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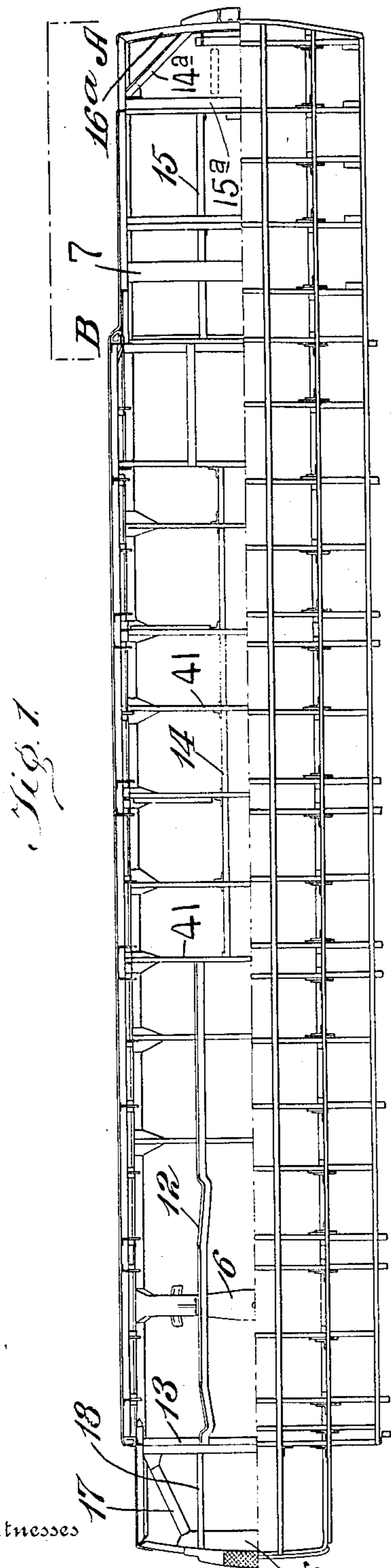
PATENTED JULY 10, 1906.

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RAILWAY CAR.

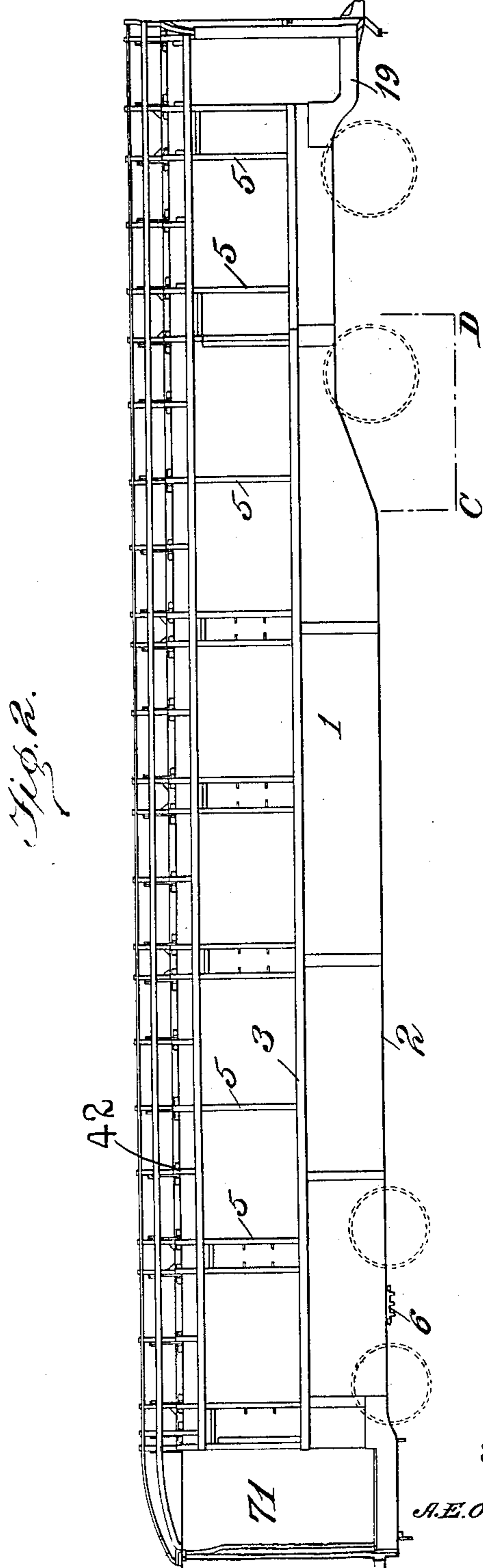
APPLICATION FILED NOV. 4, 1905.

13 SHEETS—SHEET 1.



Witnesses

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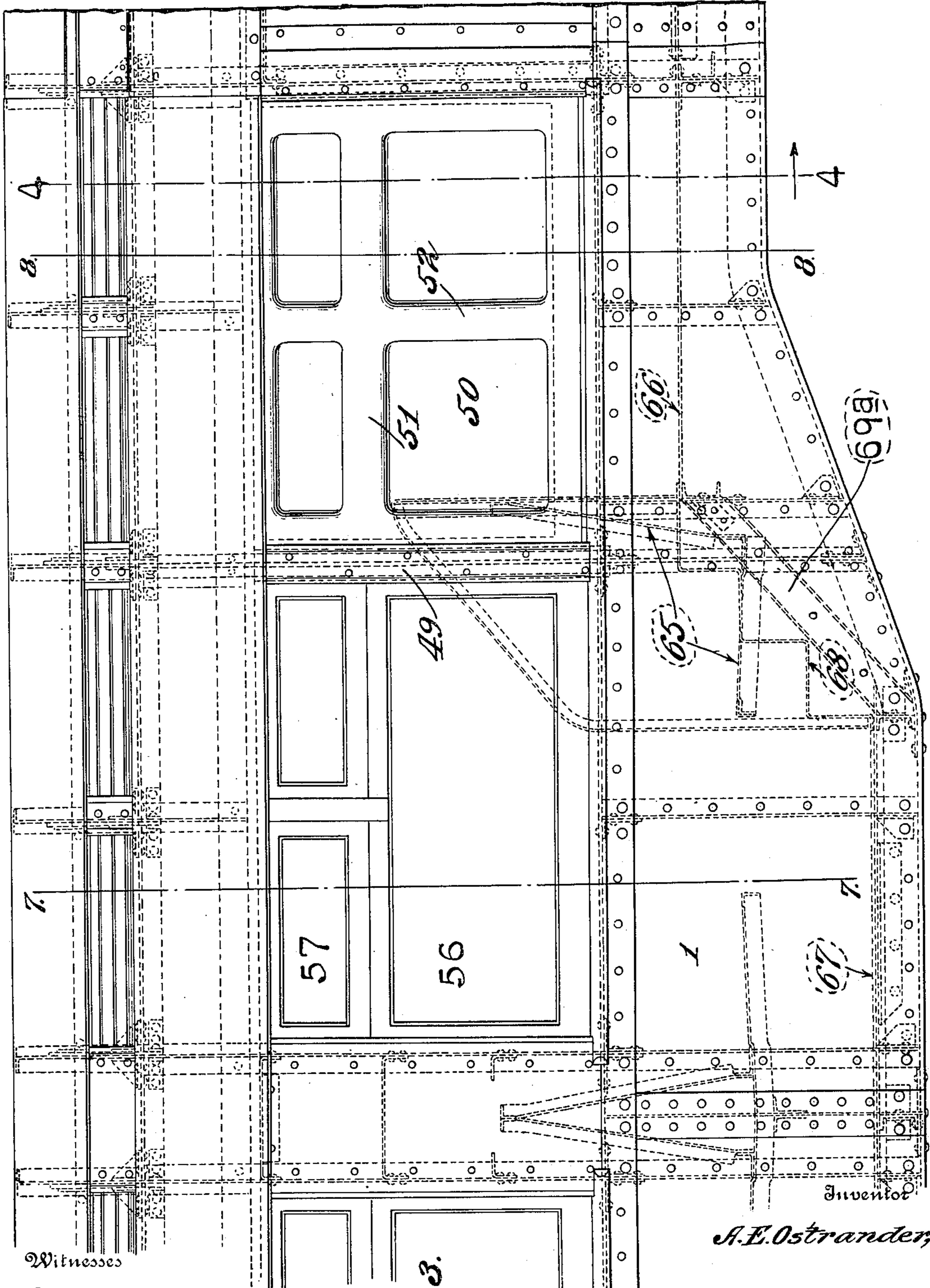
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13 SHEETS—SHEET 2.



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Fig. 3.

