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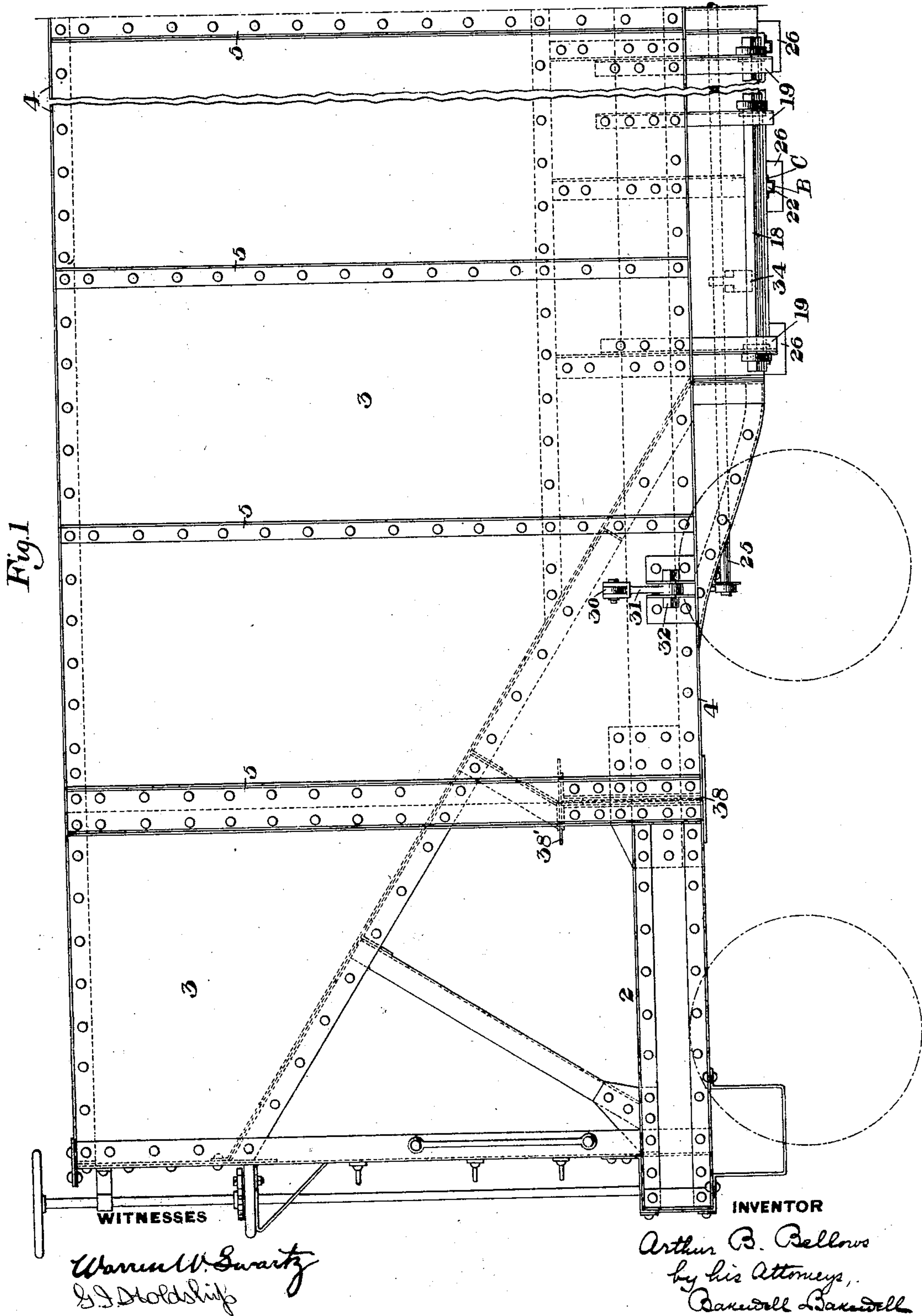
Patented Mar. 4, 1902.

A. B. BELLOWS.  
METAL CAR.

(Application filed Mar. 28, 1900.)

(No Model.)

