

No. 746,385.

PATENTED DEC. 8, 1903.

R. V. SAGE.  
HOPPER GONDOLA CAR AND DOOR THEREFOR.

APPLICATION FILED NOV. 30, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

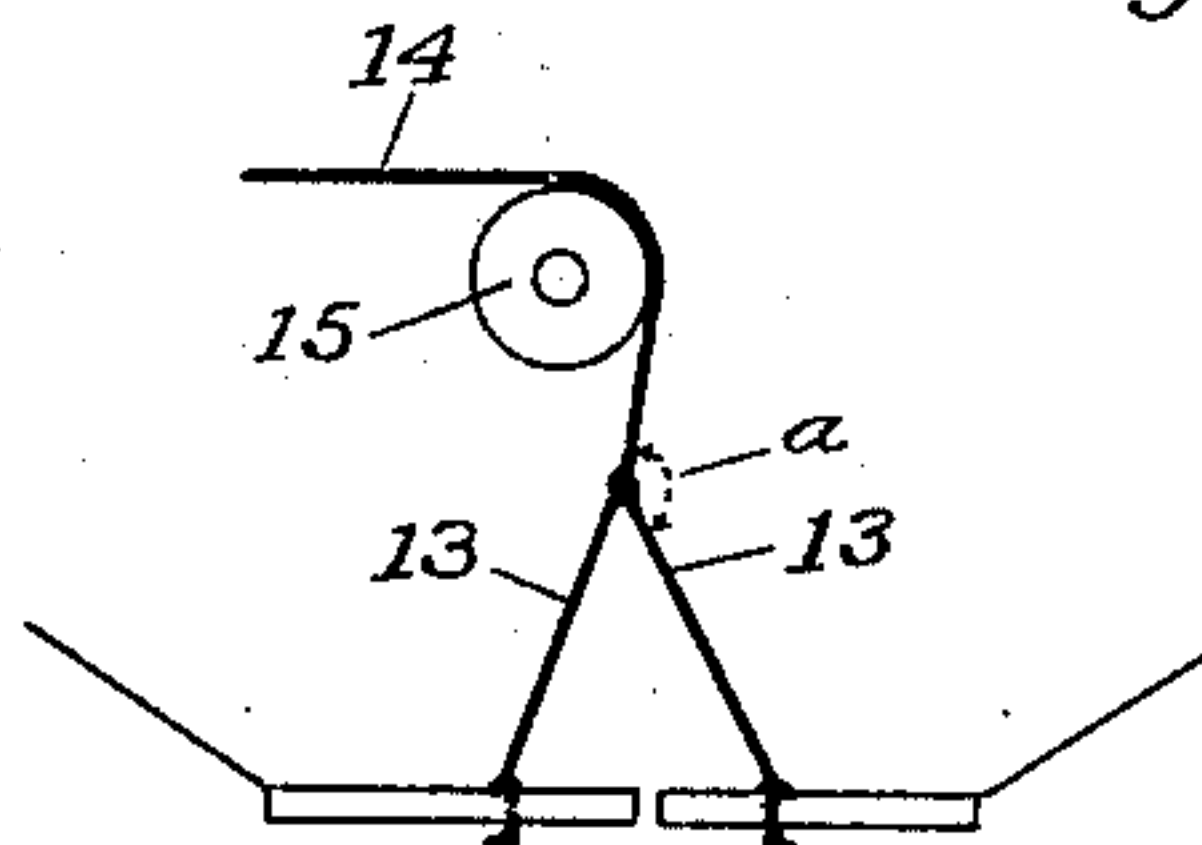
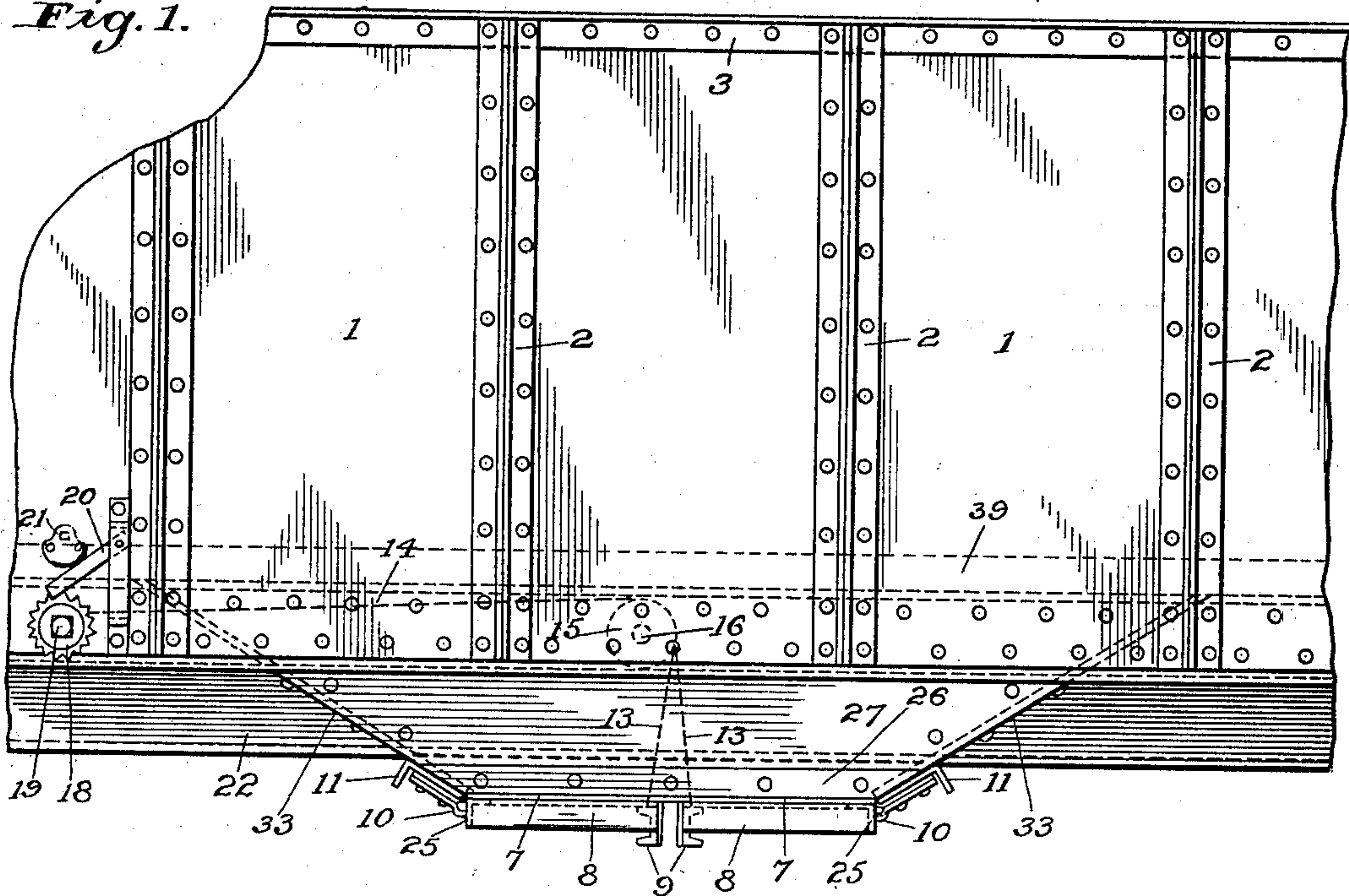