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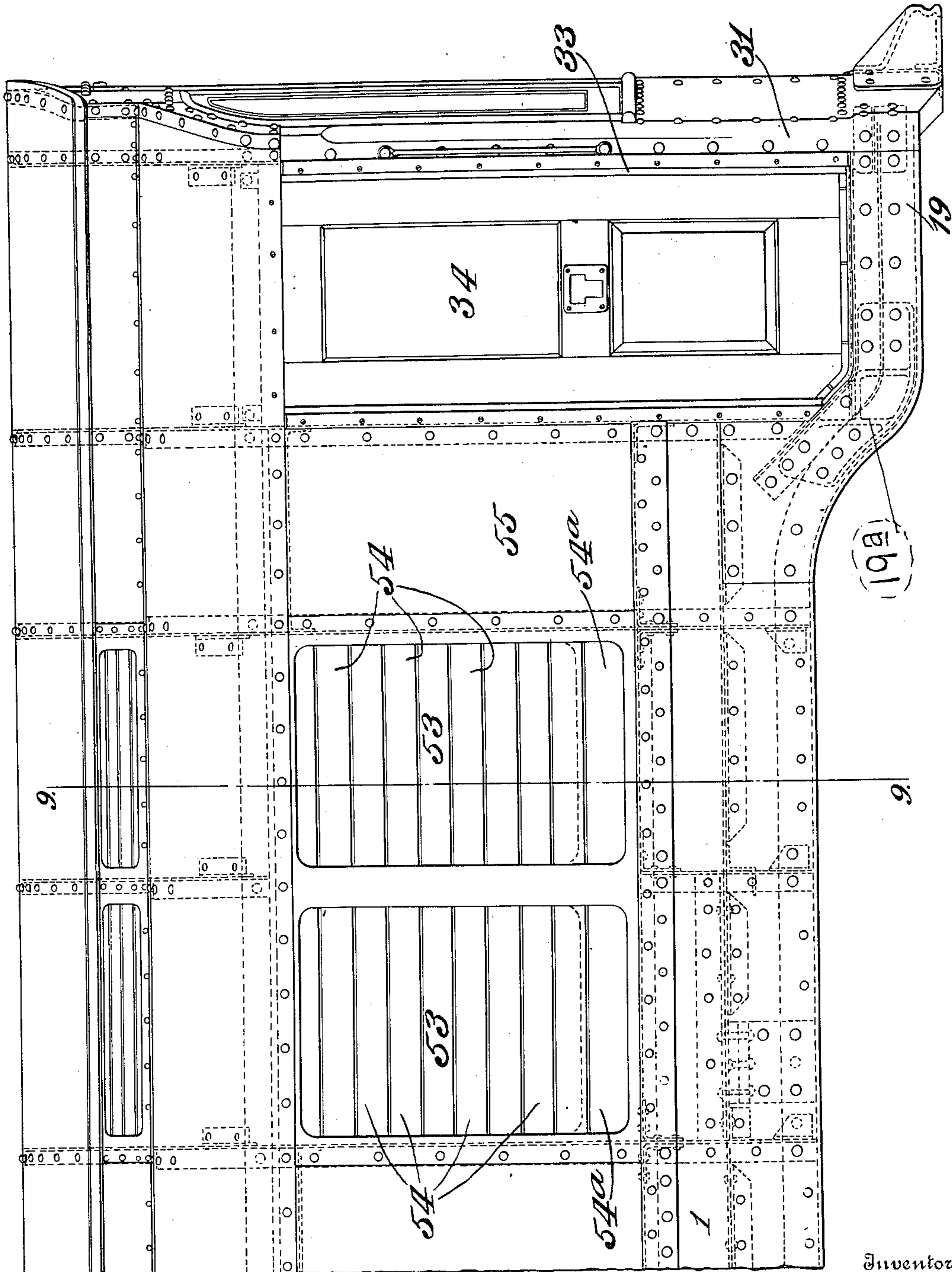
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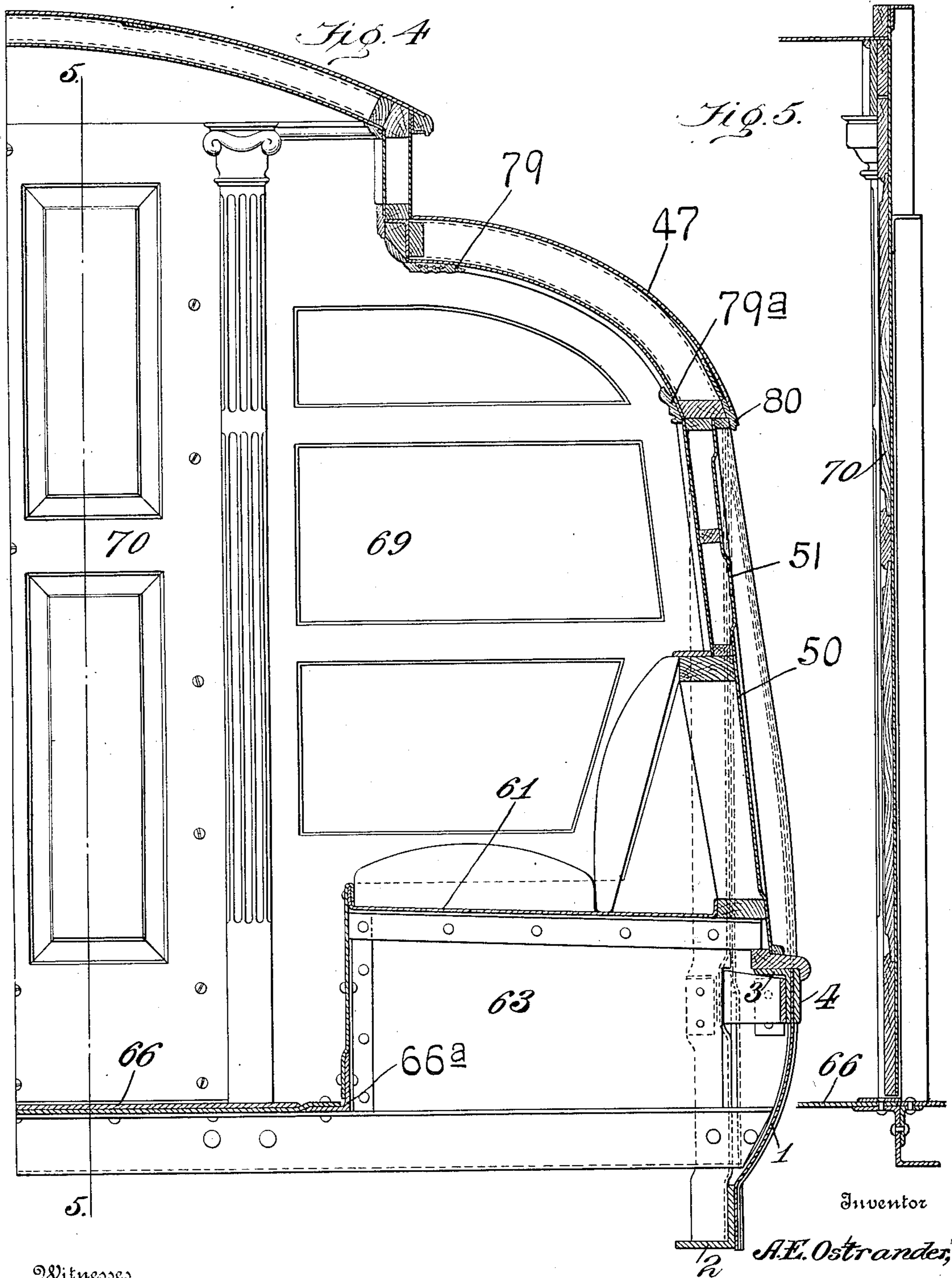
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13 SHEETS—SHEET 4.



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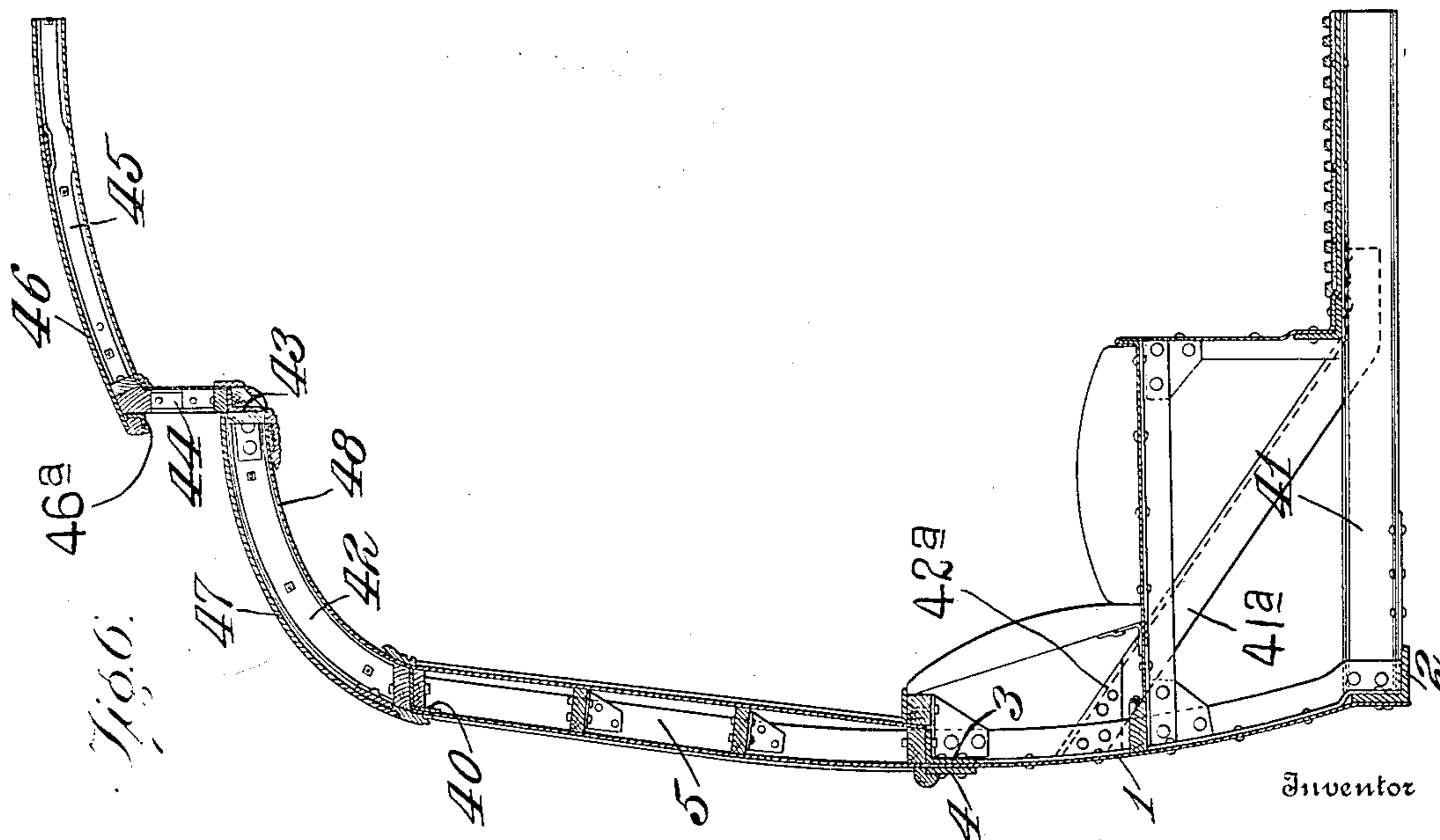
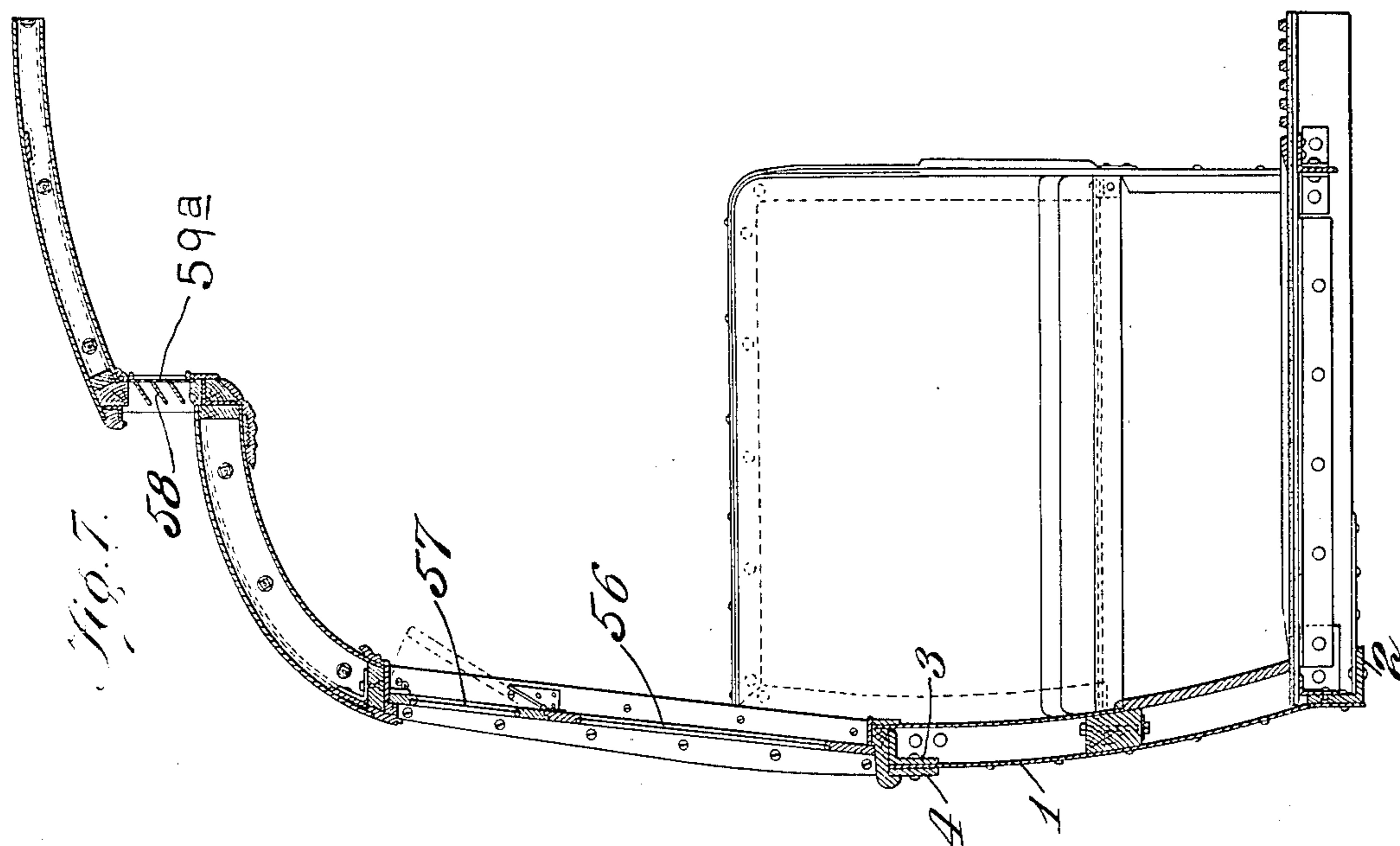
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13 SHEETS—SHEET 5.



