No. 608,414.

Patented Aug. 2, 1898.

C. C. WENTWORTH.

FLOOR FRAME FOR RAILWAY CARS.

(Application filed Aug. 25, 1897.)

(No Model.)

3 Sheets—Sheet 1.

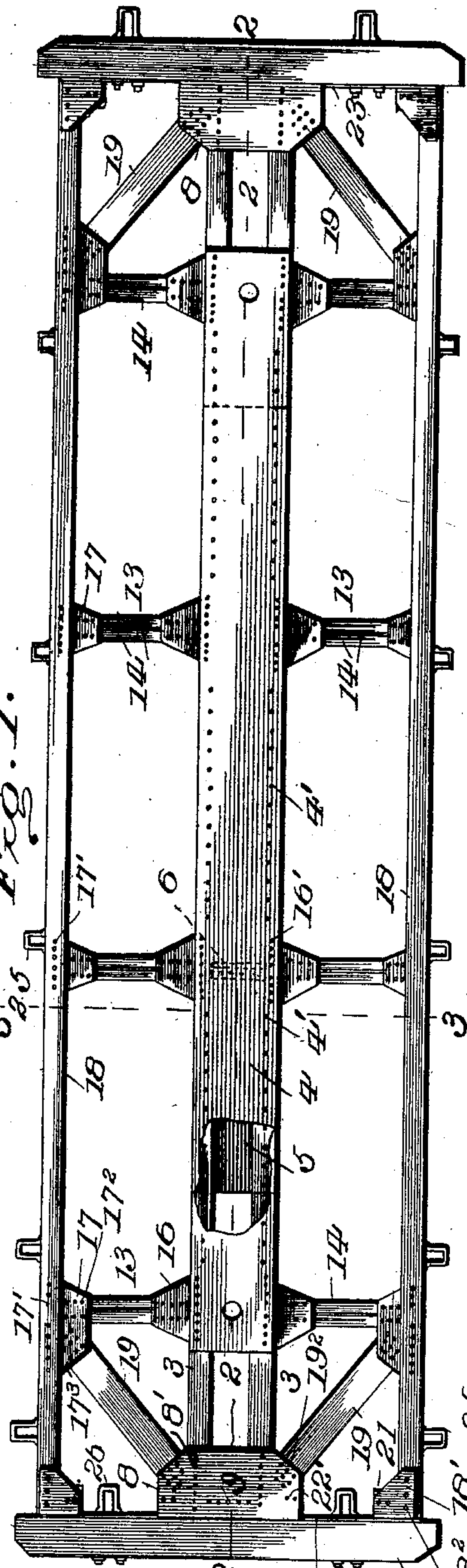

Fig. 1.

