 10 is part of an elevational view similar to Fig. 3, the central doors being located in a longitudinal direction. Fig. 11 is a half bottom plan view of the same, looking down. Fig. 12 is a half plan view of the same along the longitudinal girder top and bottom chords and that along any deck or floor. Figs. 13 and 14 are variously-constructed sectional transverse views of the same through the longitudinally-arranged doors. Fig. 15 is an end or interior transverse view of a car-body, showing transversely-located door-openings in elevation and horizontally-placed sliding doors, as well as longitudinally-hinged doors, all in section. Figs. 16, 17, and 18 are sectional views showing several intermediate transverse girders, r', in elevation in connection with the various above-shown constructions, Figs. 16 and 18 showing knee-braces o' connected therewith. Fig. 19 is a sectional longitudinal view of a double-deck car, whose lower compartment is of a hopper-bottom construction, while the upper part is that of a partly or wholly closed car. Fig. 20 is a similar view of a composite car, whose central compartment is of hopper-

bottom construction, extending all the way to the roof or top of the car, while each adjoining compartment is that of a single or double deck car, being either entirely open or wholly or partly closed. Fig. 21 is a similar view, except that the end compartments are of hopper-bottom construction, while the central one is of an entirely open or wholly or partly closed, being of a single or multiple deck. Fig. 22 is a sectional longitudinal view of a single or multiple deck hopper-bottom car of extreme height, showing the girders F in elevation and E and r' in section, suitable for carrying extremely light materials shipped in bulk. Figs. 23 and 24 are interior longitudinal sectional views of a multiple-deck composite car of an open, partly-open, or closed construction, having the lower central compartment partly projecting downward between the two trucks. Fig. 25 is a similar view, being a single-deck closed or partly-closed car, with a thoroughly-braced suspended platform, C′, between the two trucks for carrying loads, or a suspended tank or tanks. Fig. 26 is a sectional transverse view through the hopper-compartment of Fig. 19, showing also a suitable pipe downward from out of the roof into the lower compartment for the filling of the latter. Fig. 27 is a similar view taken through Figs. 20 and 22. Figs. 28 and 29 are side views of the various forms of girders, showing corrugated metal plate-webs whose straight and parallel corrugations run diagonally. Fig. 30 is a similar view of a longitudinal girder. Fig. 31 is an end view showing the connection of a corrugated web with connecting members, the corrugation being flattened; Fig. 32, the same in plain view, except the corrugations are filled in to enable making connections. Fig. 33 is a transverse view showing a continuous stiffening-frame, Z, left open on top in connection with Fig. 13. Fig. 34 is a similar view except that it is closed on top and taken in connection with Fig. 20. Fig. 35 is a plan view of a double-acting slide door, valve, or gate having lineal movement, with lever-connections for operating same. Fig. 36 is a sectional view of Fig. 35. Fig. 37 is a plan view of a sliding door, gate, or valve having circular movement, the valve being shown partly open. Fig. 38 is a sectional view of Fig. 37. Fig. 39 is a perspective view of a bucket-door. Fig. 40 is a sectional side view of a sliding gate with lineal movement, having a discharge-nozzle with screw attachment for pipe or hose connection.

The details of construction of the herein-described car-frames are the same as for my improved statically-constructed car-frames as covered by my patent and various patent applications above referred to, and said improvements may be combined in any one of the herein-described cars, as well as any combination of any of them with any of those shown and described in this application.

A represents my improved car-frame, of metal or any analogous material which possesses the required strength.

B B represent the exterior side longitudinal trusses of the car-frame of my improved constructions, having a top chord, s, and a bottom chord, s', each being continuous throughout the whole length of the car-body, with a statically-constructed web. These girders may be inclined out or inwardly, (see Fig. 7,) as may also the end girders, E, Fig. 6, especially for coal and kindred hopper-bottom cars; but, instead of inclining the whole truss, the downwardly extension of same below the bottom chord, s', may be inclined only, all to dispense with any false floors, Y, Fig. 11, for the full self-discharge of the materials. The door-openings may be at their top side of less length than on the opposite or bottom side. (See Fig. 10.) By such a construction the strength of the downwardly-extended part of the car body or frame is greatly increased.

The lowest points of the several hopper-door frames may be connected togther by s'', Fig. 3, and to increase the depth of the girders B, s'' may act as its bottom chord, instead of s', or in connection therewith, and the latter may be then wholly or partly omitted, respectively. To facilitate operating the doors more readily, the web w of the space n may be wholly or partly omitted. In connection with any of these constructions, the vertical or inclined web members of the trusses B may be extended and connected to all of the exterior longitudinal faces of the body, principally so as to form a continuous stiffening-frame, Z, which may be completely closed, Fig. 34, or left open for the top or roof face only, Fig. 33, to be preferably located at or near large door-openings to give increased stiffness to the body transversely. These stiffening-frames may also form statically-constructed girders r'.