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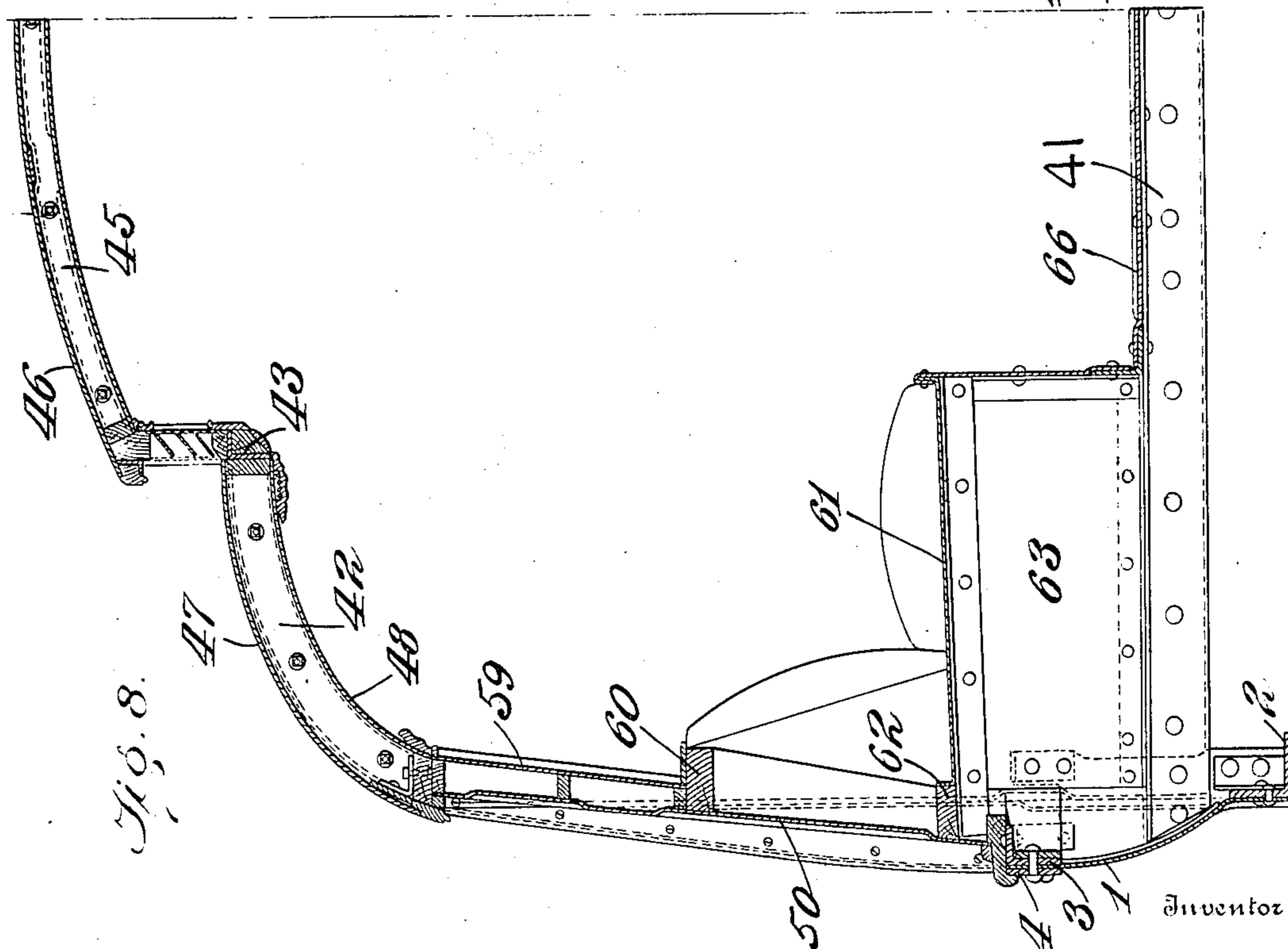
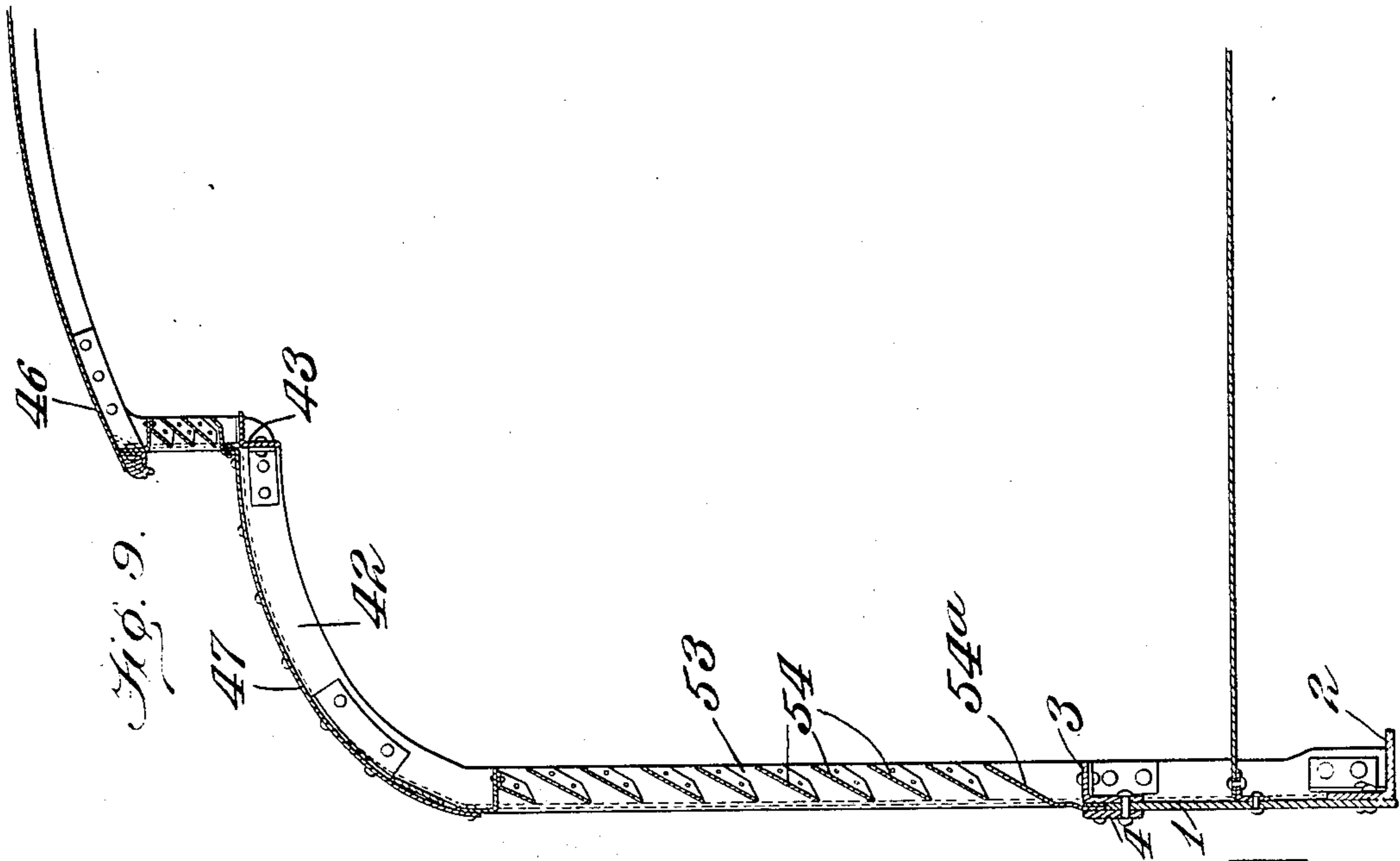
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13 SHEETS—SHEET 6.



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13 SHEETS—SHEET 7.

Fig. 10.

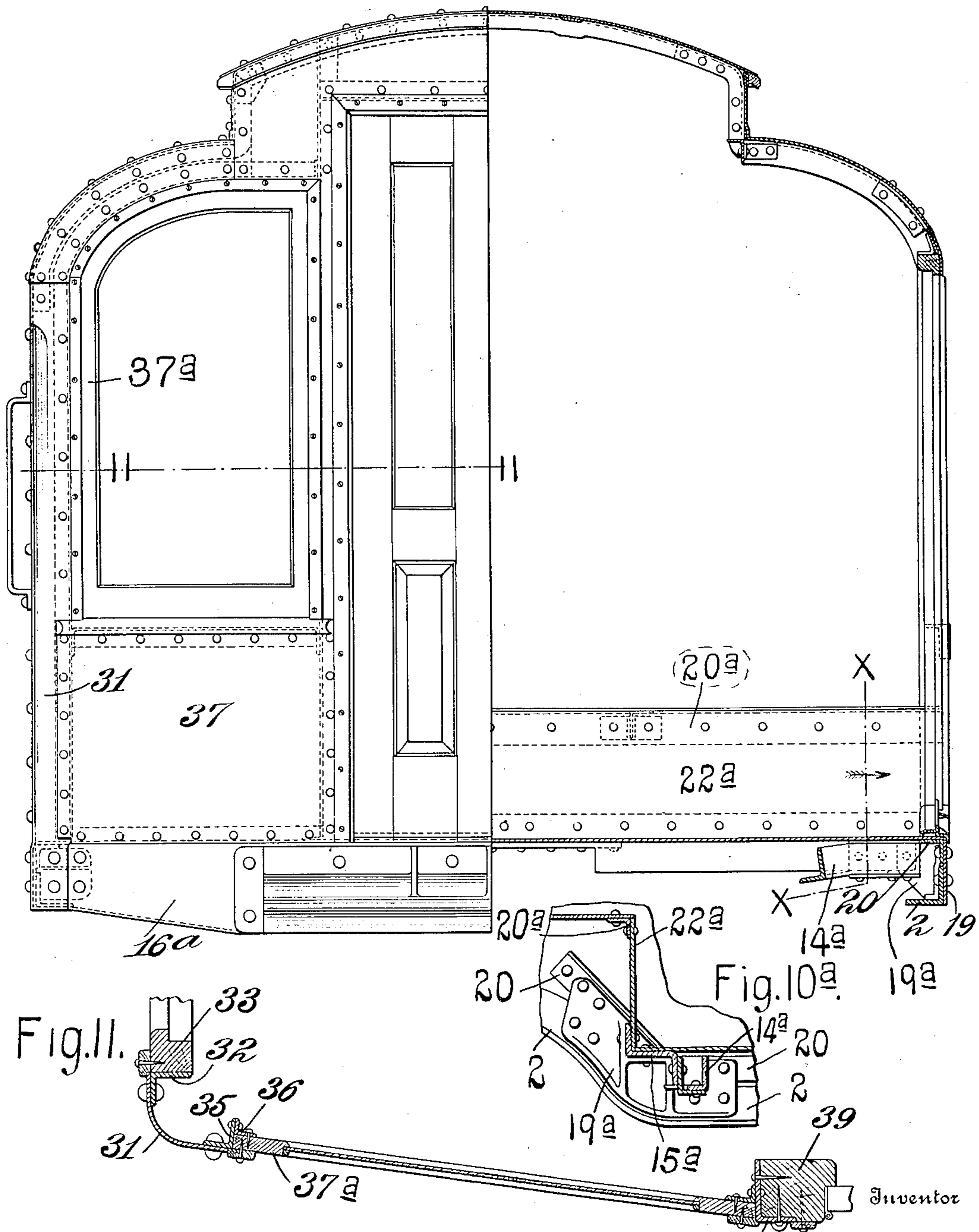


Fig. 11.