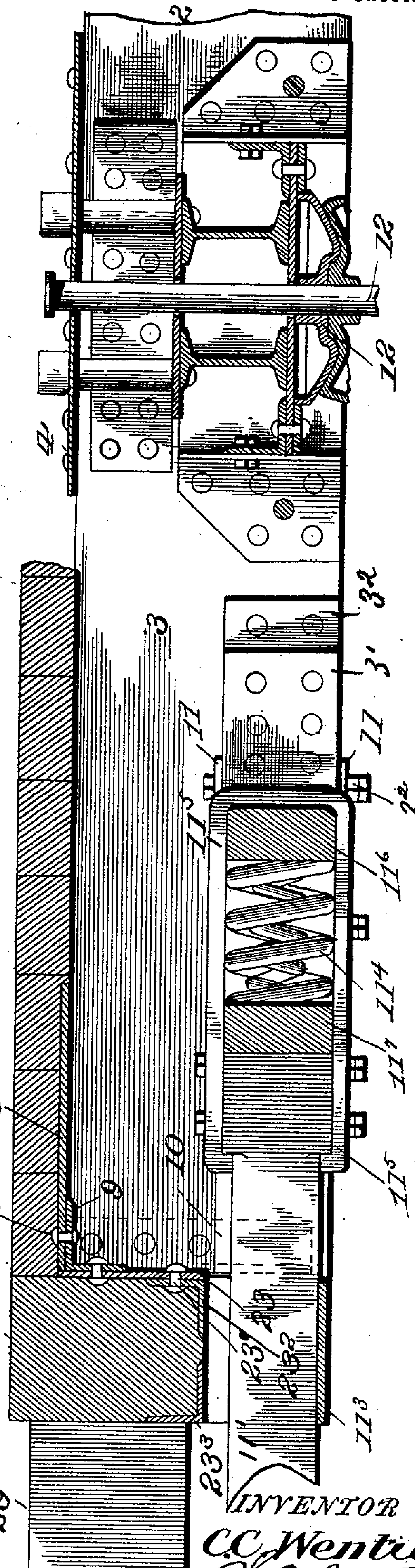

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

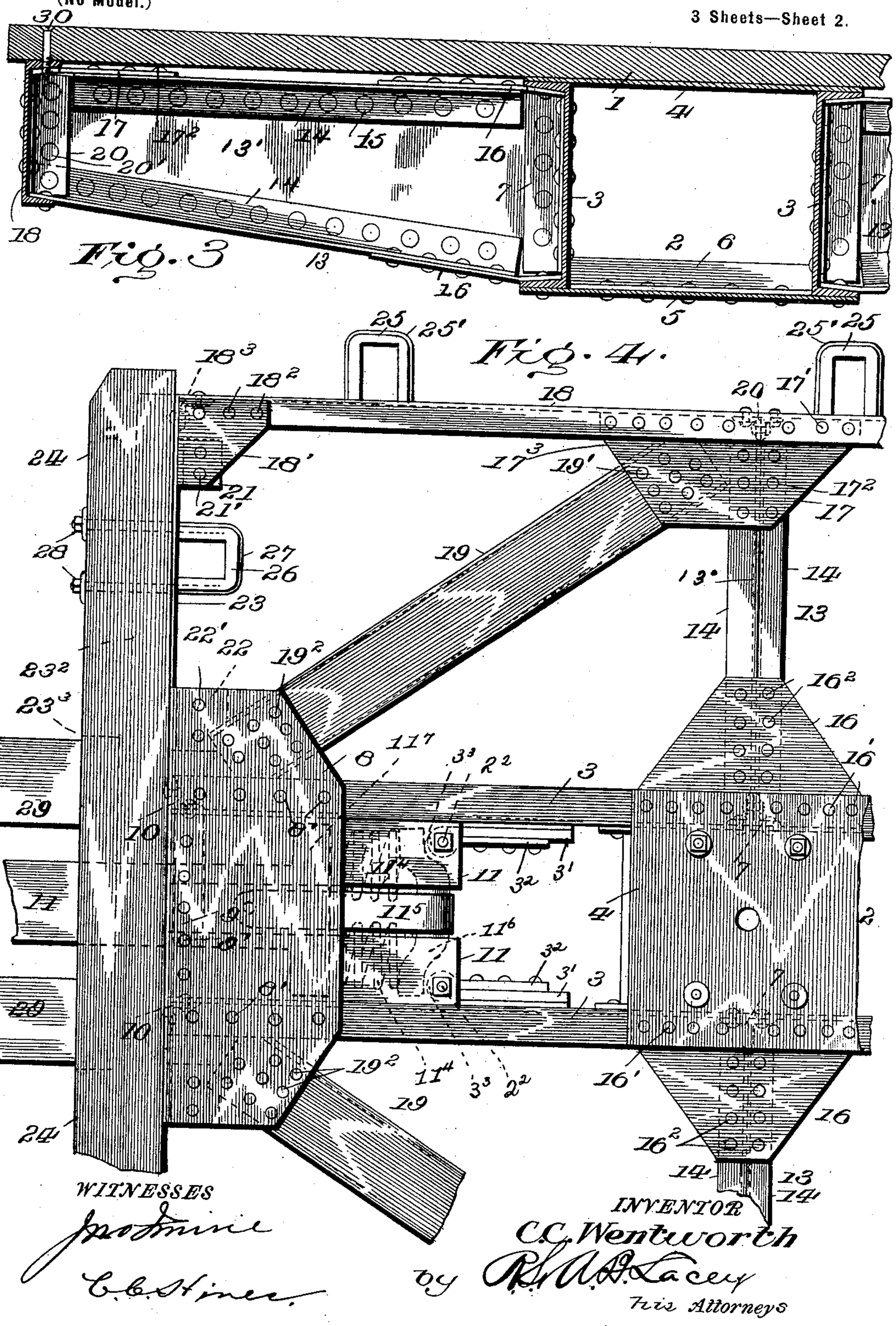

Fig. 3

Fig. 4.

