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PATENTED MAR. 22, 1904.

C. A. LINDSTRÖM & A. STUCKI.  
STEEL FRAME BOX CAR.

APPLICATION FILED OCT. 21, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 2.

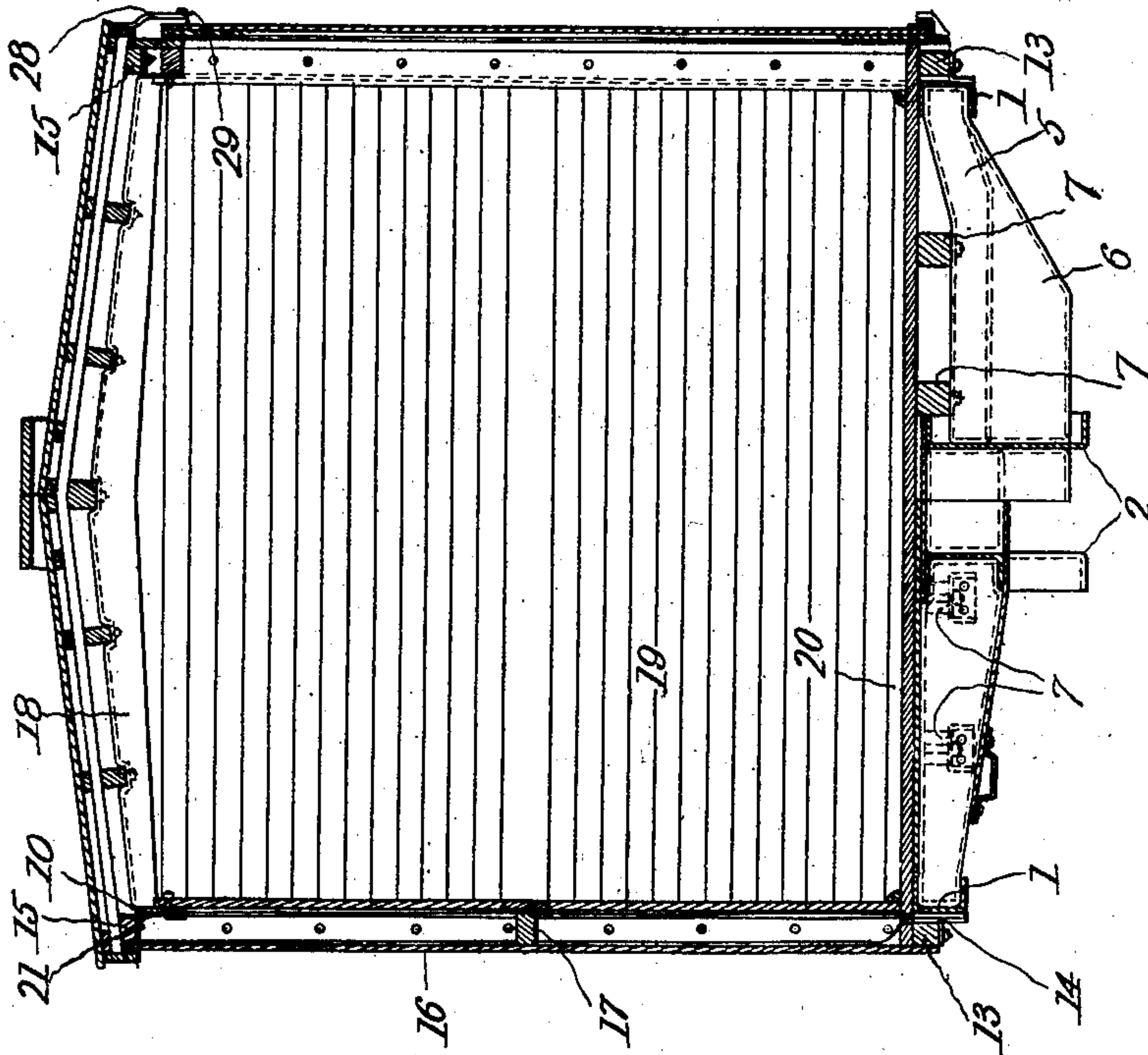
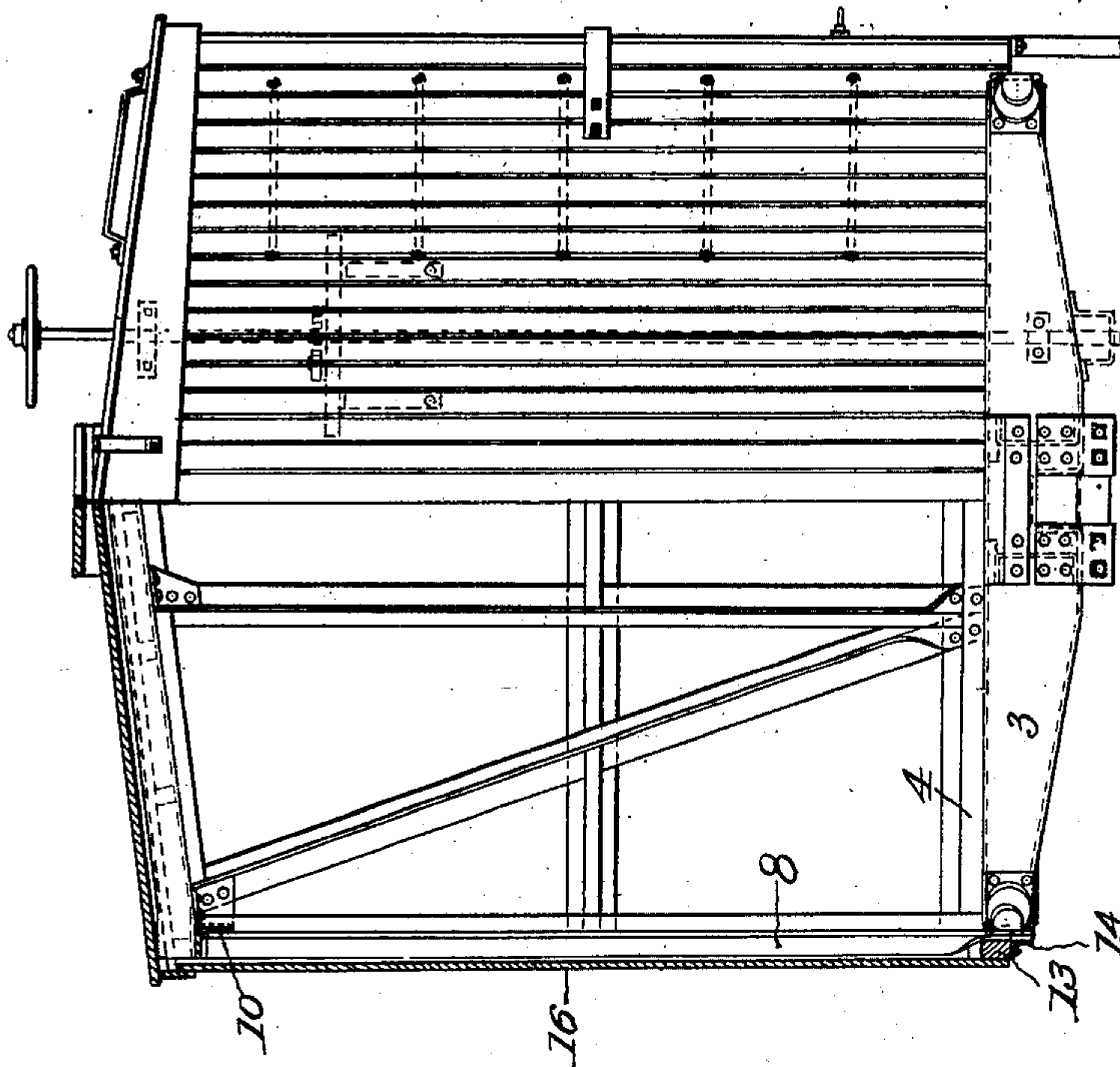