Fig. 10a.

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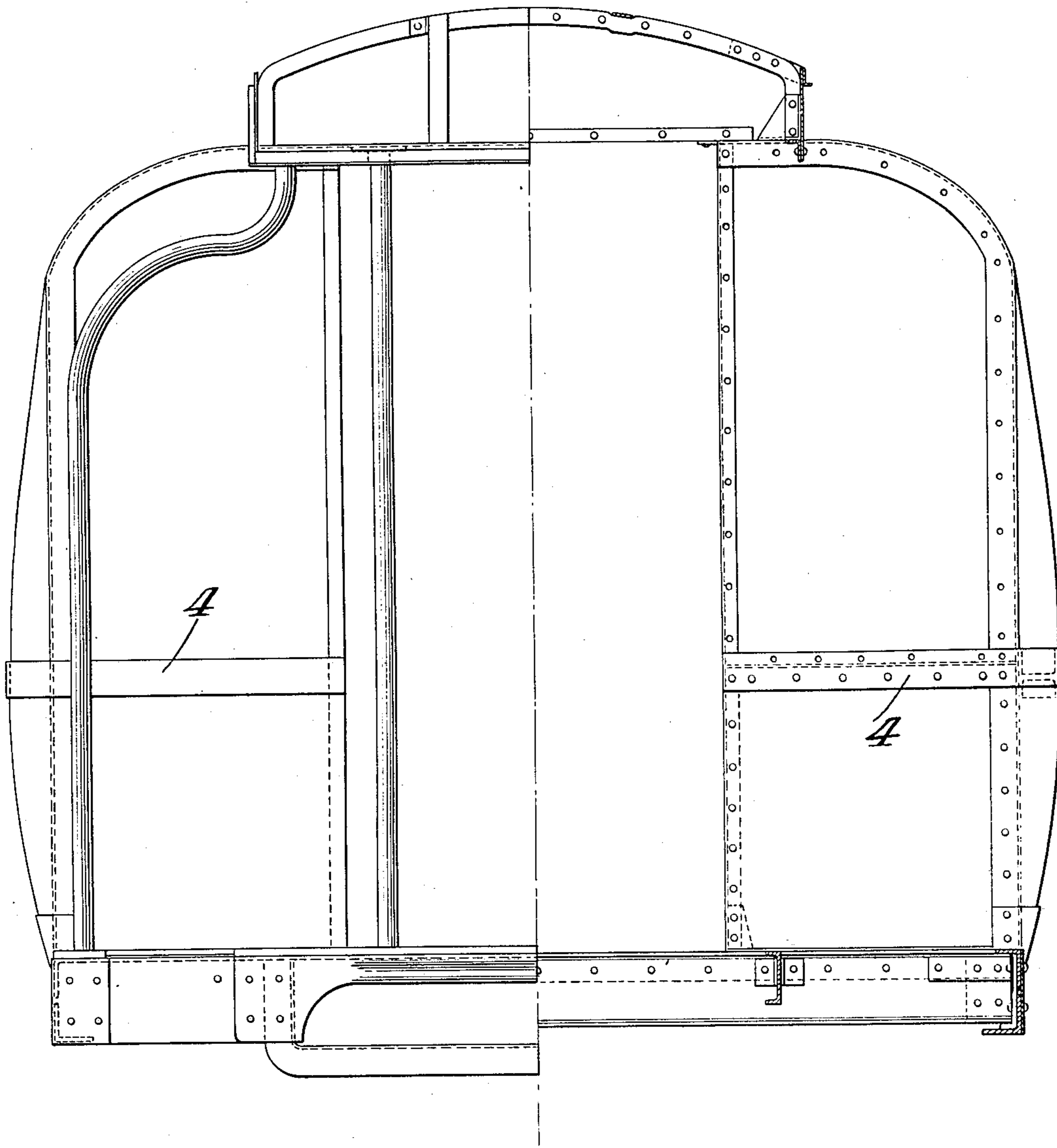
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13 SHEETS—SHEET 8.

Fig. 12.



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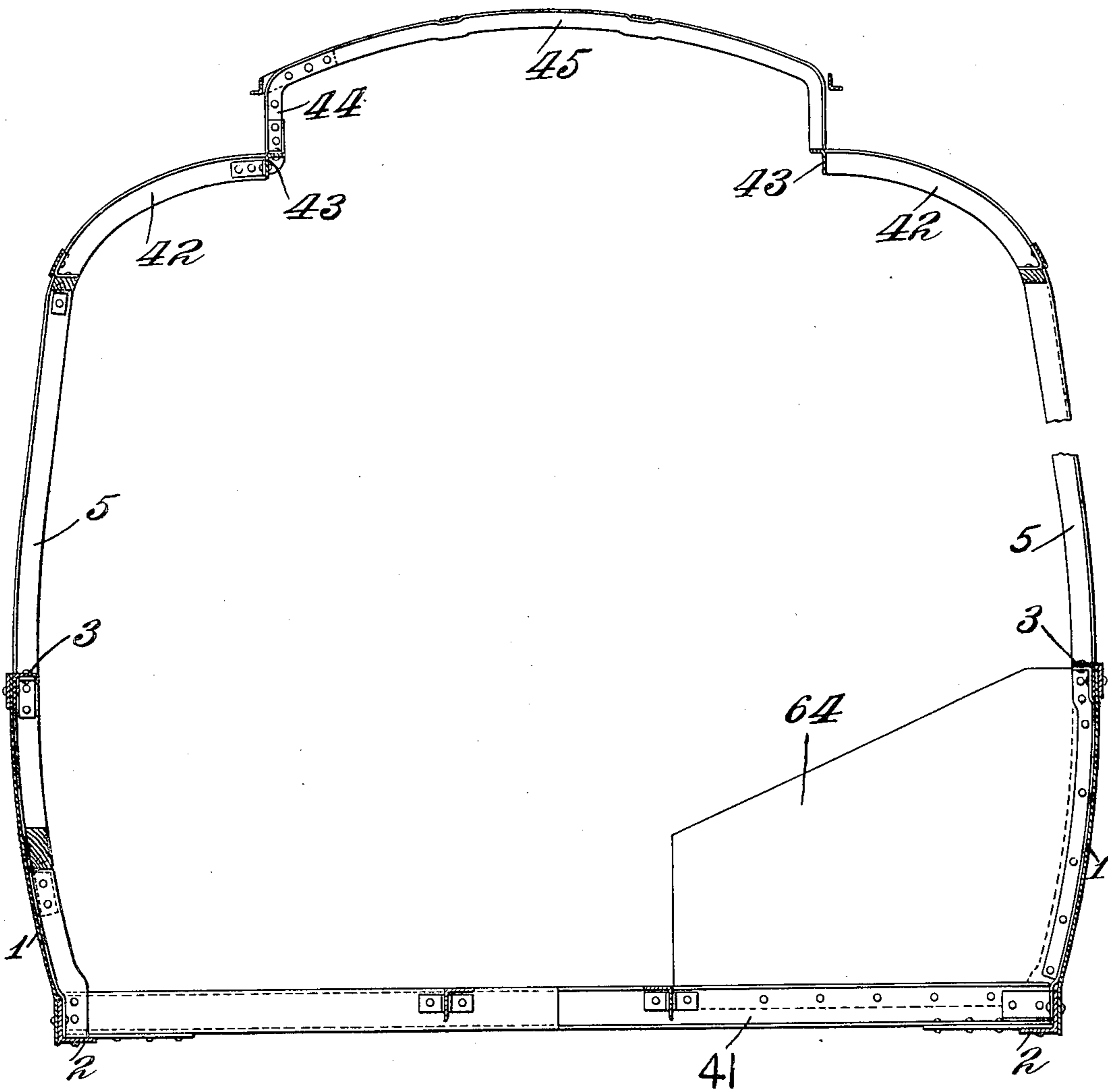
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13 SHEETS—SHEET 9.

Fig. 13.



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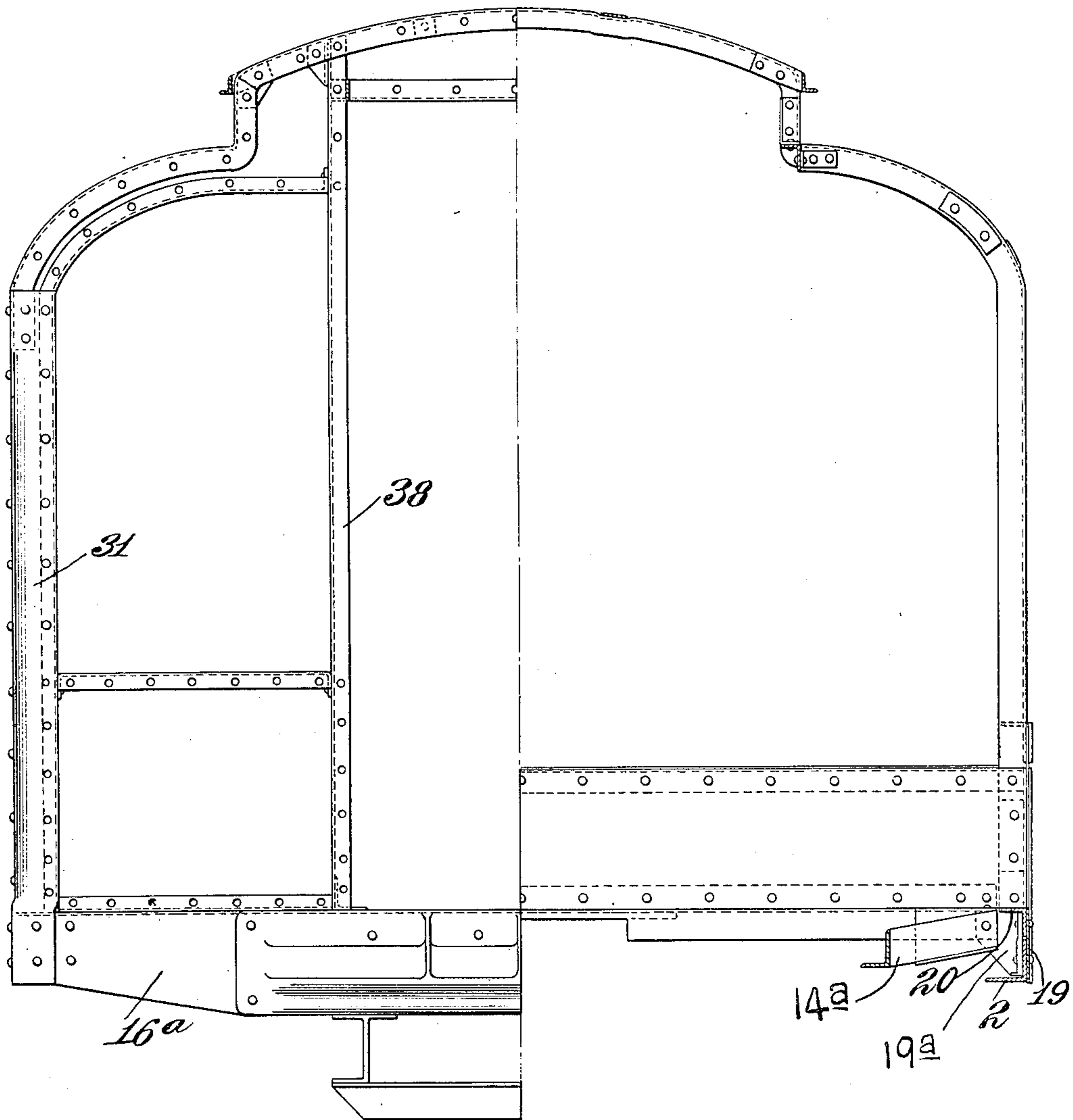
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13 SHEETS—SHEET 10.