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Fig. 5.

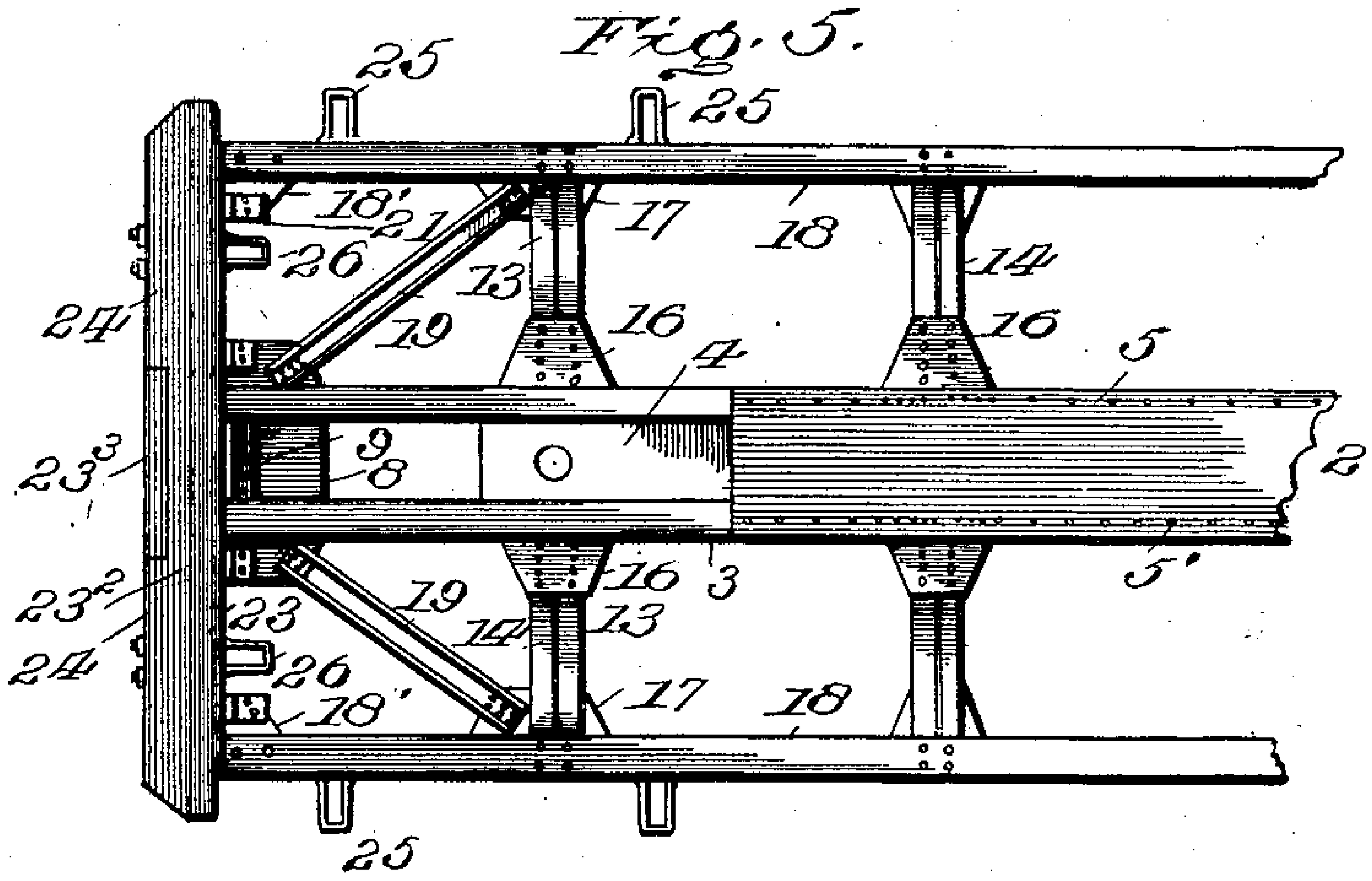
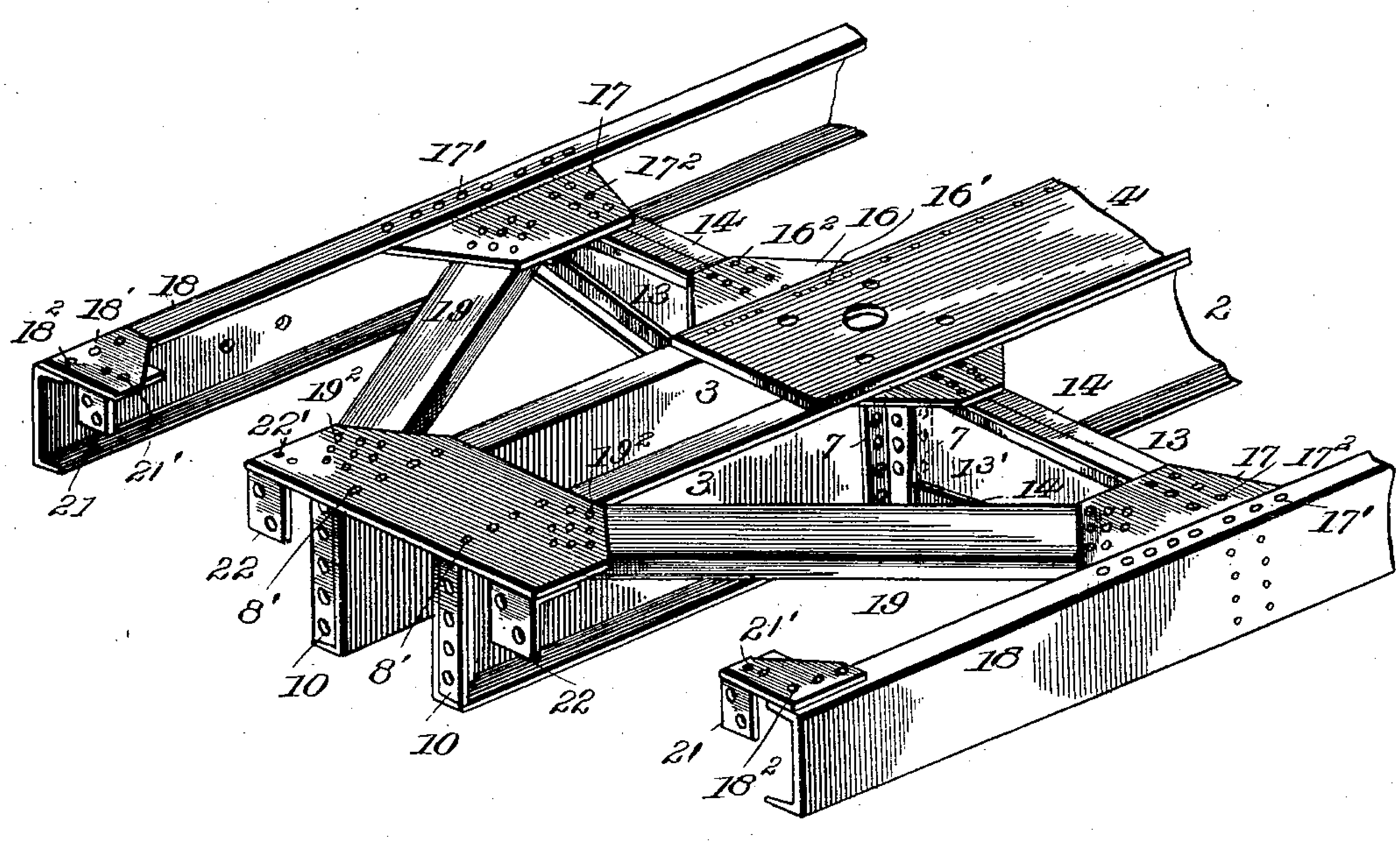


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES C. WENTWORTH, OF ROANOKE, VIRGINIA, ASSIGNOR OF ONE-HALF TO J. E. M. HANCKEL, OF SAME PLACE.