Fig. 5.

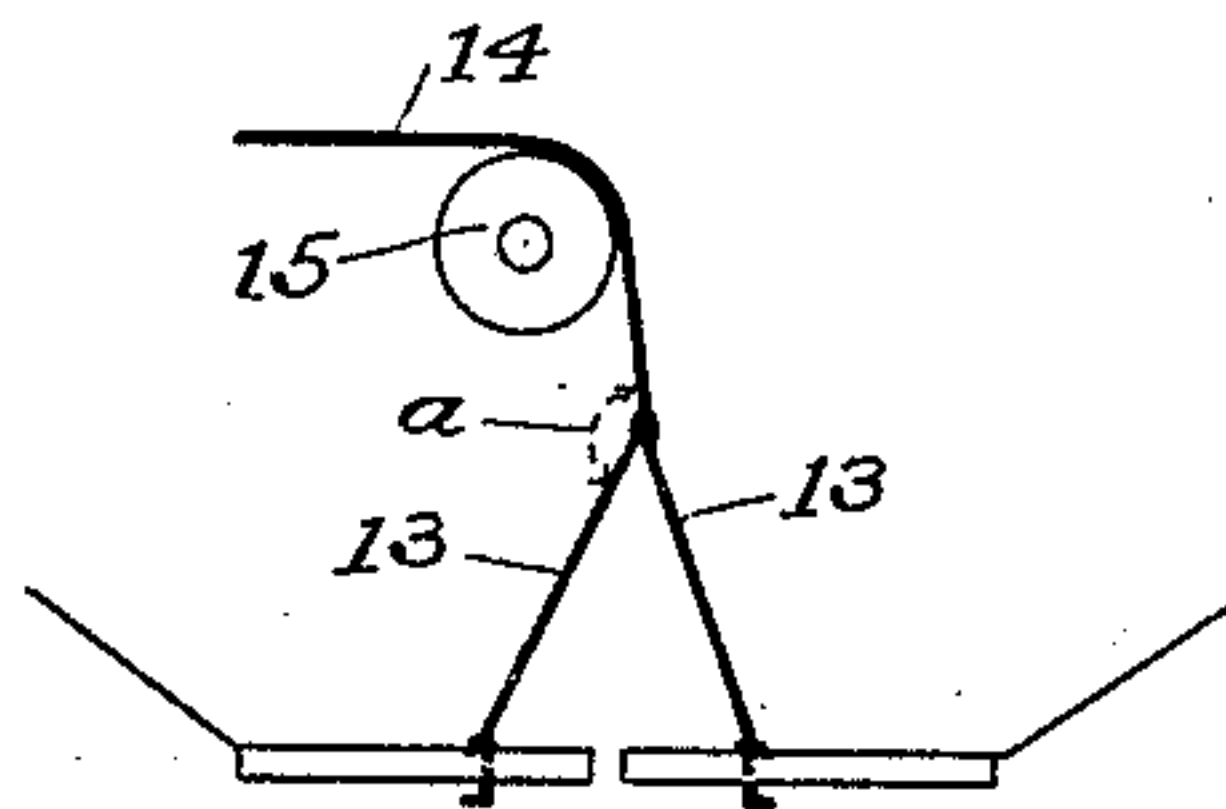
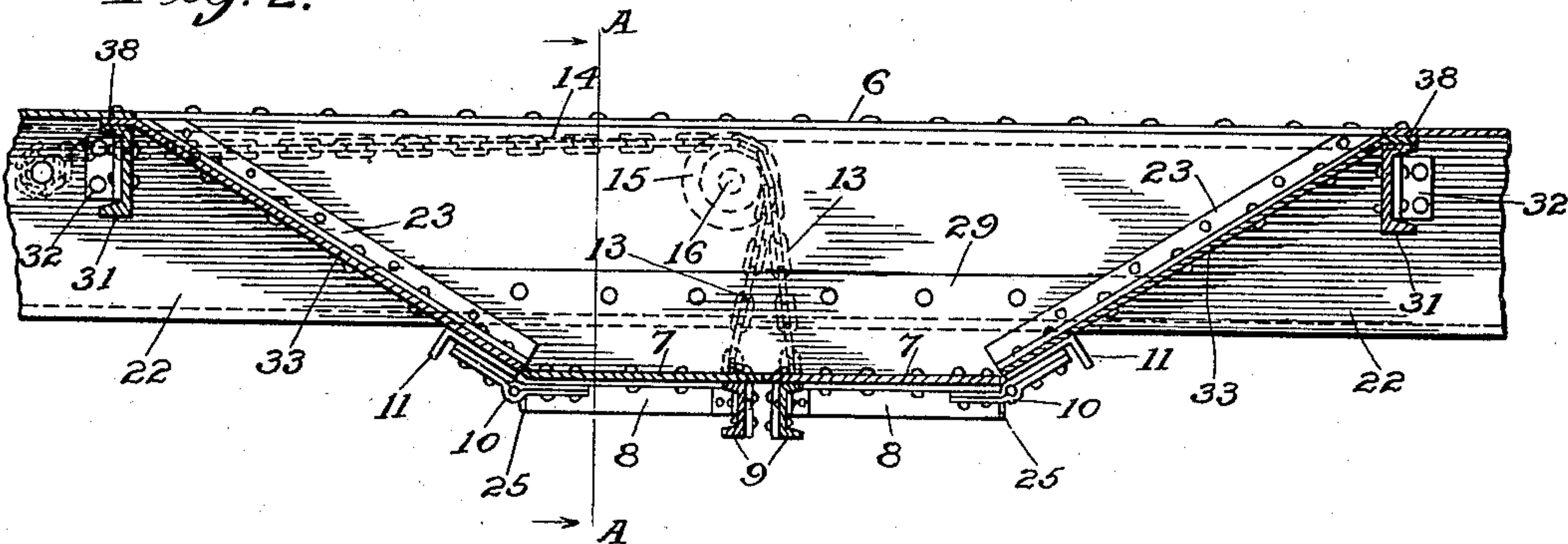


Fig. 6.

Fig. 2.



WITNESSES,

C. M. Newman  
by C. C. Hubbard.

INVENTOR.