6 Sheets—Sheet 1.



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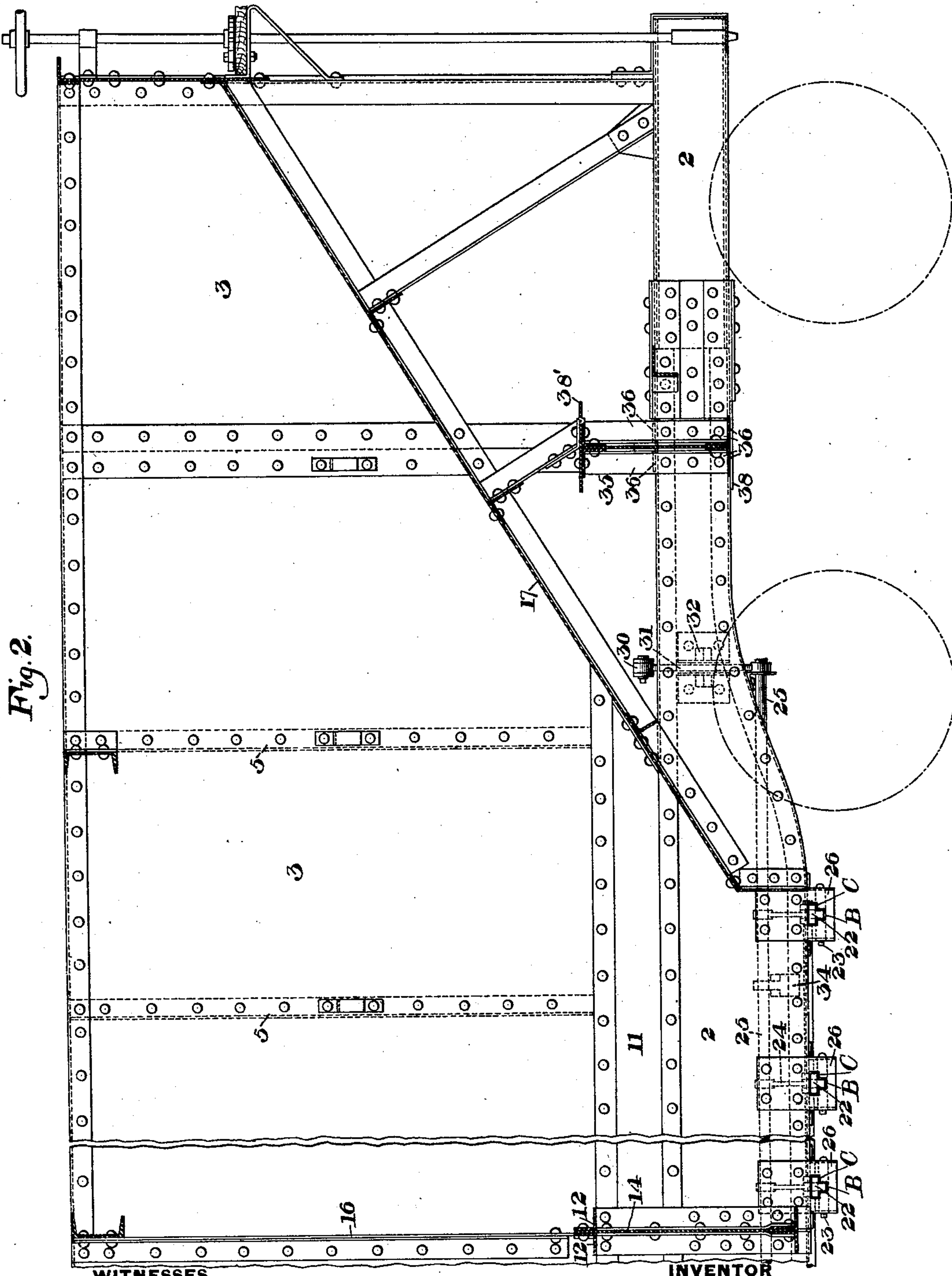
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6 Sheets—Sheet 2.



WITNESSES  
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**A. B. BELLWS.**  
**METAL CAR.**

(No Model.)