The girders B for coal and kindred cars have generally a plate-web, w. If of lattice, corrugated metal plates or sheets may be used for the wallings and the floor to increase the strength of the surfaces inclosing the load, or the latter may form part or the whole of the web. Then the lattice-web may be of diminished strength or partly or wholly omitted. The latter, especially if the corrugations run only in one direction, mainly that of the fiber of the metal, are straight and parallel to each other and are laid inclined to enable the transmission of web strains properly, as shown in Figs. 28, 29, and 30 by the diagonal lines; but any other combination may be also used. These corrugated webs are then rigidly and integrally connected to the chords or to any other connecting member, so as to form a statically-constructed and acting girders, B, r, F, E, and r', singly or any or all combined in a car, and thereby resulting in a construction of increased strength and minimum weight. As shown in Fig. 31, they are connected by flattening the corrugations wholly or only partly, or not at all. Then suitable blocking-pieces may be used for filling the corrugations

wholly or partly to allow making the necessary connections, Fig. 32. Stiffeners or stiffening-frames variously arranged may be connected thereto; but instead of the above-described parallel and straight corrugations, should a lattice-web be used in connection therewith, any others may be substituted of a single or compound shape, or of such variously-shaped buckle-plates as are used in the art; or the corrugation may be laid vertical or horizontal instead of inclined. These web constructions may be used in any car. To offer less hinderance in self or partly self discharging cars, the corrugations may run principally in the direction of the discharge. The same corrugated-plate constructions may be used for any of the doors.

As already explained, my car-frame constitutes externally a statically-constructed hollow prism or body or frame, strengthened by the following interior constructions: First, one or more interior vertical longitudinal trusses or girders, *r* or F, singly or combined, extending the whole or any part of the length of the car, may be used, or they may be the same as the girders B; second, interior transverse bracing or trussing, *r'*, is provided at the proper points, connected to any or all of the longitudinal trusses, as already explained. It may be below each or any one floor only or extending all the way to any or all of the upper floors or to the roof, or partly or wholly between any of the floors and the roof, or a combination of any of them into one car. In any hopper-bottom car the upper flanges of the transverse girders E and *r'*, or, instead of any of them, members connected to their webs, may form the floor-support of an upper deck, U, with or without a completely-covered floor connected thereto for the support of a load. The longitudinal girders B, F, or *r*, similarly constructed, may also form such a floor; or any combination may be formed singly or any or all of the girders combined in both directions. In connection therewith any one or more girders in either direction, singly or combined, may extend above said upper floor-level, U, especially if not forming a covered floor to enable holding short pieces of load in place.

Any lower floor, C, may be horizontal or any other shape either longitudinally or transversely or both combined, but not necessarily on the same level of the bottom chords, *s'*, of the girders B or that of *r* or F. This floor-level C may be longitudinally also statically trussed as well as the bottom chords of the above-referred-to girders in the same direction as D, as already fully described in my previous application, Serial No. 275,121, filed May 25, 1888. When this lower floor or truss, C, forms a hopper-bottom compartment or part of one, it will generally be constructed with a plate or corrugated plate web, as already fully explained, with one or more suitable openings, each of such a size as to allow in discharging the load and permit in transmitting the web shear. The openings may be located either in any or all of the exterior or interior faces of the car and having doors, valves, or gates of any or all of the various herein shown and described constructions. The trussing D in this case may be wholly or partly omitted.

Any of the upper floors, U, or floors above same may be constructed same as C, and the discharge of the load can be accomplished through suitable openings in the sides and ends, either self-discharging or otherwise, or through a pipe or channel extending through the lower compartments with suitable doors or valves at its top or bottom or at any other point. The same considerations also apply to any otherwise constructed floor from that of the above-described hopper-car.

If the upper compartment is that of a closed car, its roof portion may be constructed same as already described, so as to form an auxiliary statically-constructed prism, body, or frame for same, or it may be the floor of a flat or any open car, also to carry load. Should the upper compartment or that of a single-deck car be open on top, without the roof portion, the top chords of the vertical longitudinal trusses may, nevertheless, also be laterally statically trussed or braced, so as to form a horizontal or inclined, or both kinds combined, longitudinal truss or trusses throughout the whole length or any part of the length of the car, Fig. 12; or knee-braces *o'*, Figs. 16 and 18, may be substituted instead, extending downward from the said top chords to the other girder-work to fulfill the same functions; or the vertical posts s^2 of side girders, B, may be constructed as girders transversely to resist the strains which are taken up in closed cars by the longitudinal roof-trussings. Any of the floor longitudinal trussing not in the same level with that of the bottom or top chords of the girders B may require the vertical web-posts s^2 to act as girders in various directions to transmit the resulting strains from such floor-trusses having no chords to both of its own chords in due proportion. Such strains in s^2 may be partly relieved by connecting auxiliary longitudinal members to them or to or into the trusses B to transmit parts of such chord strains, or by using knee-braces, Fig. 18.