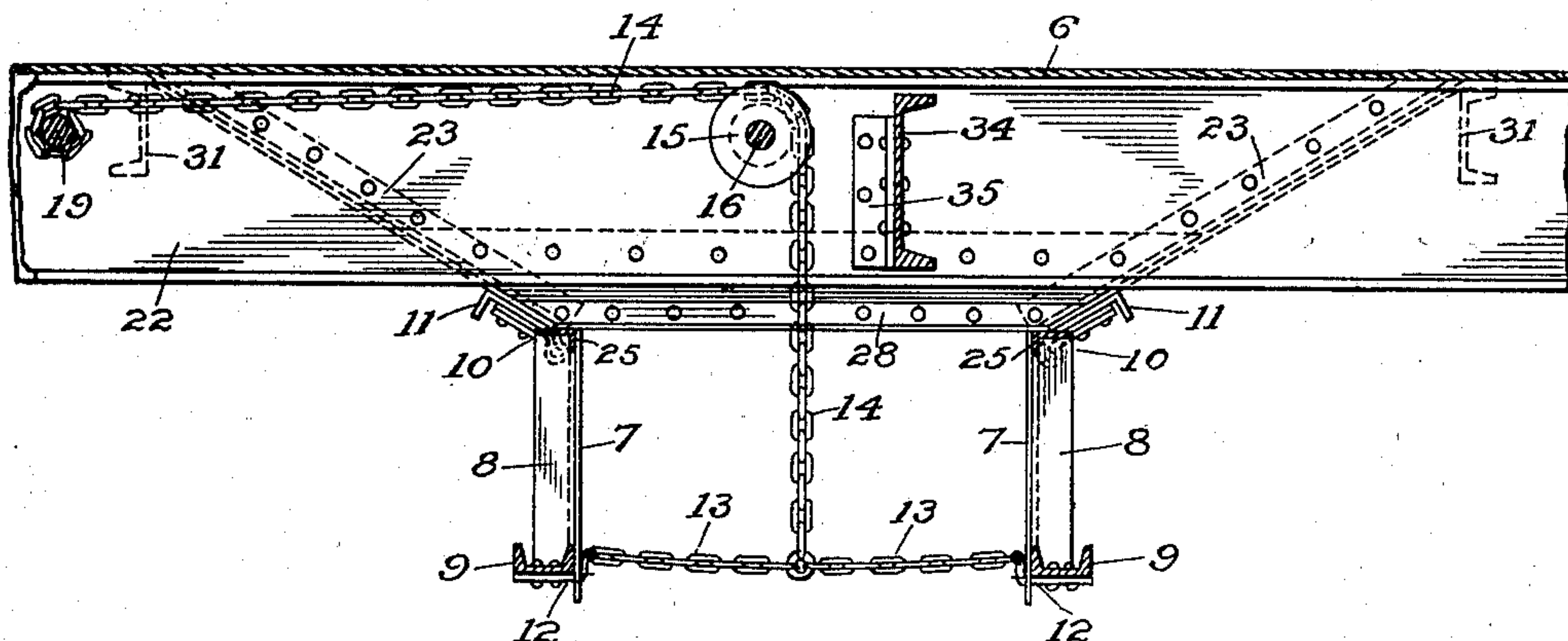
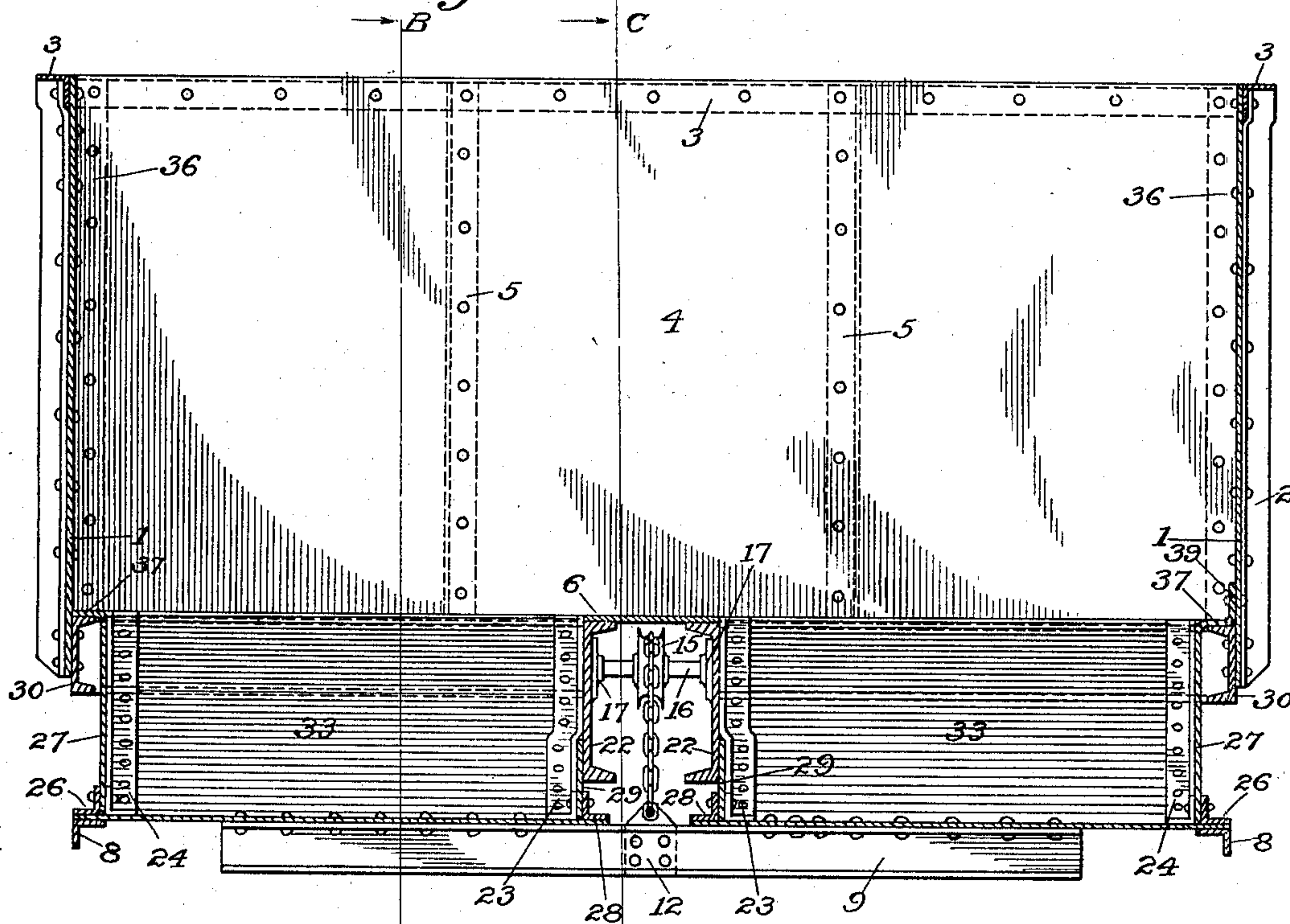
Ralph V. Sage  
by Geo. E. Thackray.  
his ATTORNEY.