6 Sheets—Sheet 3.



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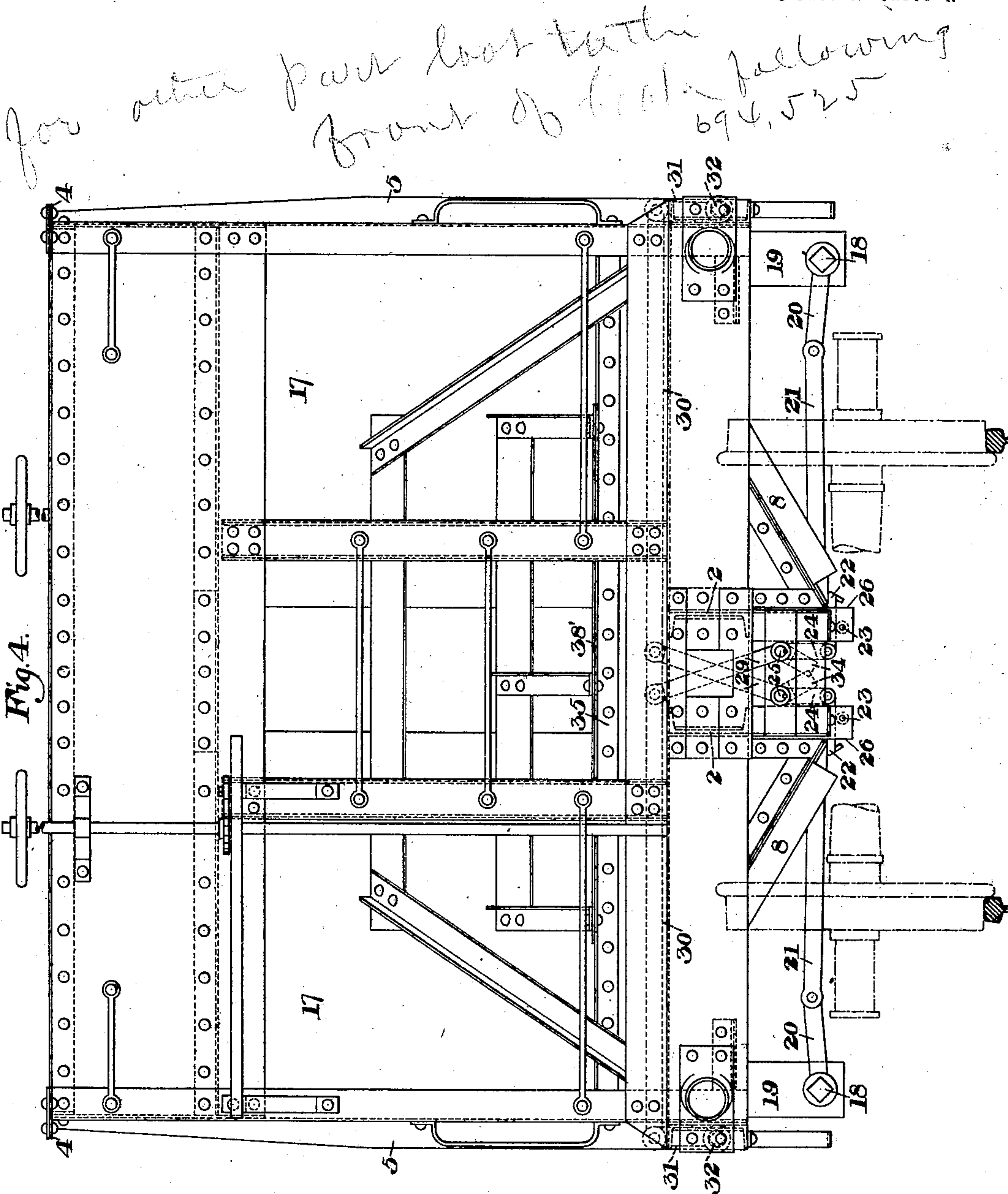
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WITNESSES

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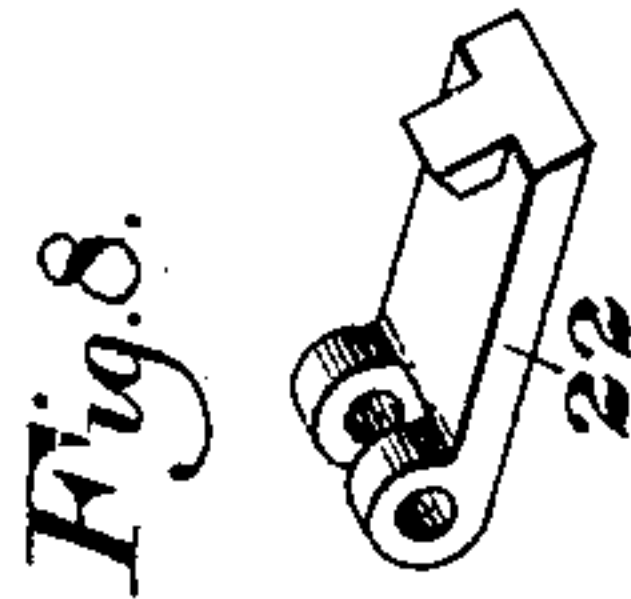
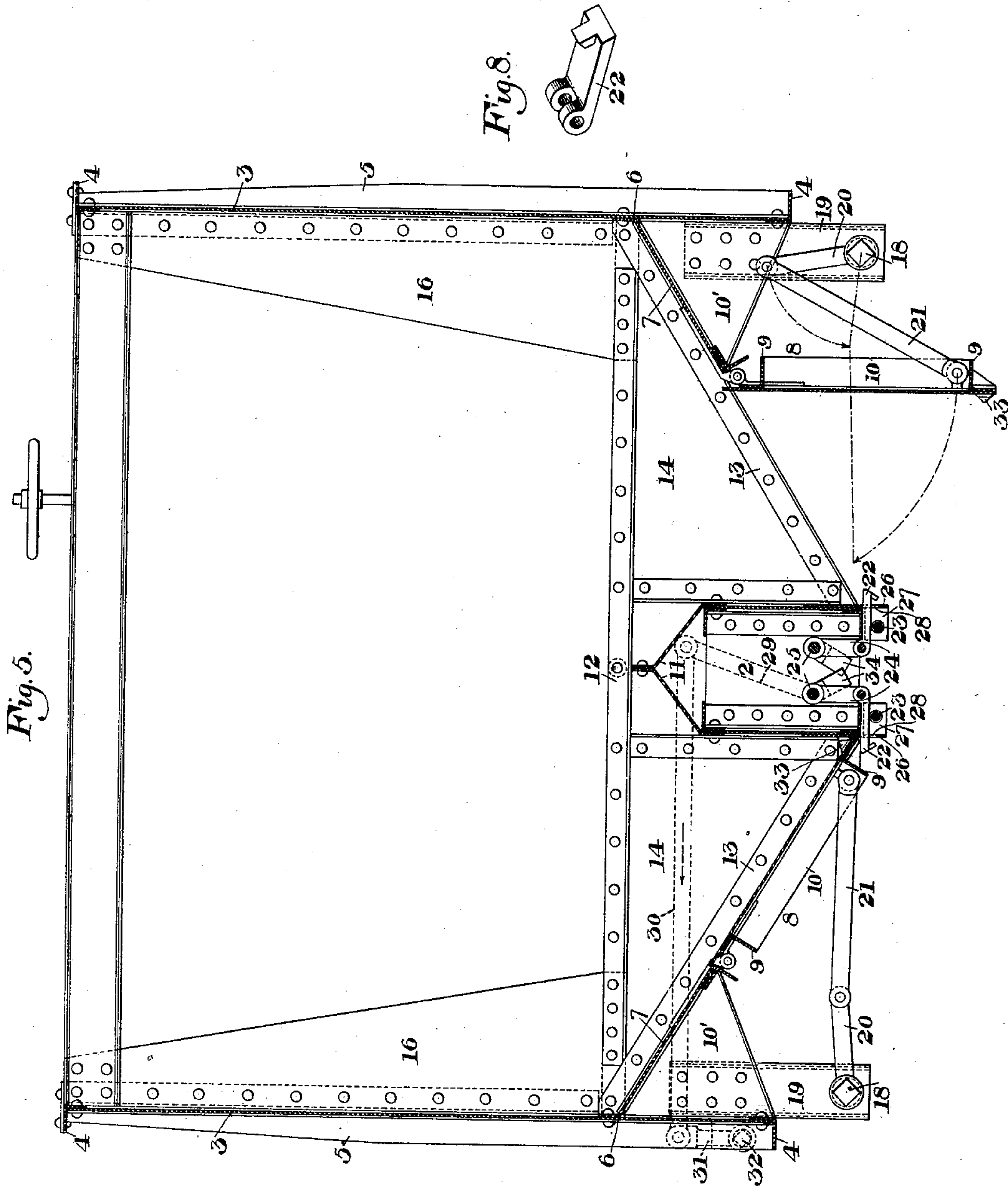
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**WITNESSES**  
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*Fig. 6.*