Fig. 1.



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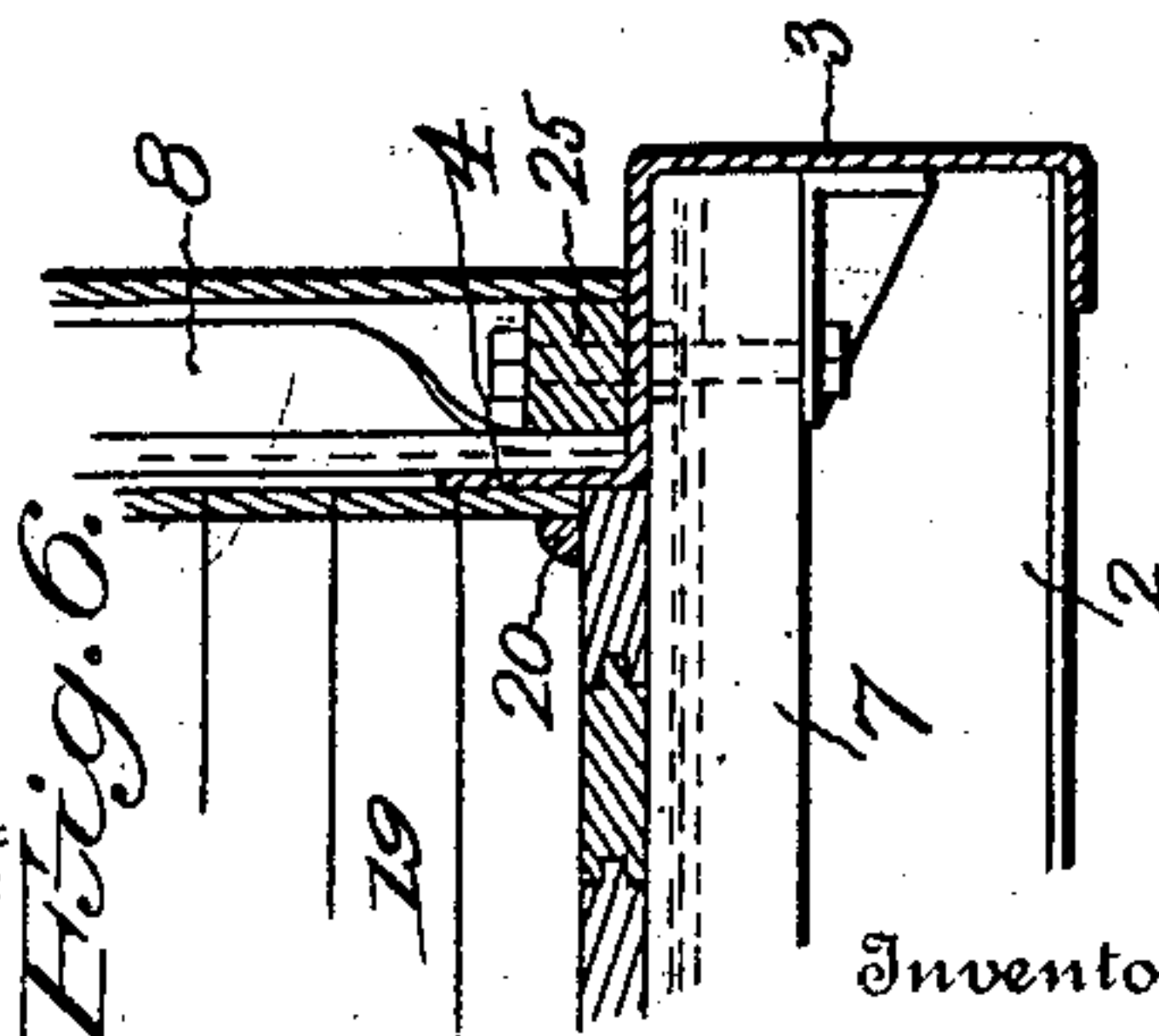