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2 SHEETS—SHEET 2.

*Fig. 3.**Fig. 4.*

WITNESSES,

INVENTOR.

C. M. Newman  
by C. Hubbard.

Ralph V. Sage  
by Geo. E. Thackeray.  
his ATTORNEY.



# UNITED STATES PATENT OFFICE.

RALPH V. SAGE, OF WESTMONT, PENNSYLVANIA.

## HOPPER GONDOLA CAR AND DOOR THEREFOR.

SPECIFICATION forming part of Letters Patent No. 746,385, dated December 8, 1903.

Application filed November 30, 1901. Serial No. 84,211. (No model.)

*To all whom it may concern:*

Be it known that I, RALPH V. SAGE, a citizen of the United States, residing in the borough of Westmont, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Hopper Gondola Cars and Doors Therefor; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in the construction of railroad-cars, with special reference to that class of freight-cars which are known as "hopper" gondola cars for carrying bulk freight, such as minerals or other materials which may be unloaded by dumping through hoppers arranged in the bottom portion of the car.

Certain of the objects of my invention are to provide an improved form, construction, and arrangement of hoppers, doors for closing the bottom of said hoppers, mechanism for operating and securing said doors, and other particulars, as will hereinafter be more fully described.

My invention, as illustrated and described herein, is applied to a metallic car having a main body substantially rectangular in its various outlines, the bottom of which is provided with two hoppers, preferably near the center, arranged as a pair, one on either side of the center sills and extending thence toward the sides of the car. Each of these hoppers has the general form of an inverted frustum of a wedge, the parallel sides of which are adjacent to the car sides and the center sills, respectively; the sloping sides thus being located as to extend downwardly from the car-bottom in directions longitudinal of the car. Each of the pair of hoppers, as above described, is provided with double doors, preferably hinged in line to the bottoms of the sloping hopper sides, and the corresponding or adjacent doors on the opposite sides of the longitudinal axis or center sills of the car are secured together by means of a connecting member, so as to move as one piece.

To the central portion of each of the connecting members intermediate of the doors, which it secures together, I fasten a chain or other similar flexible connection, and said

chains when the doors are in a closed position extend upward in the form of an inverted V and are attached at the apex thereof to a single chain, which passes over an idler-pulley and thence is led to a winding-shaft, which shaft may be provided with any usual or suitable means, such as a wrench or crank, for operating it, and a ratchet, pawl, and locking device for securing it in position for holding the doors closed. These chains or flexible connections and the idler-wheel therefor are located in an open space between the center sills of the car, and thus are not disturbed or obstructed by the car lading, and the single or winding chain is extended in this open space to a convenient point where the winding-shaft is located below the floor of the car, with its end extending through the side in a convenient position for operating by means of the wrench or crank aforesaid.