*Fig. 7.*

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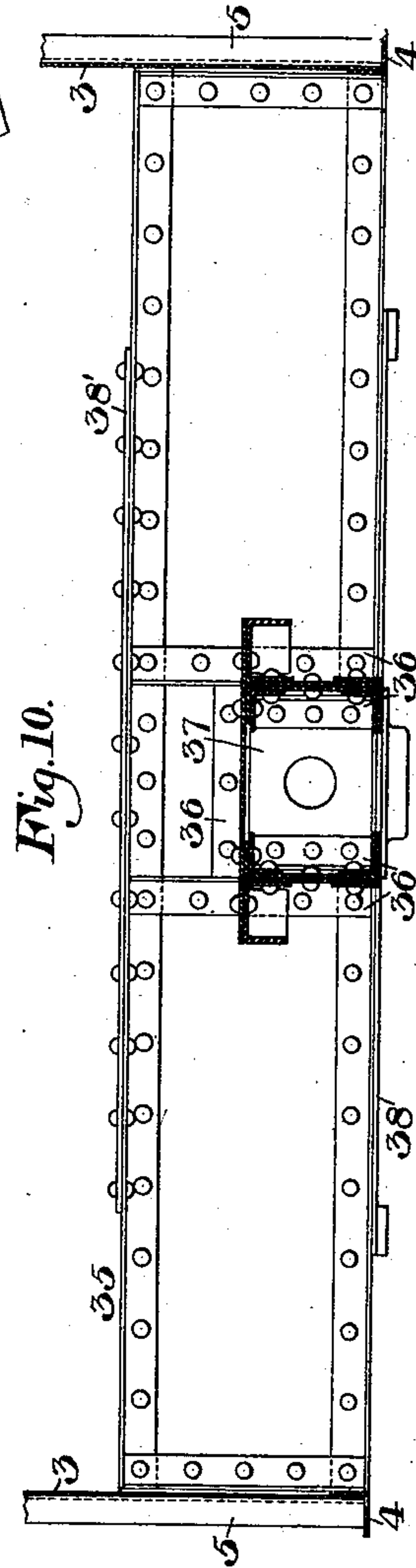