FLOOR-FRAME FOR RAILWAY-CARS.

SPECIFICATION forming part of Letters Patent No. 608,414, dated August 2, 1898.

Application filed August 25, 1897. Serial No. 649,518. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. WENTWORTH, a citizen of the United States, residing at Roanoke, in the county of Roanoke and State of Virginia, have invented certain new and useful Improvements in Floor-Frames for Railway-Cars; 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 has relation to the structure of railway-cars, and more particularly to the floor-framing of freight-cars; and its object is to dispense with the wooden framing commonly employed and provide in lieu thereof a novel structure of steel or other metallic framing possessing simplicity of construction, great durability, lightness, and maximum strength to adapt the car to sustain without injury or distortion the various strains to which cars of this character are subjected, whether due to the weight of the load carried or to the forces continually exerted in starting and stopping the car or train.

A further object is to so construct the framing as to provide for distributing the shocks or strains throughout the car, to make provision for equally distributing strains caused by the weight of the load from the central girder, especially between the two sets of trucks, to the side sills and coacting parts of the framing, and resist the stresses due to the shocks produced in starting and stopping and to "poling" and "side-wiping," and thereby prevent injury to the car.

With these and other objects in view the invention consists of a railway-car framing embodying certain novel features of construction, combinations, and arrangements of parts, as will be hereinafter more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings hereto annexed and forming part of this specification, Figure 1 is a top plan view of the floor-framing of a car constructed in accordance with my invention. Fig. 2 is a longitudinal section on the line 2 2 of Fig. 1. Fig. 3 is a transverse section on the line 3 3 of Fig. 1, and Fig. 4 is a plan view illustrating one end of the floor-framing on an enlarged scale. Fig. 5 is a bottom plan view of one end of the frame; Fig. 6, a perspective view of the same.

Referring now more particularly to the accompanying drawings, 1 represents the car-flooring, which may be of wood, iron, or steel and is laid upon my improved framing.

The framing comprises in its construction a central girder 2, of box-girder form, extending longitudinally between the end sills and consisting of two vertical side steel channel-beams 3, having their webs or flanges facing outwardly, and top and bottom plates 4 5, united by bolts or rivets to the said webs or flanges of the channel-beams. This central girder takes the place of the ordinary continuous draw-bar and has the draw-gear attached thereto, as will appear more fully hereinafter, and I construct it of box-girder form for the reason that this form is the strongest, with a given weight of steel, that can be built, both vertically to sustain weight and laterally to resist distortion. The two channel-beams 3 are connected at intervals throughout their length and maintained in proper relation by angle-iron distance-plates 6, riveted to the bottom plate 5 of the girder. Angle-iron stays 7, arranged in pairs between the webs of the channel-beams and having their contiguous flanges riveted to a web-plate 13′, are also provided at the junction of the distance-plates to sustain said beams against vertical strains.

8 represents the central end tie or attaching plates, which are bolted or riveted to the webs of the channel-beams 3 and are extended beyond the same and also united to knee-irons 9 by rivets 9′, said knee-irons being in turn riveted to transverse metallic plates 23 on the end sills 24, as hereinafter described.

By having a central girder 2 of great strength provision is made whereby buffing shocks can be received without injury and transmitted from car to car throughout a train, which is a desideratum, as these shocks are necessarily felt chiefly by the central portion of the car whatever its construction. The pull of the locomotive is also thereby readily transmitted to the car and throughout the train by having the draw-gear attached directly to said central girder. By this con-

struction the necessity for a continuous draw-bar is avoided. It will thus be understood that all the stresses that the car is subjected to, whether due to the weight of the load or to the forces continually exerted in starting or stopping the car, are provided for in the most direct and economical manner by a girder arranged where such shocks or strains are directly encountered and which is adapted to sustain them without injury.