Fig. 14.



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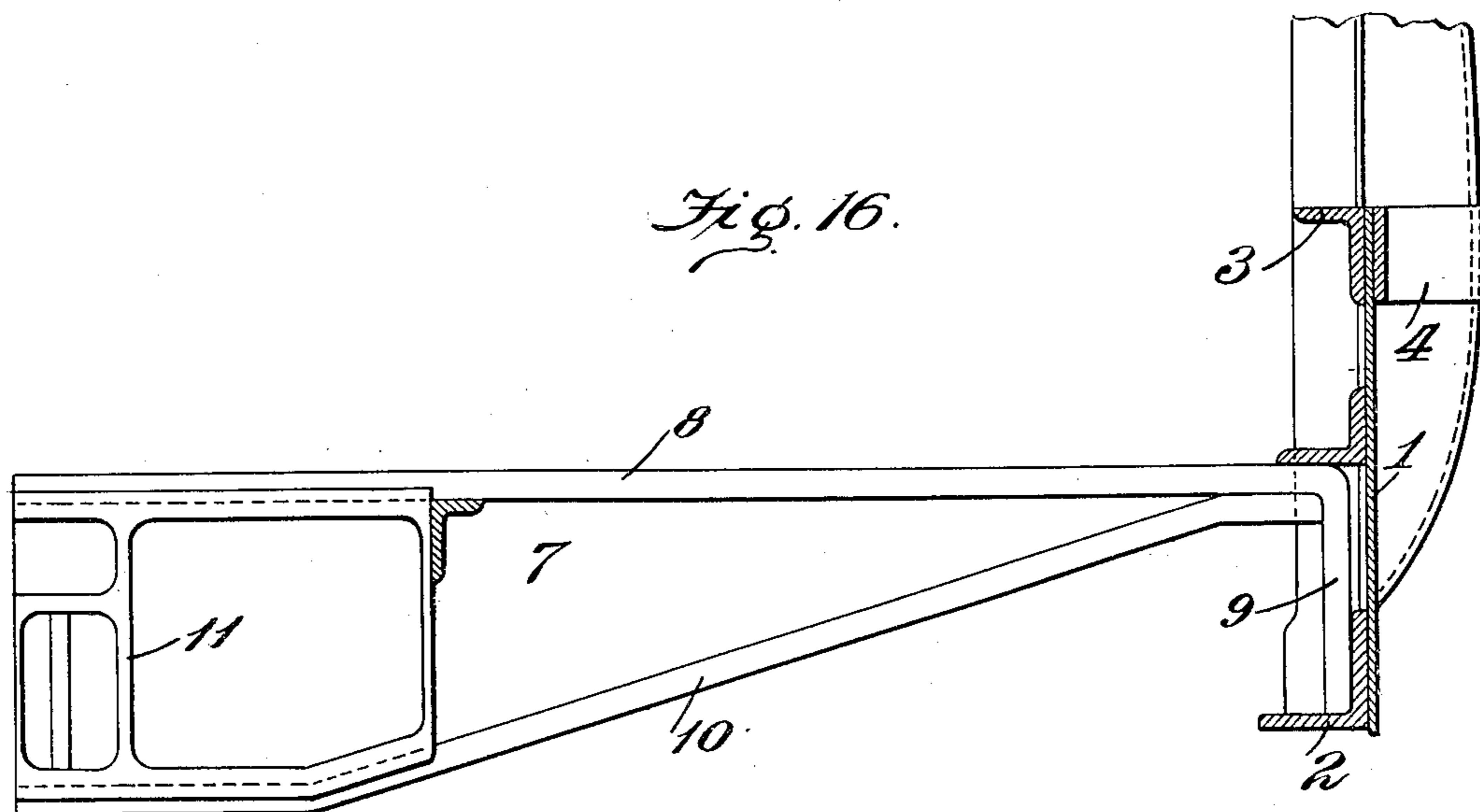
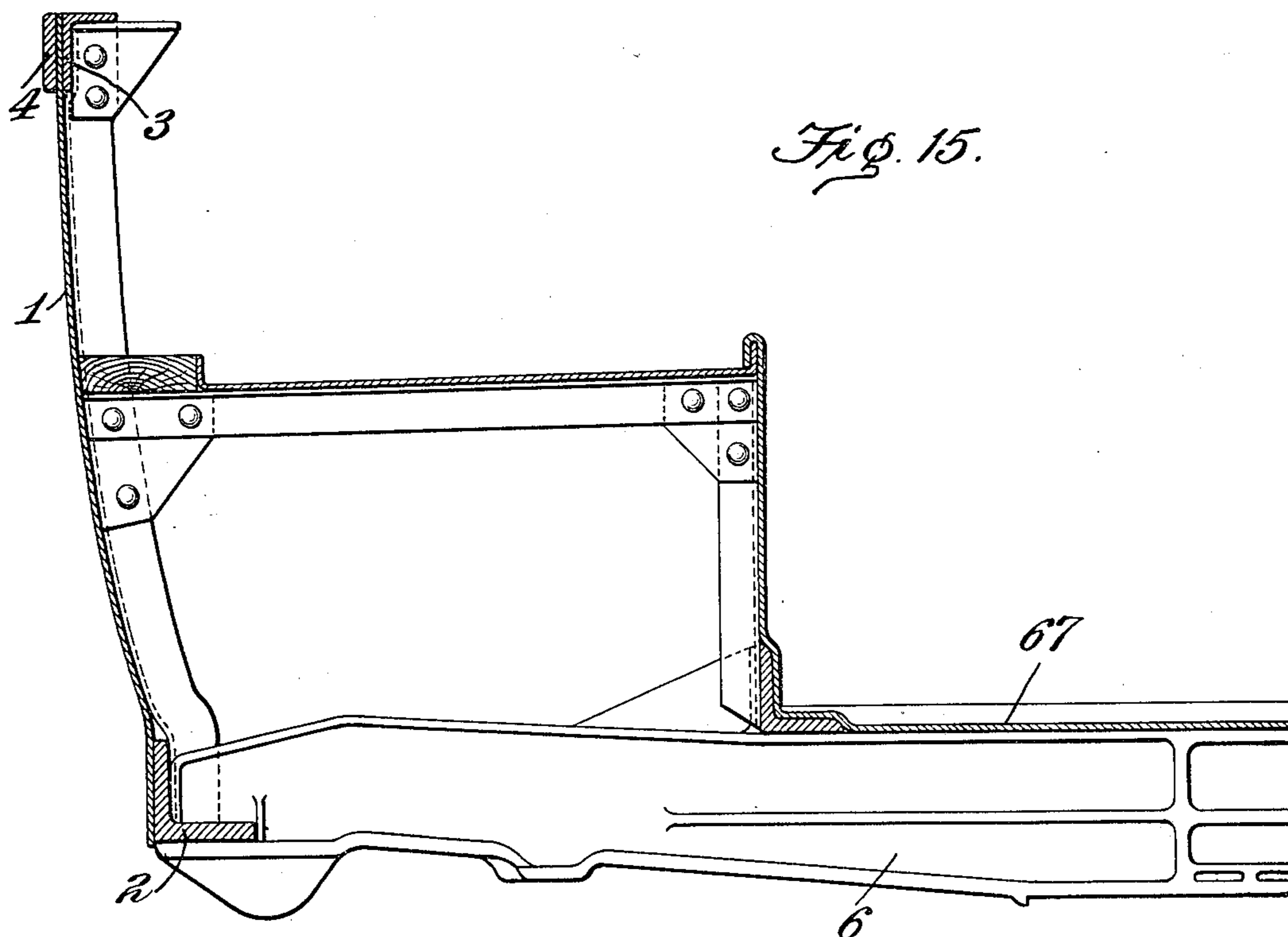
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APPLICATION FILED NOV. 4, 1905.

13 SHEETS—SHEET 12.

Fig. 17.