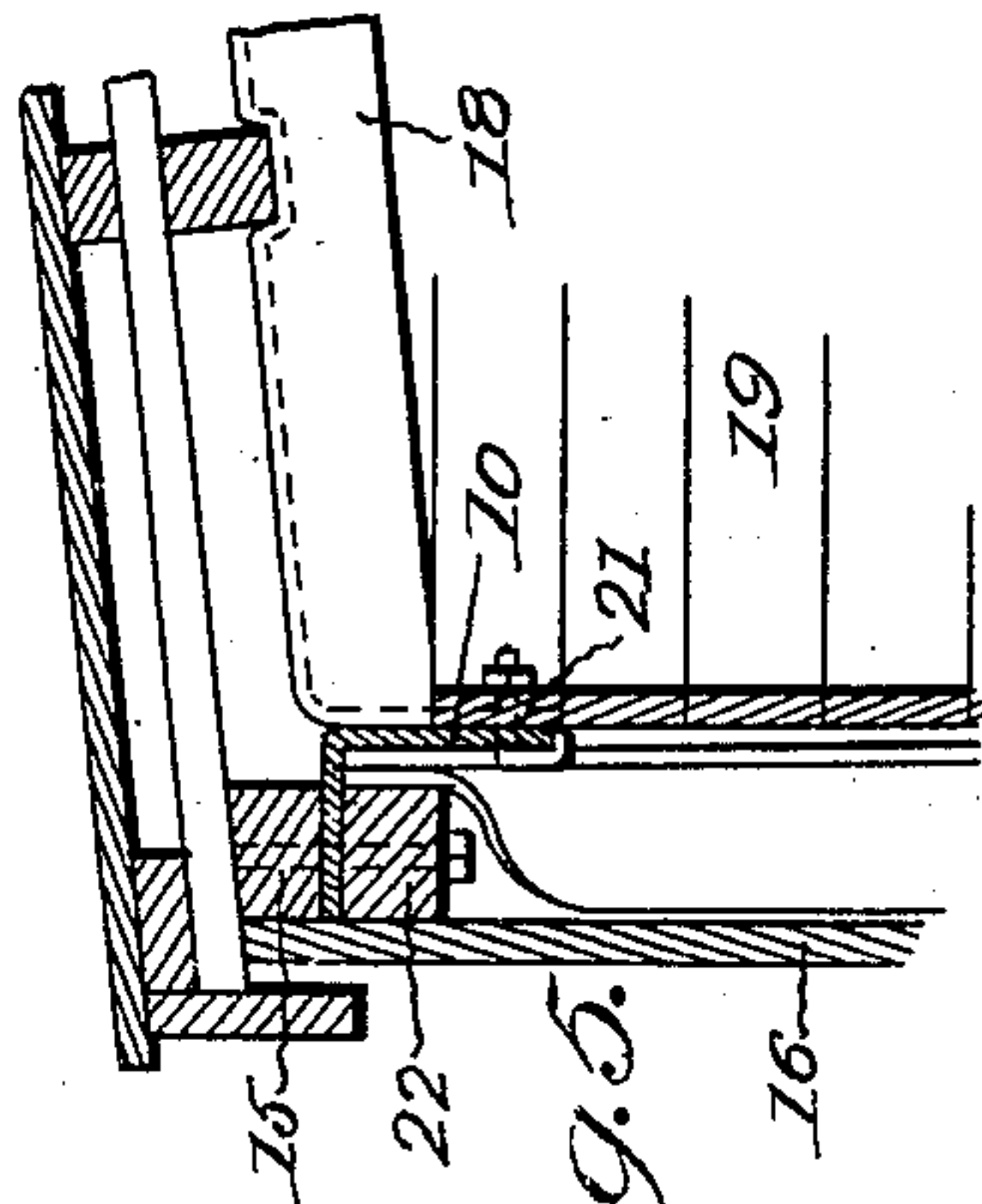
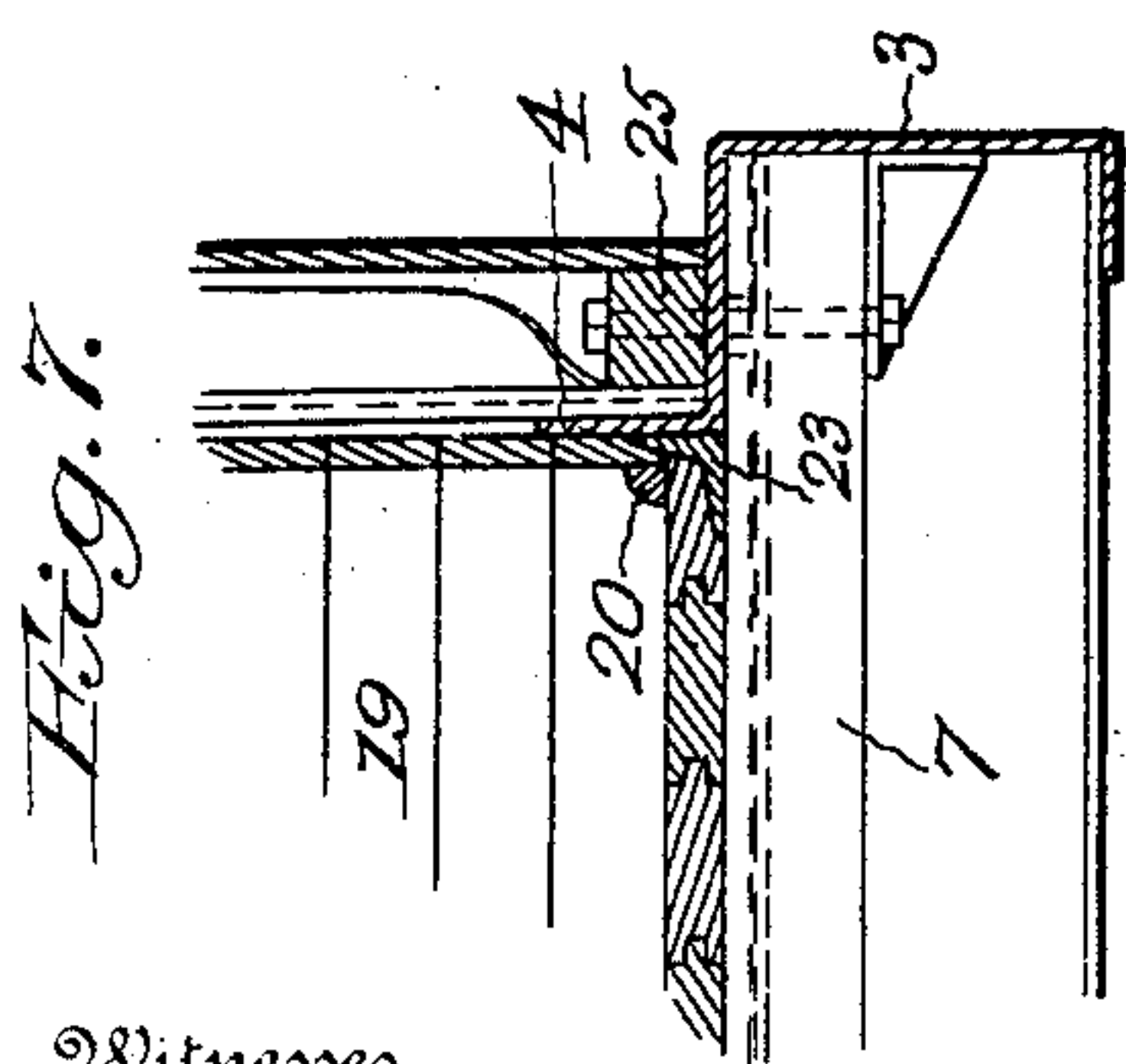
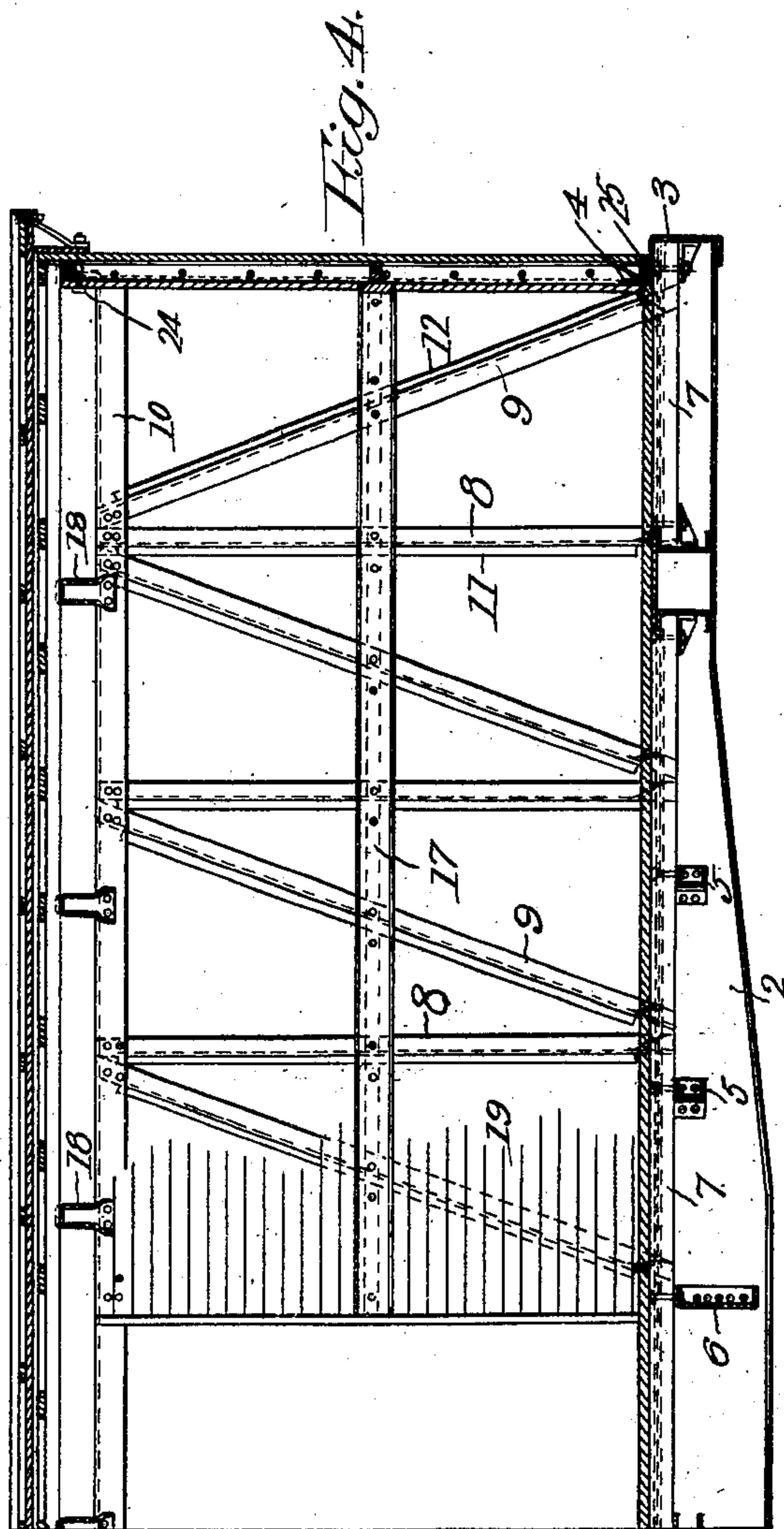