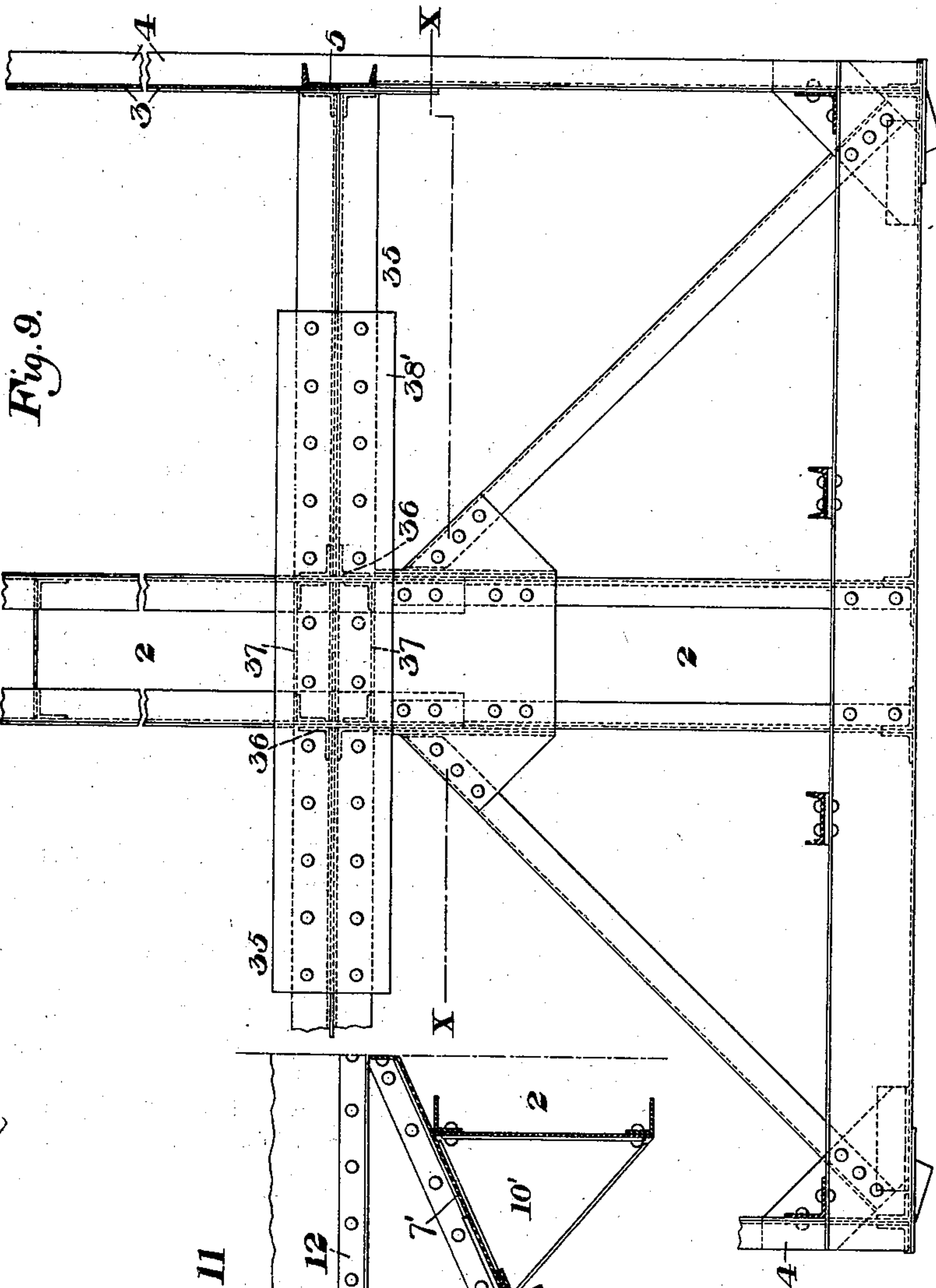
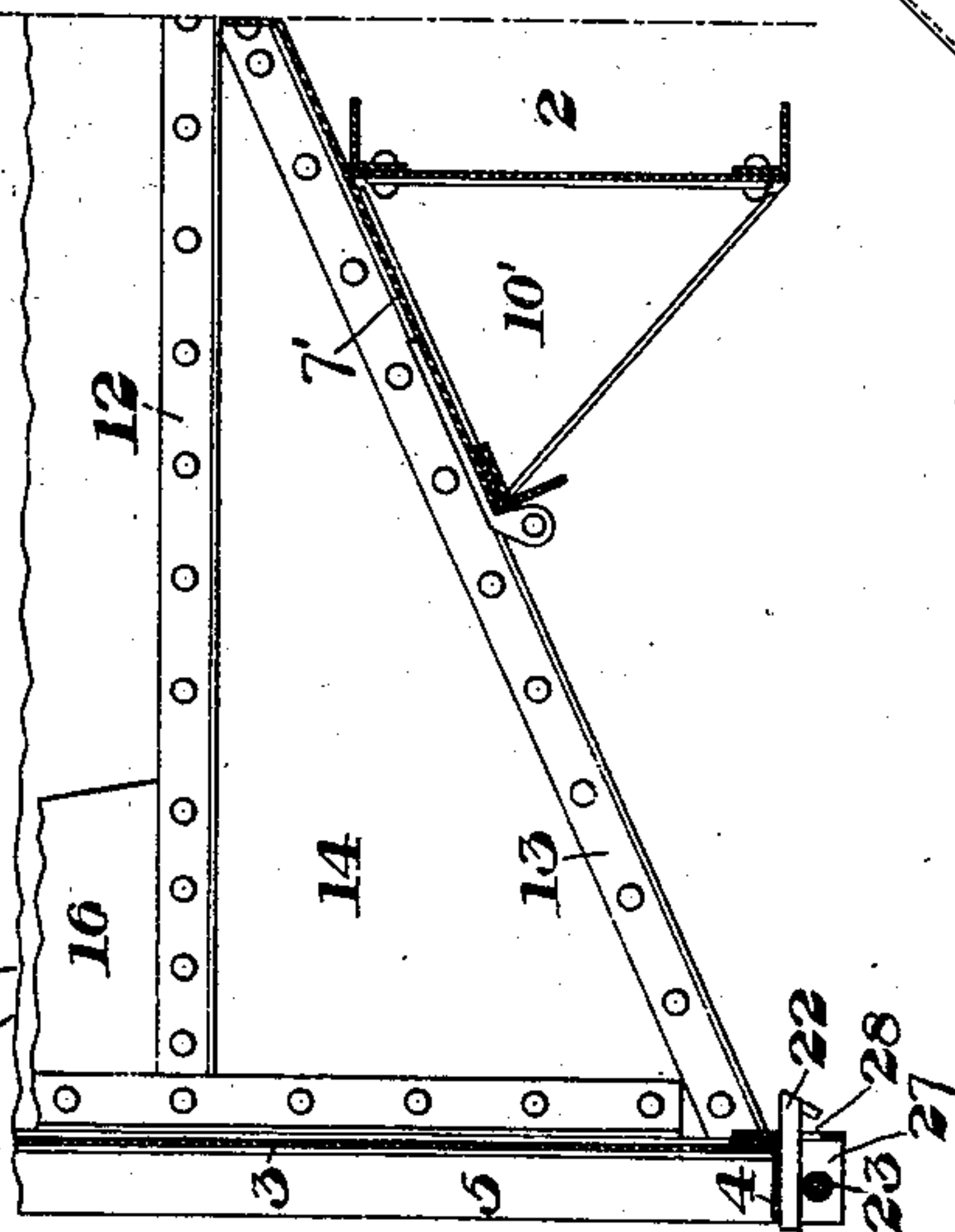