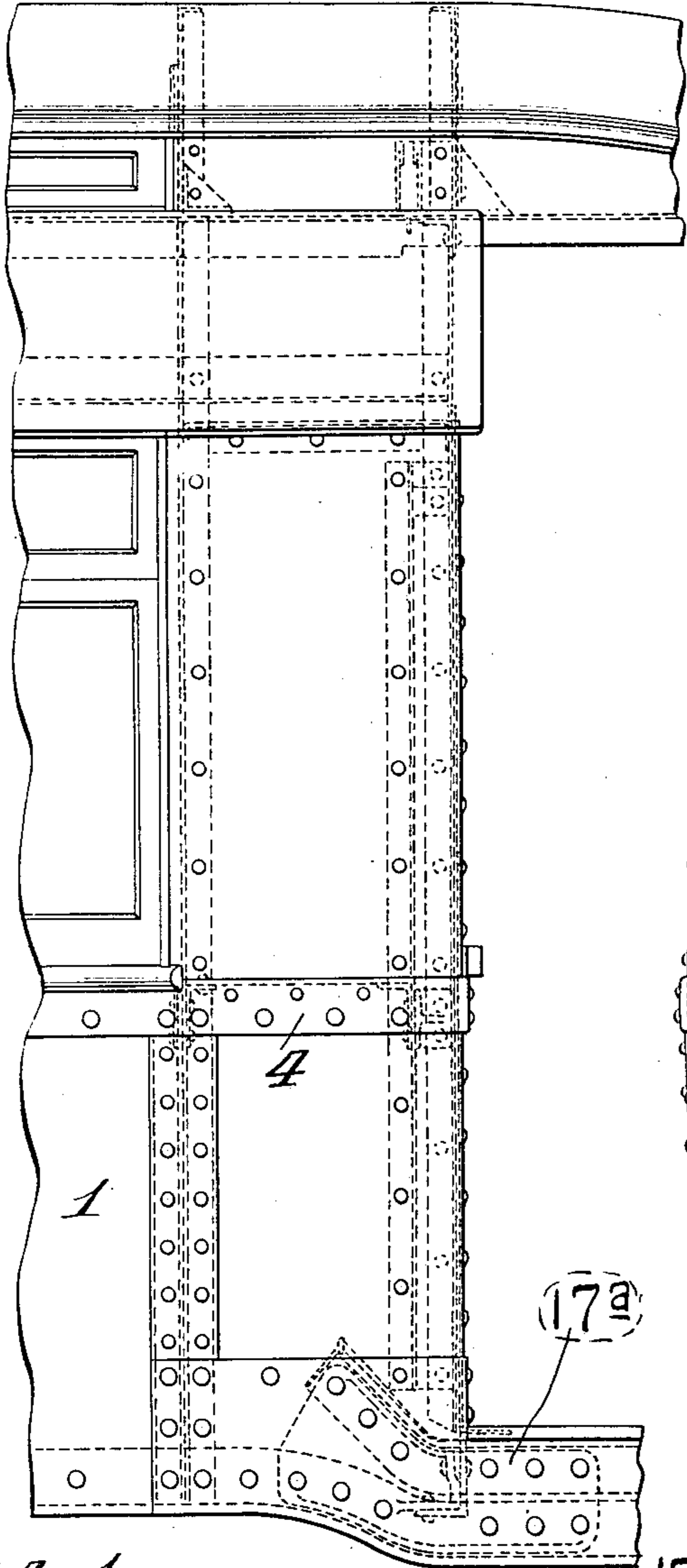
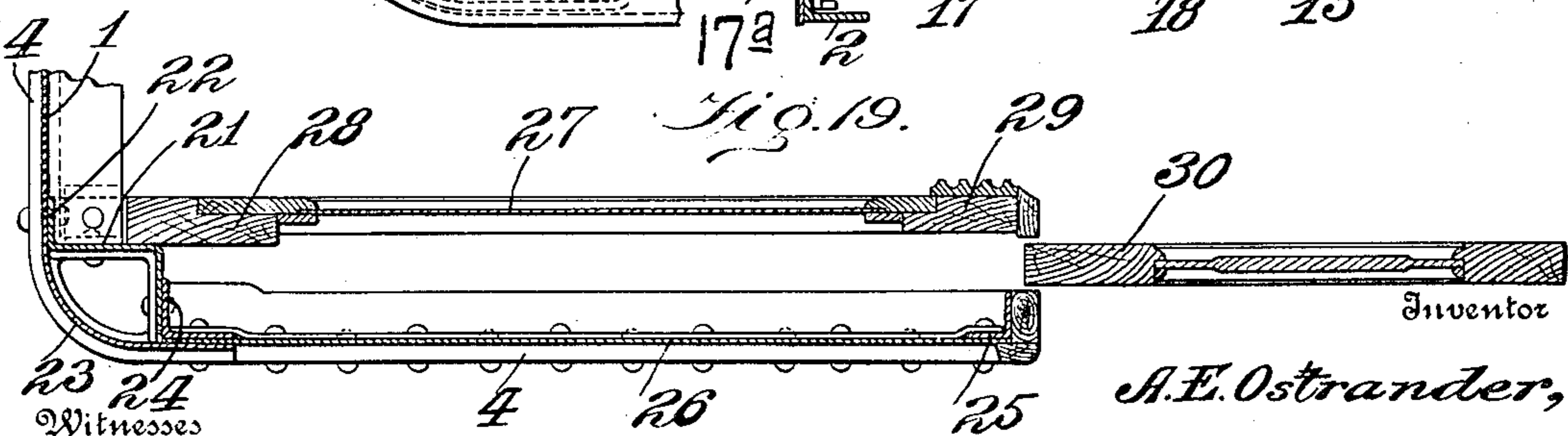
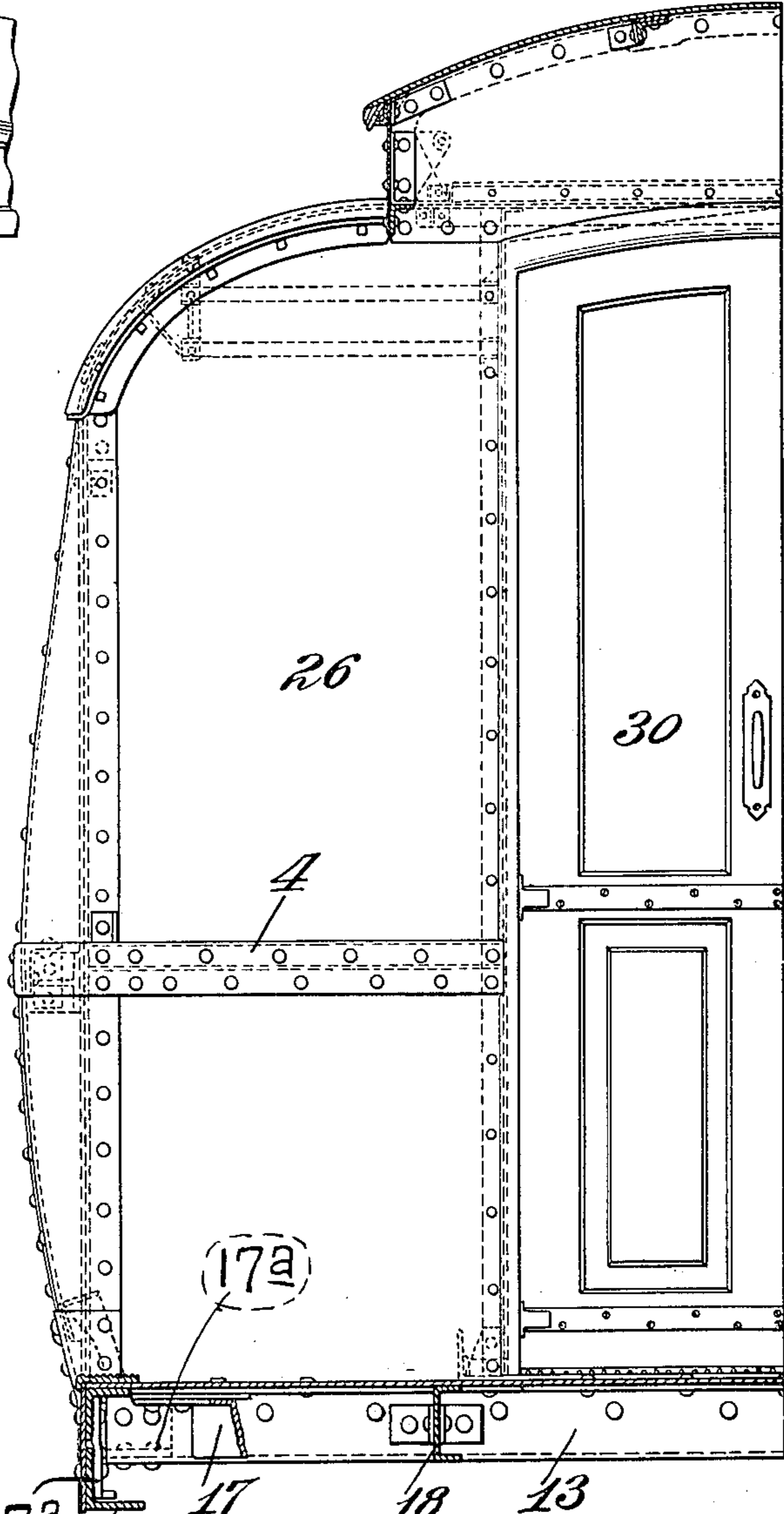


Fig. 18.



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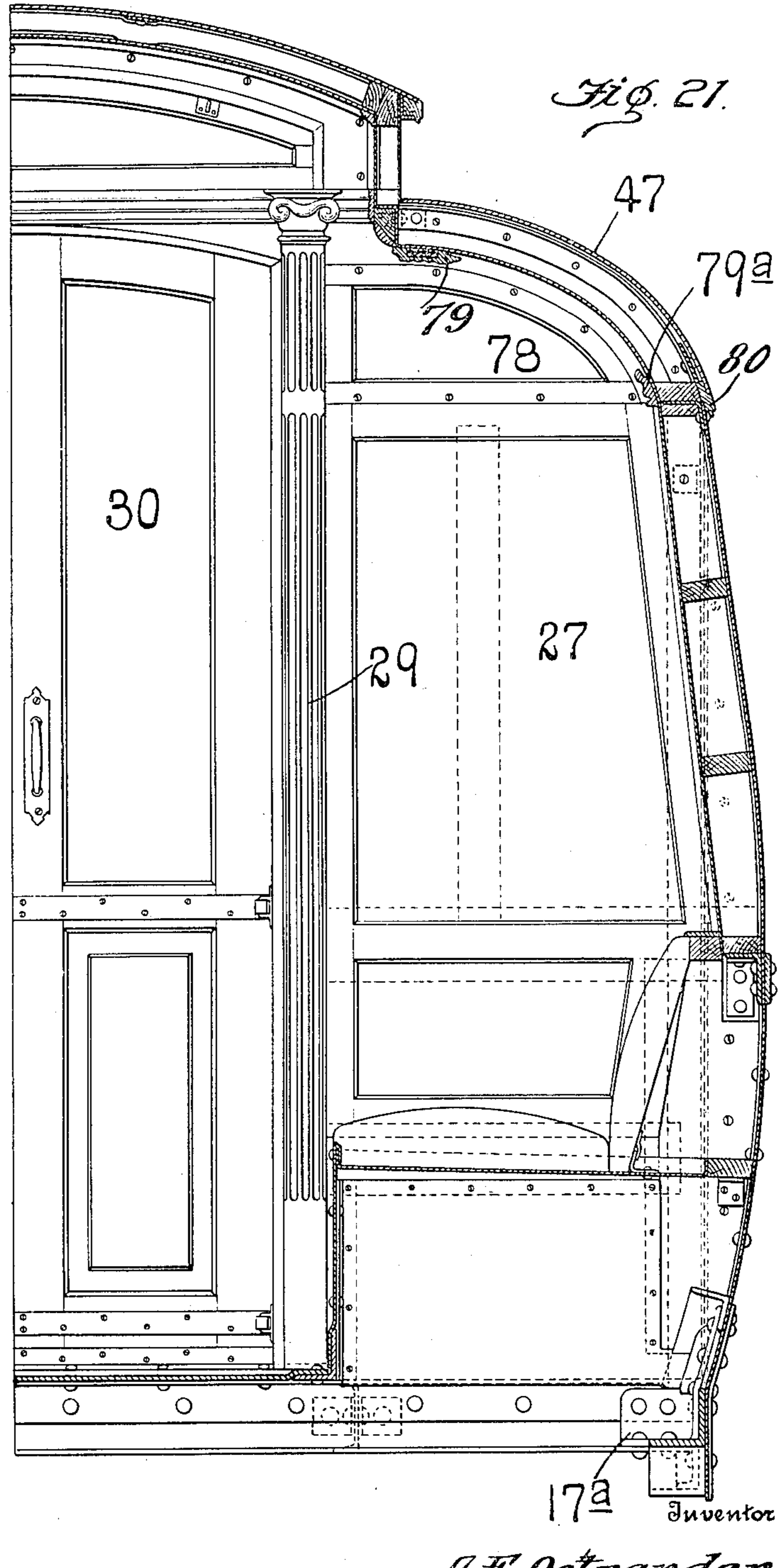
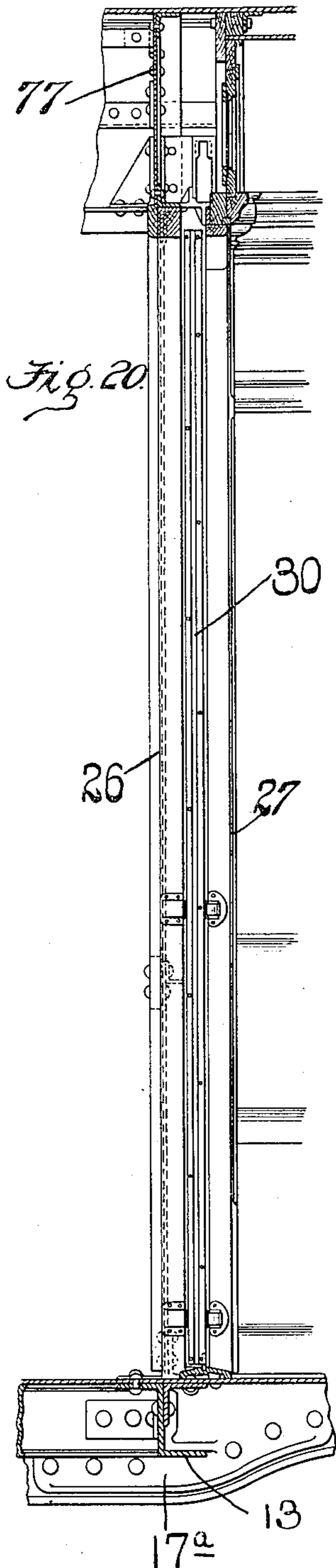
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13 SHEETS—SHEET 13.