I construct complete self-discharging hopper-bottom cars by inclining the floor sufficiently, which would materially reduce the present car capacity. I overcome this defect and greatly increase the capacity by lowering the floor-level in using my improved horizontal or vertical or inclined doors, or any or all combined, especially if in a longitudinal direction, and by giving the body the greatest permissible car height, length, and width. My various exterior and interior constructions of increased strength and combined lightness permit in doing so, as already fully explained. This is especially accomplished for materials of extreme light weight, Fig. 22, wherein gird-

ers r' may be of similar height and construction, as shown for F, while in Figs. 20 and 21 the same is accomplished, except the hopper compartment or compartments have a single or multiple deck open or closed compartment adjacent thereto; or the trussing thereof may be solely used to transmit the strains from this central hopper-compartment to the trucks, and to resist coupling, traction, and sundry strains, Fig. 20; or, to connect the two end hopper-compartments, each may be balanced over the trucks or otherwise, Fig. 21, without the construction shown in either figure carrying additional loads than that of the hopper-compartments.

My improved hopper-bottom doors, hinged in a longitudinal direction, are vertical (n^6) or inclined (n^5) when closed, are shown in Figs. 10, 19, 20, and 22 in elevation, and in Figs. 13, 14, 15, 26, and 27 in section. The locking arrangement is same as is used for Fig. 2. Each door may be in one or more pieces, acting at the same or various times.

My improved hopper-bottom doors, hinged in a transverse direction, when closed being vertical (n^3) and inclined, (n^4,) are shown in Figs. 2 to 6, inclusive, also Figs. 10, 19, and 21, all in section, and in Figs. 15 and 7 in elevation. The mechanism for operating same is entirely external to the car-body, instead of that now in vogue and shown in Fig. 1; but this does not debar me from using it in connection with my improved car frame and body constructions. These horizontal doors may be hinged in any direction. To fasten or release any of the doors n^2 to n^6, the customary mechanism may be used—namely, the doors have hinges a', and each door is connected to one or more chains, a^2. The latter are attached to a shaft, a^3, on which is fastened a ratchet-wheel, a^4. This shaft works in bearings fastened to the car-frame. The shaft is turned by a removable wrench. The doors are closed when chain is wound on shaft, and then held in place by a pawl, a^5, working on a pin fastened to the car-frame and acting into a^4. a^5 is held in place, when the car is loaded, by a dog, a^6, whose pin is also connected to the car-frame. I prefer to use an exterior connection for this mechanism, Fig. 2, instead of an interior one, as is shown in Fig. 1; but any other fastening or releasing device at will, common in the art, may be used instead.

To facilitate operating the doors more readily, especially in open coal or similar cars in which the doors have to be pried open from the exterior or interior of the car-body on occasions where the load has been saturated with rain and frozen, I use in or near same manholes of any of the usual constructions, or such as is shown in Figs. 35 or 36, of small size; but instead of this double-acting slide a single-acting one, either with or without levers, may be used. This construction, as shown, or any of its modifications, may be also used for closing any large openings anywhere in the car, or in combination or instead of any of the above-described hinged doors.

Figs. 37 and 38 represent a slide-valve having a circular motion of the usual construction, which may be used for discharging or filling for grain or similar materials and for ventilation.

Fig. 39 shows a bucket-door for filling a compartment, of the usual construction, which can be attached to any of the faces of the car-body, and for discharging it may be used top side down. This construction may also be used in any modified form.

The form shown in Fig. 40 is especially intended for the discharge of grain, flour, and kindred materials, and it may have variously-constructed valves and coupling-connections for hose or pipe, to enable the load to be loaded and discharged by suction or injection or by its own gravity, whereby grain-carrying or analogous cars can be directly loaded or unloaded from storage reservoirs or elevators.

I am aware that hopper-cars are old where the materials are merely held in one or more iron tanks of a circular or other shape, which are supported and connected to a horizontal wooden beam-work, but are not self-sustaining trusses in themselves, as my improved exterior sides and ends, and none have my improved interior constructions and improved doors, and none have my overhead-deck constructions.

I am aware of the use of doors which, when closed, are horizontal; also, doors which, when closed, are inclined and hinged in a horizontal direction of the car; and I make no claim to such construction, broadly.

I am also aware of the use of horizontal single-acting sliding doors.