By means of the arrangement described I provide a mechanism for operating the doors, the opposite pairs of which are both equally closed and firmly held in closed position whether the individual chains connecting to them are of equal length or unequal length, as the winding-chain by reason of the manner of its connection to the separate or individual chains will pull with approximately equal force upon both of them under the varying conditions above stated, and this is an important and particular feature on my invention.

Having thus given a general description of my invention, I will now in order to make the matter more clear refer to the annexed two sheets of drawings, which form part of this specification, and in which like figures and letters refer to like parts.

Figure 1 is a side elevation of part of the car-body and hopper, showing the hopper-doors in closed position. Fig. 2 is a vertical longitudinal sectional elevation on the line B B of Fig. 4, taken through one of the hoppers between the center sills and the side of the car, in which the hopper-doors are also closed. Fig. 3 is a vertical longitudinal sectional elevation on the line C C of Fig. 4, taken between the center sills and the adjacent hoppers, the hopper-doors being shown in open position. Fig. 4 is a vertical transverse sectional elevation on the line A A of Fig. 2.



Figs. 5 and 6 are diagrammatic views of the doors, individual chains, and winding-chain to which the individual chains are attached, showing how both the doors will be equally held in closed position, notwithstanding the fact that either one of the individual chains may be shorter or longer than the other.

Referring now to the various characters of reference upon the drawings, 1 is the side of the car-body, shown as a plate.

2 represents stiffening members of the side of the car-body, shown as angles.

3 represents the top flanges of the car-body, shown as angles.

4 is the end of the car-body, shown as a plate.

5 represents the stiffening members of the ends of the car-body, shown as angles, and 6 is the main floor covering of the car, shown as plates.

7 is the flat portion of the hopper-doors, shown as plates.

8 is a portion of the stiffening-frame of the hopper-door secured to the flat portion thereof, shown as angles.

9 represents connecting members consisting of rolled channels attached to and securing two adjacent doors together, also serving as stiffening members for the outer edges of said doors.

10 represents the door-hinges.

11 represents reinforcing members secured around the lower portion of the hopper, shown as angles, and 12 represents connection or eye plates secured to the connecting-channels 9.

One of the features of my improvement is the use of rolled-steel channels of commercial form for connecting the doors together, as this shape or section of material is one of the most economical when considering the stresses to which it is subjected. The material of a channel subjected to bending in a direction parallel with its web is so disposed as to offer a great resistance, owing to the economical distribution of the material in the web and flanges and is much better in this respect than an angle. This channel form of connecting member also has a further advantage in that the eye-plate for securing the chain thereto may be riveted directly to the back of the channel in an economical and efficient manner, the arrangement of parts being such that the rivets are in shear, which is the proper arrangement in accordance with good practice in this respect. This simple form of connecting member and eye-plate has the further advantage of being economical in construction, as the work of securing them together may be done by punching cold and riveting or bolting together after the usual manner of structural work, besides which the component parts are ordinary commercial shapes which can be readily and cheaply procured at all times.

13 represents the separate or individual chains, one of which is attached to each pair of doors by means of the eye-plate 12, said

individual or separate chains being merged in one winding-chain 14, as shown.

15 is an idler-sheave for the winding-chain 14.

16 is the shaft for the sheave 14.

17 represents bearings for the sheave-shaft 16, secured to the center members or sills 22.

19 is the winding-shaft for the chain 14.

18 is a ratchet-wheel secured to the ratchet-shaft 19.

20 is a pawl attached to the car side, as shown, for cooperating with and holding the ratchet-wheel and winding-shaft in position as desired, and 21 is a pawl-lock for securing the pawl 20 in closed position.

22 represents the center sills of the car-frame, shown in this case of two channels spaced a suitable distance apart with their flanges turned inward.

23 represents connections between the longitudinal sloping bottoms of the hopper and the center sills 22, shown as an angle.

24 represents connections between the longitudinal sloping bottoms of the hopper and the adjoining outer vertical sides of the same.

25 represents reinforcing members secured to the hinge sides of the hopper-doors, shown as angles.

26 represents reinforcing or strengthening members secured to the outside of the exterior sides 27 of the hopper, said reinforcing and strengthening members being shown as angles in this case.

27 represents the exterior sides of the hoppers, shown in this case as vertical plates, which are secured to the side channels 30 and to the other parts of the hopper, as shown.

28 represents other stiffening or reinforcing members for the inner sides of the hoppers secured to the said inner hopper sides 29 and to the other members, as shown, and 29 represents the inner sides of the hoppers, shown as plates secured to the center sills.