Fig. 11



WITNESSES

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# UNITED STATES PATENT OFFICE.

ARTHUR B. BELLOWS, OF PITTSBURG, PENNSYLVANIA.

## METAL CAR.

SPECIFICATION forming part of Letters Patent No. 694,715, dated March 4, 1902.

Application filed March 28, 1900. Serial No. 10,468. (No model.)

*To all whom it may concern:*

Be it known that I, ARTHUR B. BELLOWS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Metal Cars, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 shows in side elevation the left-hand half of a steel car constructed in accordance with my invention, the car being designed specially for use in carrying ore and coal, though the novel features of my invention may be applied to cars of all kinds. Fig. 2 is a longitudinal section of the right-hand half of the car. Fig. 3 is a plan view of the left-hand half of the car. Fig. 4 is an end elevation. Fig. 5 is a vertical section on the line V V of Fig. 2. Figs. 6 and 7 are cross-sections showing modified constructions of the center sill and its ridge-plate. Fig. 8 is a perspective view of the door-latch. Fig. 9 is a partial plan view of one end of the car, showing the body-bolster and sill. Fig. 10 is a vertical section on the line X X of Fig. 9; and Fig. 11 is a sectional view showing a modified construction of the floor of the car, in which the floor of the car is inclined downwardly from the top of the center sill toward the sides of the car.

In the drawings, 2 represents the center sill of the car, which is a box-girder structure, preferably composed of flanged beams and is within the body of the car. The sides of the cars are preferably constituted of plate-girders having an intermediate web portion 3, made up of metal plates, and marginal flanged sections 4 4 at the top and bottom edges, the web 3 being provided with vertical stiffening flanged pieces 5 5, riveted thereto.

The car has inwardly-inclined floors which extend from lines 6 6 above the lower edges of the side plate-girders 3 downwardly to the lower portions of the center sill. These inclined floors are partly constituted by fixed portions 7 7 and doors 8 8, which are in substantially the same inclined plane. These doors are made of longitudinal flanged pieces 9 and cross-ribs 10, to which plates are secured, and in the space between the inclined

floor portions 7 and the outer vertical side plates 3 of the car are interposed diaphragms 10', constituted by plates or flanged sections which are riveted to the side plates 3 and to the floor-sections. These diaphragms contribute greatly to the strength and rigidity of the car structure.