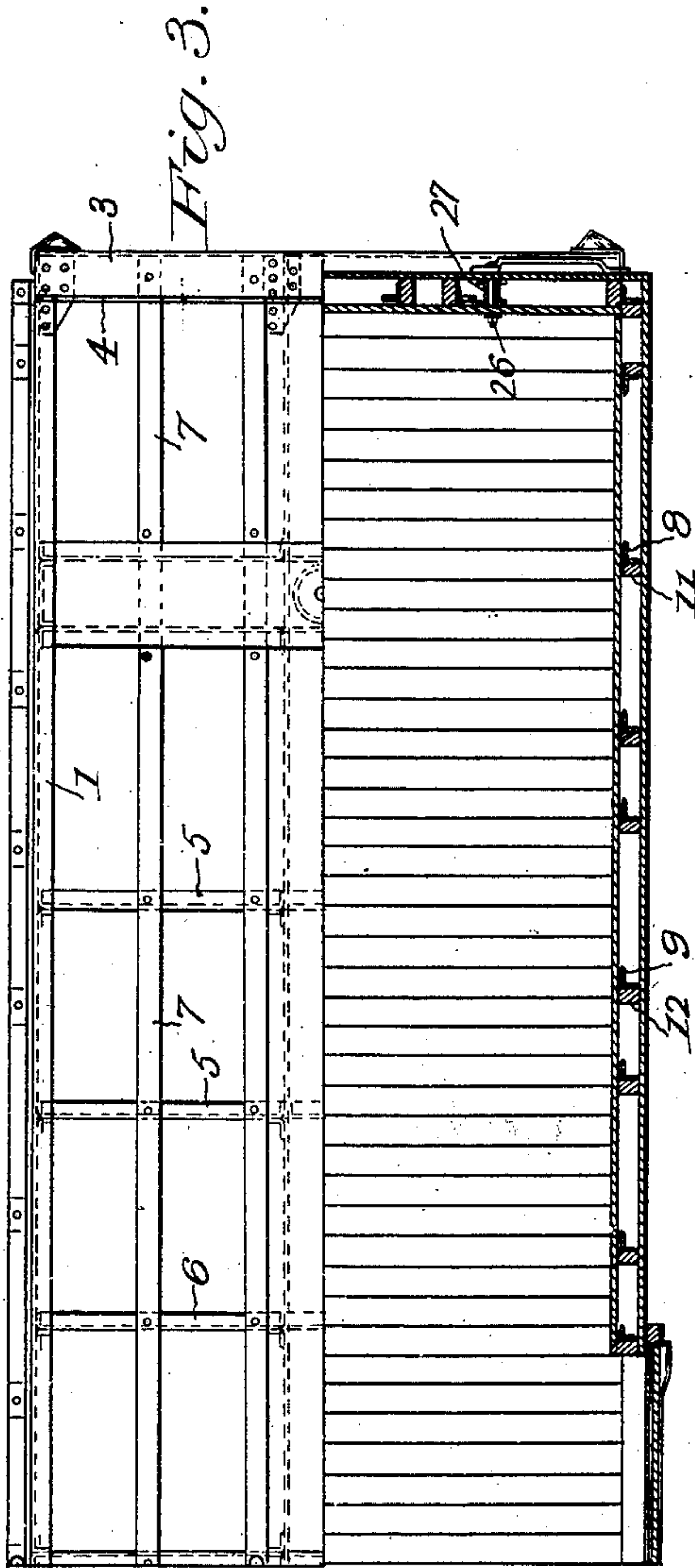
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2 SHEETS—SHEET 2.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## STEEL-FRAME BOX-CAR.