30 represents the lower side members of the car-body, shown as channels.

31 represents transverse members extending between the center sills and the lower side members of the car-body and connected thereto, as shown.

32 represents connections for securing the transverse members or channels 31 to the center sill 22, said connections being shown as angles.

33 represents the inclined bottoms of the hopper sloping longitudinally, as shown.

34 is a stiffening-diaphragm secured to and between the center sills 22 by means of the connections 35, and 36 represents the corner-angles of the car-body for stiffening the same and connecting the ends with the sides.

Referring now to Figs. 5 and 6, the former indicates how both the doors are firmly held in closed position, although the left-hand chain may be shorter on account of wear in the other chain or inaccurate adjustment of the chains, while Fig. 6 is a similar illustration in which the right-hand chain is the



shorter, and it will be seen upon reference to these figures that as long as the angle  $\alpha$  is less than one hundred and eighty degrees the winding-chain 14 will draw and tighten both the individual chains in a manner such as to hold both the doors tightly closed in spite of differences in the length or adjustments of the connections 13.

On referring to Fig. 4 it will be seen that the outer sides 27 of the hopper are secured to the side channels 30 by means of horizontal flanges 37, formed integral with said plates 27, which horizontal flanges rest on top of and are secured to the upper flanges of the channels 30. I may also provide another flange 39 on the plate 27, extending upward in a vertical direction, as indicated in Fig. 1, and at the right-hand portion of Fig. 4, for the purpose of securing a direct connection between the hopper side plates 27 and the car sides 1, as shown.

On reference to Fig. 2 the longitudinally-sloping bottoms of the hopper consisting of the plates 33 are provided with flanges 38 at their upper edges, which flanges rest on and are secured to the transverse members 31, as shown.

Although I have shown certain of my improvements in considerable detail, I do not limit myself to the exact and definite particulars of the construction, arrangement, or sections shown and described, but may use such substitutions and modifications or equivalents thereof as are embraced within the scope of my invention and as pointed out in the claims.

Having thus given a description of my invention, what I desire to secure by Letters Patent is—

1. In a metallic car, a hopper having the general outline of an inverted frustum of a wedge, the sloping sides of which extend transversely of the car, said sloping sides being directly attached to the webs of the channel-shaped center sills and to the adjoining vertical sides of said hopper by angle connections.

2. In a metallic car, a hopper having the general outline of an inverted frustum of a wedge, the sloping sides of which extend transversely of the car, said sloping sides being directly attached to the webs of the channel-shaped center sills and to the adjoining vertical sides of said hopper by angle connections, the outer vertical side of said hopper being secured to the car side by a flange formed integral with said vertical side.

3. In a metallic car, a hopper having the general outline of an inverted frustum of a wedge, the sloping sides of which extend transversely of the car, said sloping sides being directly attached to the webs of the channel-shaped center sills and to the adjoining vertical sides of said hopper by angle connections, the outer vertical side of said hopper being secured to the car side by a flange formed integral with said vertical side, the

inner vertical side of said hopper being secured directly to the lower portion of the center sill.

4. In a metallic car provided with center sills and transverse members extending between the car sides and said center sills, a hopper having the general form of an inverted frustum of a wedge, the sloping sides of which are arranged transversely of the car, said sloping sides being directly attached to the webs of the channel-shaped center sills and to the adjoining vertical hopper sides by angle connections and to the transverse members by flanges formed integral with said sloping sides.

5. In a metallic car provided with center sills, a hopper having the general form of an inverted frustum of a wedge, the sloping sides of which are arranged transversely of the car, said sloping sides being directly attached to the webs of the channel-shaped center sills and to the adjoining vertical sides of said hopper by angle connections, transverse members extending between said center sills and the car side, and flanges, formed integral with said sloping sides, resting on and secured to the said transverse members.

6. In a metallic car provided with center sills, a hopper having the general outline of an inverted frustum of a wedge, the sloping sides of which extend transversely of the car and are secured directly to the adjoining portions of said hopper by means of angle connections, an inner vertical side secured directly to the lower part of the web of said center sill, and an outer side secured to the car side by means of flanges formed integral with said outer side.

7. In a metallic car provided with channel center sills and lower side channels, a hopper having the general outline of an inverted frustum of a wedge, the sloping sides of which extend transversely of the car, an inner vertical side secured directly to the lower part of the web of said channel center sill, an outer vertical side provided with a flange formed integral therewith, said flange resting on top of and secured to the lower side channel aforesaid.

8. In a metallic car provided with center sills of channel form and channels arranged at the bottom of the car sides; a hopper having the general form of an inverted frustum of a wedge, the inner vertical side plate of said hopper being attached directly to the lower portion of the web of said channel center sill, the outer vertical side plate of said hopper being provided with a flange, formed integral therewith, resting upon and directly secured to said side channel.