The center sill 2 projects upwardly from the lower edges of the doors and is preferably provided at the top with an angular ridge 11. The sill is of novel construction in that its sides are made of flanged beams having webs and marginal flanges, and the top of the sill is composed of trough-plates, which may be bent or rolled and which (when made of two parts) are riveted together at the apex and also riveted at the lower edges to the beams of the sill. At the middle of the car-body there is a needle-beam, of general triangular outline, constituted of a plate-girder comprising a horizontal flanged bar 12, which may be made up of two angles riveted together, inclined flanged pieces 13, extending at the same inclination as the doors and floor portions 7, and an intermediate web 14, which is riveted to the pieces 12 and 13 and has vertical flanged attaching-pieces by which it is secured to the sides of the center sill. I also provide gusset-plates 16, extending vertically in the plane of the needle-beam.

There are preferably two doors on each side of the center sill, each door extending from the needle-beam to the foot of the end incline 17 of the car-floor. To operate the doors, I employ a shaft 18, preferably one shaft for each door, journaled in hangers 19, which depend from the sides of the car. These shafts are connected by levers 20 and links 21 to the door, so that by turning the shaft the door may be raised from the open position (shown at the right of Fig. 5) to the closed position, (shown at the left of that figure,) in which position the levers 20 extend upwardly within the space afforded between the inclined floor 7 and the side plate of the car. The doors are upheld from below by latches 22, mounted to slide on pins 23 and operated by levers 24 on shafts 25, arranged within the sill. The latches 22 project through plates 26 on the sill, having rearwardly-projecting arms 27, to which the pins 23 are fixed. The slots 28 in



the plates 26 are made of the form shown in Figs. 1 and 2, having a narrow middle portion B, through which the lip on the latch may be retracted, and having shoulders C, which support the body of the latch, the shape of the latch being shown in perspective in Fig. 8. The shafts 25 extend within the center sill till they reach beneath the inclined bottom portion 17 of the car, and they are there connected, respectively, by levers 29, cross-links 30, and levers 31 to shafts 32, formed with squared ends, situated at a convenient point at the side of the car, so that by turning the shaft 32 through a very small arc the link 30 is moved in the direction of the arrow, thereby rotating the shaft 25 and retracting the latches, thus permitting both doors on one side of the car to drop and to discharge the load. When the door is raised by turning the shaft 18, a lip 33 at the edge of the door engages the lips at the ends of its latches, pushes the latches back momentarily, and the latches then spring forward by action of a counterweight 34 and lock the door shut. It will be noticed that in this construction there are separate devices for raising and for upholding the door, with independent mechanism for each. The consequence is that either if the door-raising devices should be damaged or entirely destroyed the doors will still be upheld by their latches and will not drop, whereas in cases where the same means are used for raising and upholding the doors injury to them will frequently cause the dropping of the doors and the discharge of the load of the car upon the tracks, resulting in labor and expense in replacing or removing it.

The hinges of the doors are above the level of the lower edges of the side of the car. This is a desirable construction in that it enables me to construct the door-opening of greater horizontal width than otherwise without causing the door to interfere with the rail when it is swung open.

The base of the center sill 2 is below the level of the lower edge of the sides of the car. This of importance, because it lowers the center of gravity and admits of a greater cubical capacity without exceeding the lines permissible in car construction.

The body-bolster 35 is a structure having a web with flanged edges, and about midway of its length there is a slot or hole cut in the lower portion of the web below or mainly below its neutral axis. The center sill 2 is extended through said hole or slot and is secured to the web by attaching angles or plates 36. A diaphragm or diaphragms 37, preferably two in number, arranged to form an intermediate space for the king-bolt, are fixed inside the sill on each side of the plane of the web of the body-bolster. The body-bolster has cover-plates 38 38' at the top and bottom, and instead of making it with a single web, as shown, it may be formed of two parallel webs, so as to provide a box construction. The consequence of interfitting the body-bolster

and sill in the manner just described is that a very strong construction is secured without in any way weakening the body-bolster, for as the latter is applied below the neutral axis, or mainly so, the stresses of compression put upon the bolster at the cut-away portion are entirely taken up by the sill, the diaphragms, and bottom cover-plate 38.

In Fig. 11 I show a modified construction in which the transversely-inclined floors 7', with the doors, are inclined downwardly from the top portion of the sill to the sides of the car, and in this case the diaphragms 10' are interposed between the floor portions and the vertical sides of the center sill.

In Figs. 6 and 7 I show modified constructions of the center sill and its angular ridge.