SPECIFICATION forming part of Letters Patent No. 755,022, dated March 22, 1904.

Application filed October 21, 1902. Serial No. 128,156. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES A. LINDSTRÖM and ARNOLD STUCKI, citizens of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Steel-Frame Box-Cars, of which the following is a full, clear, and exact description.

The object of this invention is to provide a box-car with a steel underframe, steel upper-framing, and a floor, lining, and siding of wood, and thereby to effect an increased stiffness without increasing the weight as compared with the ordinary wooden car construction using a steel underframe and to reduce the cost of maintenance.

In carrying out the invention any suitable steel "underframe," so called, may be employed, and for our purpose we prefer to use side sills of uniform cross-section and bellied center sills, framed together with bolsters, offset transoms, and end sills which are provided with vertical flanges adapted to enter between the lining and siding of the ends and to receive the lower nailing-strips. The side sills receive the nailing-strips, and between the side sills and said nailing-strips are erected vertical posts of metal and also braces of metal, and these posts and braces are secured to angle-bars at the top of the car. The posts and braces support the nailing-strips to which the lining and siding are secured. Similar posts and braces are applied to the ends of the car. The side angle-bars support purlins and also the carlines. Care in every case is exercised to avoid external projections and to make the outside water-tight and the inside proof against leakage or waste of lading. The grab-irons and ladder-rungs are bolted through the siding and lining, and thimbles are interposed between the siding and lining in order to reinforce the parts through which the grab-iron bolts and ladder-rung bolts pass in order to reinforce the car at these points.