9. In a metallic car provided with center sills of channel form and channels arranged at the bottom of the car sides; a hopper having the general form of an inverted frustum of a wedge, the inner vertical side plate of said hopper being attached directly to the lower portion of the web of said channel center sill,



the outer vertical side plate of said hopper being provided with a horizontal and a vertical flange formed integral therewith, said horizontal flange resting upon the side channel, said vertical flange being secured to the adjoining car side.

10. In a metallic car, a hopper composed of plates and angles constructed in the form of an inverted frustum of a wedge, the sloping sides of which extend transversely of the car, said sloping sides being directly attached to the webs of the channel-shaped center sills and to the adjoining vertical sides of said hopper by means of angle connections, said hopper being provided with a strengthening and reinforcing angle secured around the lower edge thereof.

11. In a hopper-car, two pairs of oppositely-hinged doors, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, and means for operating the winding-chain aforesaid.

12. In a hopper-car, two pairs of oppositely-hinged doors, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, an idler-sheave mounted on the car-framing above said doors, a winding-shaft arranged below the car-floor, and means for operating said winding-shaft.

13. In a hopper-car provided with a pair of center sills arranged below the floor thereof, two pairs of oppositely-hinged doors, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, an idler-sheave mounted between said center sills and below the car-floor, a winding-shaft arranged below said car-floor, and means for operating said winding-shaft.

14. In a hopper-car provided with a pair of center sills arranged below the floor thereof, two pairs of oppositely-hinged doors, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, an idler-sheave mounted between said center sills, a winding-shaft arranged below said car-floor, and means for operating and locking said winding-shaft.

15. In a hopper-car, two pairs of oppositely-hinged doors, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted

or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, and means for operating the winding-chain aforesaid.

16. In a hopper-car, two pairs of oppositely-hinged doors, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, an idler-sheave mounted on the car-framing above said doors, a winding-shaft arranged below the car-floor, and means for operating said winding-shaft.

17. In a hopper-car provided with a pair of center sills arranged below the floor thereof, two pairs of oppositely-hinged doors, a connecting-channel secured to the adjacent doors of each pair, an eye-plate riveted or bolted to the back of said channel, a separate chain attached by means of said eye-plate to each connecting-channel intermediate of the doors, a single winding-chain attached, by a ring or link, to and joining the ends of said separate chains, an idler-sheave mounted between said center sills and below the car-floor, a winding-shaft arranged below said car-floor and means for operating the same.

18. In a hopper-car provided with a pair of center sills arranged below the main floor thereof, two pairs of oppositely-hinged doors, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, an idler-sheave mounted between said center sills, a winding-shaft arranged below said car-floor, and means for operating and locking said winding-shaft.

19. In a hopper-car, two hoppers each having the general outline of an inverted frustum of a wedge, said hoppers being located on opposite sides of the longitudinal center line of the car, a pair of oppositely-hinged double doors for each hopper, a connecting-channel secured to the adjacent doors of each pair, an eye-plate riveted or bolted to the back of said channel, an individual chain attached by means of said eye-plate to each connecting-channel intermediate of the doors, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, and means for operating the winding-chain aforesaid.

20. In a hopper-car, two hoppers each having the general outline of an inverted frustum of a wedge, said hoppers being located on the opposite sides of the longitudinal center line of the car, a pair of oppositely-hinged double doors for each hopper, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-



channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, an idler-sheave mounted on the car-framing above said doors, a winding-shaft arranged below the car-floor and means for operating said winding-shaft.

21. In a hopper-car, provided with a pair of center sills arranged below the floor thereof, two hoppers each having the general outline of an inverted frustum of a wedge, said hoppers being located on opposite sides of the center sills, a pair of oppositely-hinged double doors for each hopper, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, an idler-sheave mounted between said center sills and below the car-floor, a winding-shaft arranged below said car-floor and means for operating the same.

22. In a hopper-car, provided with a pair

of center sills arranged below the floor thereof, two hoppers each having the general outline of an inverted frustum of a wedge, said hoppers being located on opposite sides of said center sills, a pair of oppositely-hinged double doors for each hopper, a connecting-channel secured to the adjacent doors of each pair, an individual chain attached to an eye-plate riveted or bolted to the back of each connecting-channel, a single winding-chain attached, by a ring or link, to and joining the ends of said individual chains, an idler-sheave mounted between said center sills, a winding-shaft arranged below said car-floor, and means for operating and locking said winding-shaft.

In testimony whereof I hereto affix my signature in the presence of two witnesses.

RALPH V. SAGE.

Witnesses:

J. R. WEMLINGER,  
HERBERT LUEBBERT.