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UNITED STATES PATENT OFFICE.

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RAILWAY-CAR.

No. 825,611.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed November 4, 1905. Serial No. 285,912.

To all whom it may concern:

Be it known that I, ALLEN E. OSTRANDER, a citizen of the United States, residing at Paterson, New Jersey, have invented a certain new and useful Improvement in Railway-Cars, 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 use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top plan view of a car-frame divided longitudinally to illustrate the framing for the roof and for the floor, respectively. Fig. 2 is a side elevational view of the framing of a car constructed in accordance with my invention. Fig. 3 is an enlarged side elevational view of a portion of a car constructed in accordance with my invention. Fig. 3^a is a side elevational view of the motor end portion of the car. Fig. 4 is a fragmentary sectional view showing the interior of the bulkhead on the line 4 4 of Fig. 3 looking in the direction of the arrow. Fig. 5 is a sectional view on the line 5 5 of Fig. 4. Fig. 6 is a fragmentary sectional view through the car side adjacent one of the longitudinal seats. Fig. 7 is a similar view through the car side adjacent the transverse seats, taken on the line 7 7 of Fig. 3. Fig. 8 is a sectional view on the line 8 8 of Fig. 3. Fig. 9 is a sectional view on the line 9 9 of Fig. 3^a. Fig. 10 is a view, partly in end elevation and partly in section, taken at the motor end of the car. Fig. 10^a is a detail sectional view on the line X X of Fig. 10. Fig. 11 is a fragmentary horizontal view through a portion of the motor end of the car on line 11 of Fig. 10. Fig. 12 is a view, partly in end elevation and partly in section, taken at the trailer end of the car. Fig. 13 is a cross-sectional view through the car-body, taken at approximately the center. Fig. 14 is a view, partly in elevation and partly in section, taken through the motor-end vestibule. Fig. 15 is a fragmentary side elevational view through a portion of the car-bolster at the trailer end of the car, the car-seat support and plate-girder side being shown in section. Fig. 16 is a fragmentary side elevational view of the floor-beam or cross-bearer 7 at the motor end of the car, part of one of the plate-girder

sides and the side sills being shown in section. Fig. 17 is a side elevational view of a part of the trailer end of the car. Fig. 18 is a view, partly in end elevation and partly in section, of the trailer end. Fig. 19 is a horizontal sectional view through the trailer end, showing the construction of the door-pocket. Fig. 20 is a fragmentary longitudinal sectional view through a part of the car-frame, showing the door-pocket in elevation; and Fig. 21 is a half-sectional view through the car-body near the end of the trailer portion of the car.

This invention relates to railway-cars, and particularly to railway passenger-cars.

The car illustrated in the accompanying drawings is designed for use particularly in connection with underground tubes or tunnels—such as, for example, the well-known underground tube system in London, England. In designing this type of car it is desirable to provide curved or bulged sides, which will generally conform to the inner contour of the tube or tunnel and yet possess sufficient strength to resist the weight and strains to which a car of this type would be subjected. It is well known that a straight vertical brace generally possesses greater resisting power than one having a curved form. Therefore a car partaking of a bulged or convexed side requires special bracing or a peculiar disposition of the essential elements, so that it will possess the requisite strength.

It is the purpose of my invention to provide a car whose sides are curved outwardly, such a car possessing practically no straight vertical braces, but having a sufficient resisting power to meet all natural requirements and which is of a minimum weight.

A further object of my invention is to provide a car comprising a combined motor and trailer in a single structure, thereby avoiding the necessity of having a propelling-car and a passenger-carrying car.

Other objects and advantages, as well as the novel details of construction of this invention, will be specifically described hereinafter, it being understood that changes in form, proportion, and minor details of construction may be resorted to without departing from the spirit of my invention or sacrificing any of the advantages thereof.

Referring now to the drawings by characters of reference, 1 designates the plate-girder sides, which plate-girder sides extend practically from car end to car end. The plate-girder sides are of approximately the same depths throughout the passenger-carrying portion of the car, but are relatively shallow at the motor end of the car. In other words, the bottom chords of these plate-girder sides are deflected in an upward direction to provide relatively shallow portions, so that sufficient room will be provided beneath the floor of the motor end of the car for the gearing required to propel the car. The plate-girder sides are provided with lower chords 2 and upper chords 3. The lower chords are in the form of angles whose horizontal flanges are inwardly disposed, and the upper chords are formed of similar angles 3, having inwardly-disposed flanges accurately fitted between posts 5, with a continuous bar 4 on the outside and connected thereto by rivets to form the belt-rail of the car-body. The motor end of the car—i. e., the part from the end A to the portion B, (see Fig. 1)—is provided with approximately straight vertical sides having posts 5 arranged at suitable intervals, said posts being preferably formed of one piece and extending from the deck-sills to the side sills. The plate-girder sides are connected by the bolsters 6, which bolsters are of approximately the construction illustrated in a companion application filed August 24, 1905, and given Serial No. 275,644. These plate-girder sides are also connected by floor-beams or cross-bearers 7, said floor-beams preferably consisting of tension members 8, having their ends deflected, as at 9, and secured to the plate-girder sides, said tension members being braced by the compression members 10, which are terminally connected to them and which are spaced therefrom by struts or spacing-blocks 11. (See Fig. 16.) The floor-framing of the car is additionally braced by the longitudinal angles 12 of irregular formation, said angles 12 being secured to the end sill 13 at the trailer end of the car, to the bolsters 6, and to the floor-beams 41. Longitudinals 14 are also connected to the floor-beams at about the center of the car, while similar longitudinals 15 are connected to the floor-beam or cross-bearer 7 at the motor end of the car. The rear or trailer end platform is carried by the plate-girder sides and the end sill 13, the platform end sill 16 having an inturned flange, which is connected to the end sill 13 by diagonal braces 17 and by the longitudinal braces 18. As shown in dotted lines in Fig. 17, this construction is reinforced by a steel casting 17^a, connected to the side sills and also to the end sill, for which it forms a support. A similar casting 19^a is provided for the motor-end platform, said platform being additionally strengthened by an angle 20^a, extending from side to side of the car,

said angle being connected to the end sill 15^a by a web-plate 22^a, extending for the full width of the car from the floor of the motor-end section to the floor of the motor-room, as shown in Figs. 10 and 10^a.

Extending from the end sill 15^a to the vestibule end sill 16^a are diagonally-extending braces 14^a. At the motor end of the car the plate-girder sides are slightly deflected, which deflection is caused by the attachment of the motor-platform carrying extensions 19, which are riveted to the plate-girder sides and, in effect, form part of them, and these extensions are reinforced by inverted angles 20, secured to their webs, so that the side sills at the motor end of the car are, in effect, channels, as shown in Figs. 3^a and 10. At the trailer end of the car are corner-posts 21, which are of Z-form, one flange 22 of each post being secured to the plate-girder side at the side of the car and to the bent corner-plate 23 and another flange being secured to the bent corner-plate 23 by an angle 24. (See Fig. 19.) A door-post 25 is connected to the floor-framing and extends to the car-deck, said post being also connected to the belt-rail 4, which is bent around the end of the car, as shown in Fig. 19. The post 25 and the angle 24 support a partition or end plate 26, which is riveted to them, to the corner-plate 23, and to the belt-rail, so as to form the end of the car and partition the vestibule therefrom. An inner partition 27, preferably a sheet-metal plate, is connected to the vertical posts 28 and 29 within the passenger-compartment, the plates 26 and 27 constituting a pocket for a sliding door 30, closing an end opening, through which access may be had into the car from the trailer end platform.

At the motor end of the car, at the extreme end of one of the extensions 19, which are connected by the vestibule end sill 16^a, is an end corner-post in the form of a built-up channel having a web-plate 31 and inturned flange 32, which is connected to the member 33, constituting the door-frame for the side door 34. A flange 35, which is connected to the web-plate, is also riveted to an angle 36, carrying the front window-sash 37^a of the motor end of the car. At about the center of the motor end and supported by the end sill is a vertical angle 38, carrying a wooden door-post 39, said angle 38 also supporting one of the front walls 37 of the car, the other edge of said wall 37 lapping over the web 31 of the corner-post and being connected thereto. (See Fig. 10.)

The intermediate posts 5, which are connected at their lower ends to the side sills 2, extend up above the belt-rail and are connected to the angles 43, comprising the deck sills, said posts 5 also being secured to additional floor-beams 41, which preferably comprise channels extending from car side to car side and constituting supports for the floor. The

posts 5, which are continuous from the side sills 2 to the deck-sills 43, are curved at their upper portions and form supports for the deck, which is further stiffened and supported by curved carlines 42, preferably formed from angles and connected to the side-plate angles 40 and deck-sills 43, said side-plate angles being connected to the posts 5. The roof-covering 46 is supported by continuous carlines 45, extending from deck-sill to deck-sill and connected to the posts 5 by reinforcing flat S-shaped braces 44, which act as supports for the deck-lights and the eaves-angles 46^a. Over the curved carlines 42 and the curved upper end portions of the posts 5 is placed a deck-covering 47 of some suitable material, and an interior finish 48 is attached to the inner edges of said members 42 for well-known purposes. At suitable portions along the sides of the car continuous sheets are connected to the belt-rail and to the angles 40, which sheets are reinforced by the vertical posts, so as to constitute piers for strengthening the car sides. The window-openings are framed in by the verticals 49, which extend from the belt-rail to the angle 40; but as these cars are generally to be used in tubes or tunnels the necessity for the windows will not always arise.

Where the windows are not employed, I substitute pressed-steel diaphragms 50, connected to the belt-rail and to the angle 40, as well as the side posts and members 49, heretofore described. The diaphragms 50 (illustrated in Fig. 3) consist of sheets provided with pressed-in panels, so as to form longitudinal and transverse ribs 51 and 52, respectively. As these diaphragms 50 are connected to the car side at the belt-rail, it will be obvious that the plate-girder sides, in effect, extend from the side sills to the top of the car side or to the angles 40, to which they are secured. These diaphragms are also utilized in part of the passenger-carrying or trailer part of the car. The motor-compartment or bulkhead is provided with openings 53, which are closed by the rigid deflecting-slats 54, which are suitably spaced apart. The lower slat 54^a, being a part of the frame to which other slats are fastened, is connected to the upper chord 3 of the plate-girder side, as shown in Fig. 9. Between the opening 53 and the end of the car the portion 55 of the car side extends from the side sill to the car deck, so as to provide practically a wide pier the entire height of the car side, and thereby efficiently strengthen the car at this point.