Within the scope of my invention as defined in the claims the parts may be modified in form and construction, and certain parts may be used without the others or in other combinations, since

What I claim is—

1. A car having a longitudinal center sill extending throughout its body portion, and floor portions inclined transversely between the center sill and the car sides, and having doors forming parts thereof, said parts forming the bottom framework of the car, the car being open and unobstructed below the doors to allow dumping at points between its sides, substantially as described.
2. A car having a longitudinal center sill, and a transversely-inclined floor, constituted of a door and a fixed portion, and diaphragms 10' interposed between a fixed portion of the inclined floor and an upright part of the car structure; substantially as described.
3. A car having a transversely-inclined floor, comprising a door with a fixed portion, said fixed portion being adjacent to the side of the car and extending above the base thereof, and cross ribs or diaphragms interposed between the side of the car and the floor; substantially as described.
4. A car having fixed stationary sides, a longitudinal center sill extending throughout the car-body, and a bottom or floor having oppositely-inclined portions extending from above the bases of the sides downwardly to the center sills upon which they are carried, the car sides terminating above the level of the lower part of the center sill; substantially as described.
5. A car having fixed stationary sides, and a longitudinal center sill, extending throughout the car-body, plate-girder side portions, and floor portions inclined in opposite directions from a level above the base of the side of the car down to the base of the center sill and supported on said center sill; substantially as described.
6. A steel car having fixed side portions and a longitudinal center sill extending throughout the car-body, continuous plate-girder sides, and floor portions inclined in opposite directions from the stationary sides to the



base of the center sill, and supported on said center sill; substantially as described.

7. A car-sill consisting of a box structure having flanged side beams and a covering-  
5 ridge of angle form, said ridge being composed of two flanged parts having their flanges secured together; substantially as described.

8. A car having a center sill with transversely-inclined floors and a needle-beam  
10 composed of a web and marginal flanges fixed to the floor and to the sill, and of general triangular form; substantially as described.

9. A car having a center sill with transversely-inclined floors and a needle-beam  
15 composed of a web and marginal flanges fixed to the floor and to the sill, and of general triangular form, and a diaphragm within the sill at or about the plane of the needle-beam; substantially as described.

20 10. A car having a center sill and sides, the body of said sill extending below the level of the sides and floors inclining transversely upwardly from the center sill at each side; substantially as described.

25 11. A car having continuous metal plate sides, a longitudinal center sill extending throughout the body of the car, and floors inclining transversely and upwardly from the center sill to the sides, the body of said  
30 center sill extending below the level of the car sides; substantially as described.

12. A car having a longitudinal center sill extending throughout its body, and floors inclining transversely and upwardly from the  
35 base of said sill to the car sides, at least a part of the center sill being below the lower parts of the car sides; substantially as described.

13. In combination with door mechanism  
40 and a car having inclined floor portions at the ends, a cross-link extending under the inclined floor portion to the side of the car, and a connection leading therefrom to the door mechanism; substantially as described.

45 14. The combination with a car-door and center sill, of a latch arranged within the center sill and adapted to project therefrom to engage the door; substantially as described.

15. The combination of a car-door and the  
50 sill, an operating-latch arranged within the sill, and connections extending transversely therefrom to the side of the car; substantially as described.

16. The combination with a car-door, of  
55 raising mechanism comprising a shaft extending lengthwise of the car, a lever attached to the shaft, and a link connecting it with the door, said lever extending upwardly when the door is open, the side of said car extending downwardly exterior to the body thereof  
60 below the upper end of said lever when the same is raised, affording thereby an open

space into which the lever may rise; substantially as described.

17. A car having a longitudinal sill and a  
65 body-bolster located over the truck-bolster, said sill being passed through the body mainly below the neutral axis of the latter; substantially as described.

18. A car having a body-bolster located over  
70 the truck-bolster and formed with a continuous web plate or plates having a hole cut therein mainly below the neutral axis, and a longitudinal sill passed therethrough; substantially as described.

19. A car having a body-bolster located over  
75 the truck-bolster and formed with a continuous web plate or plates, having a hole cut therein mainly below the neutral axis, and a longitudinal sill passed therethrough, said sill being  
80 formed of metal pieces with a diaphragm interposed at or near the plane of the bolster to resist compression; substantially as described.

20. A car having a body-bolster located over  
85 the truck-bolster and formed with a continuous web plate or plates having a hole cut therein mainly below the neutral axis, and a longitudinal sill passed therethrough, said bolster having a cover-plate at its lower side;  
90 substantially as described.

21. A car having a center sill, diagonal  
braces inclined upwardly therefrom to the sides of the car above their lower ends, and  
95 doors hinged at intermediate points of the diagonals, said points being at least as high as the level of the side base-line of the car; substantially as described.

22. A car having a body-bolster located over  
the truck-bolster and provided with a top  
100 flange, a bottom flange, and a continuous web plate or plates arranged to transmit bending strains from the top flange to the bottom flange, said web plate or plates having a hole  
105 cut therein, and a longitudinal sill extending through the hole; substantially as described.

23. A steel car, having a longitudinal center  
sill extending throughout the car-body, and plate-girder sides extending below the  
110 level of the top of said center sill; substantially as described.

24. A steel car, having a longitudinal center  
sill extending throughout the car-body, and continuous plate-girder sides having vertical  
115 strengthening members secured thereto, said sides extending below the top of the center sill; substantially as described.

In testimony whereof I have hereunto set my hand.

ARTHUR B. BELLOWS.

Witnesses:

THOMAS W. BAKEWELL,  
G. I. HOLDSHIP.