The invention consists of the features above mentioned singly and in combination, sub-

stantially as we will proceed now particularly to set forth and finally claim.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated; Figure 1 is an end elevation with the siding at the left-hand side removed. Fig. 2 is a vertical cross-section, the right-hand half being taken substantially in the plane of the doorway and the left-hand half being taken substantially in front of the bolster. Fig. 3 is a plan view of half of the car, the upper portion being taken in the plane of the underframe and the lower portion being in a plane just above the floor. Fig. 4 is a central vertical longitudinal section. Fig. 5 is a vertical cross-section of an upper corner at the roof, illustrating a modification. Fig. 6 is a cross-section of one corner of the end-sill construction. Fig. 7 is a view similar to Fig. 6, illustrating a modification.

In the preferred construction the side sills 1 are of uniform height in cross-section throughout their entire length and are in the shape of a channel made of pressed steel of commercial shapes or simply of a plate with angle-bars at top and bottom. The center sills 2 may be of any approved construction and are here shown as bellied. These sills 1 and 2 are connected by end sills 3, which have vertical flanges 4 rising from them and concealed between the lining and siding. These sills are further connected by cross-pieces 5 and 6, respectively, which are variously called "diaphragms," "transoms," "bearers," and the like, but which for the sake of uniformity are herein designated "transoms," and these transoms may be produced similarly to the sills, with flanges on all four edges. As clearly indicated in Fig. 2, these transoms are offset from the side sills, and the transoms 6, which are arranged beneath the door-posts, are of considerably greater depth between the side sills and the center sills than the transoms 5 in order the more efficiently to resist the strains to which the car is subjected at this point. The offset-



ting of the transoms is practiced in order to permit them to receive wooden stringers 7, upon which the flooring is nailed, so as to have the flooring rest on the upper flanges of the side sills and the tops of these wooden stringers. The ends of the stringers are supported on brackets on the adjacent sides of the bolsters and end sills, as plainly seen in Figs. 2, 4, 6, and 7.

10 An underframe constructed as just described is, as already stated, the preferred construction; but the invention is not limited to this one form of underframe.

15 The side posts 8 and the braces 9 are secured at their lower ends directly to the side sills and at their upper ends to angle side plates 10. These posts and braces may be made of metal in the form of angles or of T, Z, or other section, as may be desired, and wooden nailing-strips 11 and 12 applied to them.

20 Outside the lower ends of the posts and braces side stringers 13 are applied to the side sills upon any suitable brackets 14, projecting laterally therefrom. On the horizontal flanges of the side plates 10 are arranged purlins 15, and the stringers 13 and the purlins 15 serve to receive the siding 16, although intermediate timbers 17 may also be used to receive the nails employed for fastening on the siding.

30 The carlines 18 are of pressed steel, with a profile substantially such as shown in Fig. 2 to receive the purlins and of a cross-section substantially such as shown in Fig. 4, and these carlines are connected with the side plates by rivets or by any other appropriate means.

35 The lining 19 is nailed to the uprights 11 and 12 and to similar uprights in the ends of the car, and the joint between the floor and the lining is made secure by the use of quarter-round finishing-strips 20, so as to avoid all possibility of any grain or similar lading working in between the lining and the siding.

40 As indicated at 21 in Fig. 5, the top boards of the lining may be bolted directly to the angle-plate, thus preventing any part of the lading from entering between the lining and the sheathing or siding.

45 As shown in Figs. 2 and 5, the outside purlins 15 are erected above the horizontal flanges of the side plates; but, as also shown in Fig. 5, an extra nailing-strip 22 may be bolted to the under side of this horizontal flange in order to afford nailing facilities for the sheathing or siding, or this so-called "extra nailing-strip" may take the place of the outside purlin 15.

50 The floor-boards at the end of the car rest in the usual way upon the stringers; but in case of necessity angle-bars 23, Fig. 7, may be riveted to the inside of the upturned flanges of the end sills for the support of the floor.

60 The construction of the top of the car at the ends is similar to the construction at the sides, excepting that the nailing-strips 24 are placed below the angles, so as to give room

for the purlins at the top; but this construction may be varied as desired.

The lining at the ends is held in place by fascia-boards running clear across the car and beneath the roof, and these fascia-boards may be bolted to the vertical flanges of the end-plate angles, and thus a very neat finish secured.

In order to secure the lining at the ends, holes must be punched in the vertical flanges of the end sills for the passage therethrough of the nails into the wooden members 25.

The grab-irons and ladder-rungs are fastened by means of bolts, such as shown at 26, running through the lining and siding; but instead of using expensive cripple-posts we introduce malleable-iron thimbles 27 between the lining and siding, and hence the pull on the irons will be taken on the lining, and thus the irons will be reinforced against danger of being pulled off.

Any kind of roof and any kind of side doors may be used; but it is preferred to provide a pressed-steel hood 28 for each door substantially of the shape shown in Fig. 2 and having its lower edge reinforced by means of a half-round section 29 of metal.

A riveted upper structure such as hereinabove described admits of the use of very light side plates and very light side sills and effectually does away with shrinkages which produce rattling and wear in the ordinary wooden cars, and these advantages are obtained without sacrificing the advantages of the wooden car.