At suitable points in the car side are openings closed by framed-in windows or diaphragms 56, to the top of which are hinged panels 57, opening inwardly, as illustrated in Fig. 7, to assist in ventilating the car and cooperating with the ventilating-slats 58 in the deck-light openings, which slats are hidden by perforated plates 59^a.

The verticals or members 49 are illustrated as being in the form of pressed-steel channels, which are bulged so as to give additional strength and conform to the shape of the finished car. The carlines 42 are connected to the approximately vertical finishing-panels 59, which terminate adjacent to the ledge-strips 60, carried by the car sides and preferably secured to the diaphragms 50. These ledge-strips terminate adjacent to the tops of the longitudinal car-seats 61, the specific construction of which car-seats form the subject-matter of a separate application. These ledges 60, together with the longitudinal wooden strips 62, cooperating with the diaphragms 63, fast to the plate-girder sides, and the floor-beams or cross-bearers 41, brace the car and assist in distributing the weight to the car sides, so that practically the entire weight carried by the car is communicated to the car sides. Each side of the car is further stiffened by a diagonal brace 41^a, which is placed midway between the bolster and the back of the first transversely-extending seat, said braces being connected to one of the side posts 5 by a gusset-plate 42^a and at its lower end being turned under the floor-plates and riveted thereto, as shown in Fig. 6. The intermediate portion of the car is additionally braced by the gussets 64, which have their outer vertical edges connected to the posts 5 and their lower horizontal edges to the floor-beams 41. These gussets 64 assist in attaching the intermediate car-seats to the car-body. At the motor end of the car are transverse seats 65, which seats are arranged on opposite sides of the car, so as to form a center aisle. Inasmuch as the motor-compartment or bulkhead is provided with floor-sheets 66 in a plane higher than the floor-sheets 67 of the trailer portion of the car, I have provided steps 68, leading from the floor-sheets 67 to the higher floor-sheets 66. (See Fig. 3.) Preferably the floor-plates are formed of steel and are provided with depressions which tend to stiffen the plates and also act as anchorages for the monolith cement floor, which is placed over the floor-plates. As shown in Fig. 4, the floor-plates 66 are connected to the seat-frames of the car by means of angles 66^a, whereby a plate-girder is formed which adds to the stability of the car and relieves the stress due to buffing strains and end shocks. For reinforcing the car at the junction of the trailer-end portion and the motor end portion I have provided diagonally-extending channels 69^a, which extend from the floor-beams of the trailer-section to the floor-beams of the motor-section, said channels being shown in dotted lines in Fig. 3. The ends of the transversely-extending seats 65 and also the ends of the backs of these seats are connected to these channels, the backs being also fastened to one of the floor-beams of the motor-section. The stairway is formed from

a sheet of pressed steel, which is riveted in between the ends of the seats and to the floors of the motor-section and the trailer-section, thus forming a very stiff brace and cooperating with the braces 69^a to strengthen the car at this point, where it has a tendency to be weak on account of the shallowness of the side girder-plates.

The motor-room is partitioned from the passenger-carrying portion of the motor end of the car by the partition 69, having a door 70, which is normally closed, but which may be opened to permit access to and from the passenger-carrying portion of the motor end of the car. Under normal conditions, however, or when this door is closed the motor-room will be isolated from the passenger-carrying portion of the car.

Figs. 20 and 21 show the interior construction of the body at the trailer end of the car. The plate 26, which cooperates with the partition 27 to form a pocket for the sliding door 30, is connected to the roof by the web-plate 77, while above the portion 27 is a finishing-panel 78. It is to be understood that the structure just described applies to only half of the car and that similar panels and doors are on the opposite side of the car.

79 designates molding-strips, which are fastened to the inner portion of the deck, and these molding-strips preferably carry the conductors for electric lights, which may be in communication with suitable lamp-sockets at appropriate distances along the car, as is usually provided, said molding-strips also cooperating with molding-strips 79^a to form a rack for advertising-cards.

80 designates the flashing-strips, which overlap the tops of pier-covers and are in turn overlapped by the covering 47, so as to prevent deterioration of the framing or the interior finishing of the car by the admission of moisture into the joints.

From the foregoing it will be observed that the sides of the car are approximately curved vertically, and, as heretofore explained, these curved sides carry substantially the entire weight assumed by the car-body and support it in a thorough and efficient manner, so as to provide a rigid car-body well adapted to meet all requirements to which the car-body may be subjected from natural causes.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. A railway passenger-car having side sills and deck-sills located above the side sills and arranged closer together than the side sills, continuous posts extending from the side sills to the deck-sills for carrying the side walls of the car, the upper ends of said posts being curved inwardly adjacent the deck-sills, and curved plate-girders connected to said posts and forming the lower por-

tions of the side walls of the car; substantially as described.

2. In a railway-car having plate-girder sides parts of which extend to the roof of the car, upwardly-curved posts carried by the plate-girder sides, and diaphragms secured to the posts and constituting in effect parts of the plate-girder sides; substantially as described.

3. In a passenger-car body, plate-girder sides which extend from car end to car end, said plate-girder sides being of approximately the same depth throughout a portion of the car-body and relatively shallow at one end, and a floor-frame and roof connected to the plate-girder sides; substantially as described.

4. In a passenger-car combining a motor portion and a passenger-carrying portion, said passenger-car having curved plate-girder sides which extend practically from car end to car end, the plate-girder sides being of approximately the same depth throughout the passenger portion of the car and relatively shallow at the motor end of the car; substantially as described.

5. In a passenger-car combining a motor portion and a passenger-carrying portion, said passenger-car having curved plate-girder sides which extend practically from car end to car end, the plate-girder sides being of approximately the same depth throughout the passenger portion of the car, and relatively shallow at the motor end of the car, the lower chords of said plate-girder sides comprising angles whose horizontal flanges are inwardly disposed, and the upper chords of said plate-girder sides comprising a continuous bar reinforced by angles in short lengths fitted between posts and having inwardly-disposed flanges; substantially as described.

6. In a passenger-car having plate-girder sides bulged out between the top and bottom chords thereof, one end platform of said car being carried by said plate-girder sides, an end sill for the said end platform, diagonal braces connected to said end sill and said platform, and posts of Z-bar form at the end of the platform and supporting part of the roof; substantially as described.

7. In a railway passenger-car comprising plate-girder sides, and having a motor-room or bulkhead, said plate-girder sides being relatively shallow at the motor-room or bulkhead portion of the car; substantially as described.

8. A railway passenger-car having plate-girder sides provided with end extensions to which the platform of the car is connected, and means connected to said plate-girder sides for reinforcing said extensions; substantially as described.

9. In a railway passenger-car having plate-girder sides, extensions carried by said sides, platforms connected to the extensions, corner-

posts connected to the plate-girder sides and comprising built-up channels with intumed flanges and members cooperating with said corner-posts and constituting the door-frames for the side door; substantially as described.

10. A railway passenger-car having longitudinally-extending sills and being provided with a motor-room and a passenger-carrying room, the floor of which is located in a lower plane than the floor of the motor-room, and diagonal braces separate and distinct from the longitudinal sills and extending from the floor of the motor-room to the floor of the passenger-carrying room to strengthen the body of the car; substantially as described.

11. In a railway passenger-car comprising plate-girder sides having framed-in windows, hinged panels connected to the top of the framed-in windows and opening inwardly; substantially as described.

12. In a railway passenger-car, the combination with plate-girder sides, of upstanding reinforcing members connected to said plate-girder sides, said reinforcing members being in the form of bulged pressed-steel channels extending from belt-rail of the car to the deck, and diaphragms connected to said reinforcing members; substantially as described.

13. In a railway passenger-car, the combination with plate-girder sides, floor-beams or cross-bearers connected to the plate-girder sides, diaphragms connected to the plate-girder sides, and gussets connected to the plate-girder sides and floor-beams; substantially as described.

14. A passenger-car having a body which is divided into a motor-room and a passenger-carrying room, the floor of the motor-room being located in a higher plane than the floor of the passenger-carrying room, longitudinally-extending sills forming part of the car-body, diagonally-extending braces independent of the longitudinal sills and connected at their opposite ends to floor-supports of the passenger-room and motor-room, and transversely-arranged seats in the passenger-carrying room which are connected to said braces; substantially as described.

15. In a railway passenger-car, the combination with plate-girder sides portions of which extend from the bottom of the car to the deck, said plate-girder sides having cut-out portions to form windows, and metallic slats across the window-openings; substantially as described.

16. In a railway passenger-car comprising curved plate-girder sides extending from the bottom of the car to the deck, continuous posts extending from the side sills to the deck-sills, continuous curved carlines extending from deck-sill to deck-sill, reinforcing angle-bars connecting the continuous carlines to

the posts, and curved carlines extending from the deck-sills to the girder-sides; substantially as described.

17. In a railway passenger-car comprising plate-girder sides having relatively deep portions and relatively shallow portions and extensions carried by the respective ends of the car, upstanding posts carried by the ends of the extensions and a roof extending from car end to car end and connected to the upstanding posts; substantially as described.

18. In a railway passenger-car, the combination with plate-girder sides having intumed flanges at the bottom edges of said plate-girder sides and intumed flanges opposite the belt-rail, angles connected to the plate-girder sides and to the respective flanges of the plate-girder sides, bolsters extending from car side to car side and engaging the top and bottom portions of the lower flanges of the plate-girder sides, seat-frames connected to the plate-girder sides and to the bolsters, and floor-sheets on top of the bolsters and connected to the seat-frames; substantially as described.

19. A railway passenger-car comprising plate-girder sides, seat-framing on opposite sides of the car, and floor-plates connected to said seat-framing by angles and constituting a center sill for the car, said floor-plates being formed of sheet-steel having a plurality of depressions throughout its surface; substantially as described.

20. A railway passenger-car comprising two sections having floors in different planes, plate-girder sides and floor-beams, seats on opposite sides of one section of the car, diagonally-extending channels connected at one end to a floor-beam of one section and at its opposite end to a floor-beam of the other section and also connected to the end portions of said seats, and a pressed-steel stairway located between the said channels and connected thereto and fastened at its upper and lower ends to the floor-beams of the respective car-sections; substantially as described.

21. A passenger-car having a body which is divided into a motor-room and a passenger-carrying room, the floor of the motor-room being located in a higher plane than the floor of the passenger-carrying room, longitudinally-extending sills forming part of the car-body, diagonally-extending braces independent of the longitudinal sills and connected at their opposite ends to floor-supports of the passenger-room and motor-room, transversely-arranged seats in the passenger-carrying room which are connected to said braces, and steps located between said braces; substantially as described.

22. A railway passenger-car having curved sides, comprising side sills, deck-sills, posts extending upwardly from the side sills to the deck-sills and being curved for the major

portion of their length, floor-beams extending from side sill to side sill, floor-plates connected thereto, and diagonally-extending braces connected at their upper ends to the posts by gusset-plates and connected at their lower ends to the floor-plates; substantially as described.

23. In a railway passenger-car, side sills which are bent downwardly and extended to form platform-supports, a reinforcing steel casting connected to each side sill at the point where it is bent, and an end sill connected to said castings; substantially as described.

24. In a railway passenger-car, side sills having their ends deflected, floor-beams con-

nected to said side sills, a reinforcing-casting connected to the deflected ends of the side sills, an end sill connected to said casting and also to the side sills, an angle-iron extending from side sill to side sill above the deflected portions of said sills, and a web-plate connected to the end sill and to said angle-iron and extending from side to side of the car; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 16th day of October, 1905.

ALLEN E. OSTRANDER.

Witnesses:

WILLIAM N. WYETH,

ROBT. G. JEFFERY