I am aware that wooden double-deck stock-cars are now in use for transporting sheep and pigs, but not capable of carrying large merchandise and heavy loads, and not forming a statically-trussed body, as is the case in the construction shown and claimed by me.

I am also aware of the use of tool and similar compartments between the trucks underneath the floor of the car; but none have a complete platform or box-compartment of the full width and the greatest permissible length statically constructed the same as mine, able to carry maximum loads of any kind of freight, and none have a tank or tanks of similar dimensions.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A hopper-bottom railway-car body or frame consisting of statically-trussed side, end, and bottom faces and one or more transverse interior girders, all rigidly connected together, substantially as described.

2. A hopper-bottom railway-car body or frame statically constructed and having one or more transverse and longitudinal interior trusses, substantially as described.

3. A hopper-bottom railway-car body statically constructed, having corrugated metal-plate wall and floor linings to retain the load, substantially as described,

4. A hopper-bottom railway-car body or frame whose sides and ends and floor and interior girders consist each of a statically-constructed truss of a corrugated plate-web, substantially as described.

5. A hopper-bottom railway-car body or frame statically constructed, having one or more interior trusses, any of which in connection with any of the exterior sides and ends form the support for an overhead floor to carry load, substantially as described.

6. A hopper-bottom railway-car body or frame statically constructed whose exterior faces, any or all, are inclined, substantially as shown and described.

7. A hopper-bottom railway-car body or frame statically constructed, and having one or more interior girders whose exterior faces, any or all, are inclined, substantially as described.

8. A hopper-bottom railway-car body or frame externally and internally statically constructed, any of whose exterior girders are inclined, the various girders also forming an overhead-floor support to carry load, substantially as described.

9. A hopper-bottom railway-car body or frame statically constructed, any of the chords of the longitudinal sustaining-girders of which are securely held in place by knee-braces, substantially as described.

10. A hopper-bottom railway-car body or frame externally and internally statically constructed with an overhead floor and one or more variously placed and constructed and operated doors, substantially as described.

11. An externally and internally statically-constructed railway-car body or frame whose central compartment is of hopper-bottom construction, and suitable truss-work extending therefrom to transfer said loads to the trucks and to resist impacts, substantially as shown and described.

12. An externally and internally statically-constructed railway-car body or frame whose end compartments are of hopper-bottom construction, and suitable truss-work connecting these two compartments, substantially as shown and described.

13. An externally and internally statically-constructed hopper-bottom car body or frame of maximum permissible car-height, any or all of its girders also forming the support for one or more upper floors, each to carry load, substantially as described.

14. A multiple-deck car having a statically-constructed frame-work and a pipe or race-way extending downward to enable the filling of the lower compartment and the discharging of the upper, substantially as described.

15. A statically externally and internally constructed compartment-car having a hopper-bottom compartment centrally located and single and multiple deck compartments on either side, substantially as described.

16. A statically externally and internally constructed compartment-car having a hopper-bottom compartment over each truck, and centrally located a single or multiple deck compartment connecting the two, substantially as described.

17. A composite multiple-deck railway-car externally and internally statically constructed, having a central compartment partly extending downward between the two trucks, of the greatest permissible dimensions, able to carry maximum loads, substantially as described.

18. A hopper-bottom railway-car frame or body statically constructed, whose longitudinal girders have a bottom chord, s'', substantially as shown and described.

19. A railway-car body or frame consisting of statically-constructed trusses, any or all of which have latticed webs, to which are secured corrugated or buckle plates or sheets adapted to act as linings, and thereby increase the strength of the structure, substantially as described.

20. A railway-car body or frame consisting of statically-constructed trusses combined with corrugated plate and latticed webs, the whole being joined together in such manner as to withstand strains in all directions, substantially as described.

21. A hopper-bottom railway-car body or frame having an externally-trussed body with statically-constructed side girders, said side girders being inclined, substantially as described.

22. A statically-constructed hopper-bottom railway-car body or frame having one or more acting double slide-doors, in combination with a lever and connecting mechanism for operating the same, substantially as described.

23. A statically-constructed railway-car body or frame having one or more continuous transversely-located stiffening-frames, Z, the whole being so arranged as to give great strength against collisions and accidents due to derailment, substantially as described.

24. A statically-constructed hopper-bottom railway-car body or frame having one or more double-acting sliding doors provided with a lever and connecting mechanism, substantially as described, for operating the same.

25. A statically-constructed car-body having all of its exterior faces trussed except the top face, and having one or more transverse girders, r', and knee-brace o', extending from r' upward, the whole being designed and arranged to operate substantially as described.

MAX A. ZÜRCHER.

Witnesses:
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WENDELL A. ANDERSON.