The side posts and braces perform four important functions, namely:

First. They form part of a truss, and thus carry part of the load; but on account of the nature of their material and the manner in which they are joined to the underframe the strain in the upper structure ceases when the load is removed. The braces and posts on wooden cars are subject to an internal strain by undue tightening up of the rods, which overtaxes the different members and causes them to relax and get out of position in a very short time.

Second. They prevent the bulging of the sides of the car, the angle-irons of whatever cross-sectional shape being very efficient to this end.

Third. They keep the car square when passing around curves, and in this respect the riveted construction is much superior to those constructions in which wooden posts are set in pockets, since in the latter construction the posts decay very rapidly and the rocking of the car soon loosens the sheathing-boards.

Fourth. By fastening down the posts and braces between the side sills proper and the side stringers continuous side stringers may be applied, and these are almost absolutely necessary in order to properly nail the siding or sheathing, and since the flooring is supported



ported by the horizontal flanges of the side sills the side stringers serve merely as nailing-strips, carry no load, and consequently can be made very light. This feature is important also in that it permits the joining together of the steel structure with the wooden siding and the lining.

In the present construction and by reason of the assistance of the upper structure the side sills do not carry all of the load, but serve as tension members of trusses, each side being a truss, and by reason of this construction there is no real necessity for bellying the side sills. The side plates serve as compression members of these trusses and can be made of very light material.

The nailing-strips on the posts and braces are quite light in section, extend from top to bottom, and are made wide enough to give a good bearing-surface between the lining, siding, and strips.

In the wooden car construction trouble frequently arises from the pressing of the grain against the outside siding, and when the car begins to work laterally the grain enters between the side sills and the lining with a wedge-like action, tending to pull the siding away from the stringers, and thus losing the grain, and it frequently happens that such cars, after having been used for some time, cannot be loaded again without renailing the siding, and as a result the siding is destroyed in a comparatively short time. In our construction the nails which hold the siding have nothing at all to do with retaining the load in the car, but serve merely to keep the car weather-tight.

The cross-bearers perform the useful functions of keeping the car together at the center and of transferring the strains on the structure from the center stringers to the side trusses, or vice versa.

In the end construction the posts and braces are so arranged near the center of the car that they will assist each other in resisting end shocks due to shifting of the lading, and the trouble existing in wooden cars due to splitting of subsills will be largely obviated by our construction.

The construction of the end sills with their flanges turned upward behind the end posts and braces (see particularly Fig. 6) permits of the introduction of continuous nailing-strips for the nailing of the end siding, and these upturned flanges also prevent the possibility of any water which may get under the end sheathing from entering the car. It is to be noted, further, that all external projections on the body of the car are obviated, and thus one source of decay by catching the elements, especially rain and snow, is removed, and, moreover, the painting of the car is facilitated.

While we prefer to construct our steel-frame box-car in accordance with the speci-

fied details, yet obviously departures may be made therefrom within the scope of the invention, and, moreover, some portions of the invention are applicable to other forms of cars.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A box-car, having a so-called steel underframe including side sills, a superstructure comprising metallic side plates, posts and braces connecting the side plates and the side sills, and of angular cross-section, nailing-strips applied to said posts, and longitudinal stringers applied to the side sills, and lining and sheathing applied on opposite sides of the posts and braces respectively and inclosing said posts and braces, substantially as described.

2. In a steel-frame box-car, an underframe having end sills with vertically-projecting inner flanges rising above the underframe, combined with a superstructure having end posts and braces applied to said flanges, nailing-strips applied to the posts and braces, and lining and sheathing applied to opposite sides of the nailing-strips and inclosing the posts, braces, nailing-strips and flanges.

3. In a steel-frame box-car, the combination of an underframe, a wooden superstructure including a lining, end sills, and angle-bars interposed between the end sills, flooring and lining.

4. In a steel-frame box-car, an underframe having offset transoms adjacent the door-posts, the said offset transoms being widest at the center sills with which they are connected.

5. In a box-car, an underframe comprising side sills of substantially uniform cross-section throughout, bellied center sills, and transoms arranged opposite the door-posts and of greatest width next the center sills.

6. In a box-car, the combination with grab-irons, ladder-rungs and the like, of thimbles interposed between the lining and siding and receiving the bolts for fastening the said irons, substantially as described.

7. A steel-frame box-car, having an underframe, a superstructure provided with angular side plates, posts and braces rigidly secured to the side sills of the underframe and to the said side plates in compression, the said posts and braces being of angular cross-section, and supplied with nailing-strips to receive the lining and sheathing and serving to prevent the bulging out of the sides of the car, substantially as described.

In testimony whereof we have hereunto set our hands this 8th day of October, A. D. 1902.

CHARLES A. LINDSTRÖM.  
ARNOLD STUCKI.

Witnesses:

J. C. LANGFITT,  
W. L. CARR.