While the central girder is designed to carry the weight of the load between the trucks, the case may occur, as when heavy machinery is being loaded, that the weight of the same cannot be entirely sustained directly by the girder, especially if the load is on one side of the car only. To obviate this difficulty, I provide cross frame tie-braces 13, each consisting of an upper and lower series of horizontal angle-beams 14, arranged in pairs, and a vertical plate 13′, interposed between the vertical flanges of said beams and united thereto by rivets or bolts 15. These tie-braces extend on opposite sides from the central girder 2 to the longitudinal side sills or girders 18, which latter are constructed of steel channel-beams having their webs or flanges facing inwardly. The outer ends of the lower series of angle-beams 14 rest upon the base-webs of the side sills, while the outer ends of the upper series of angle-beams are attached by rivets 17^2 to side tie-plates 17, which in turn are united by rivets 17′ to the upper web of the side sill. The inner ends of both the upper and lower series of angle-beams 14 are bolted or riveted to upper and lower central tie-plates 16, which are in turn bolted or riveted to the flanges of the adjoining channels 3 of the central girder. The ends of the flooring boards or plates may be secured to the side sills and other parts of the frame by screws 30, passing through threaded apertures therein. Vertical angle-iron stay-plates 20, similar in construction to the stay-plates 7, are also inserted between the webs of the side sills and riveted to the lower series of angle-beams of the cross tie-brace and to the web-plate 13′. These cross tie-braces are arranged in line with the distance angle-plates 6, so that an exceedingly strong and rigid construction of parts is afforded at this point to withstand lateral strain and prevent inward deflection, spreading, and distortion of the side sills or girders 18 and central girder 2. It will be seen that by this construction great economy is insured, for the reason that the cross tie-braces being rigid in pairs across the car a deflection on one side must be accompanied by a corresponding rise on the other, or if one side girder is bent or deflected downward in a vertical plane by the side loading hereinbefore mentioned the other side girder is bent or deflected an equal amount in the opposite direction. Therefore the total resistance to deflection on the one side is the sum of the capacities of the two sides, considering their span as the distance longitudinally between the trucks. This follows from the fact that the moment of resistance of the central girder is so much greater than the sum of the moments of resistance of the two side girders that it constitutes a fulcrum on which the rigid cross tie-braces acting as levers distribute the disturbing force of a weight on one side to both side girders.

The central girder 2 may be built of two steel channels, one on each side, and a top and bottom cover plate, or it may be built of plates and angles, as may be most desirable. The side girders may be made of a beam, channel, or built type of plates and angles. The separate parts of the steel framing may all be riveted together or the holes may be reamed and tightly-fitting interchangeable bolts used, as desired.

18′ represents end tie or attaching plates located at the corners of the frame at intersection of the side beams or girders and end sills 24. These plates are united by rivets 18^2 to the upper web of the said side girder and by rivets 21′ to an angle-bracket 21, which latter is in turn riveted to the inner transverse sill-plate 23. The side girders are also connected with said sill-plate by knee-irons 18^3, which also assist in supporting the end tie-plate.

The floor 1 may be made of timber or of metallic plates supported on the central girder 2, the side girders 18, and the cross tie-braces 13, and for box-car construction the side girders may act as sills or carry the sills of the side framing. For platform-cars stake-pockets 25 will be provided. Heretofore more or less difficulty has been experienced, especially in metal cars, in maintaining these pockets in vertical position against sidewise or lateral deflection. This deflection is primarily due to the load bending the stake outward and causing the same to act as a lever on the pocket. The side girder is bent or distorted outwardly at the point where the stake-pocket is attached under the strain, and the pocket and stake assume an inclined position. I propose to obviate this difficulty by arranging the stake-pockets at points where the girder is reinforced and has its maximum strength. To this end each stake-pocket is formed with a groove, in which fits the bend of a U-shaped bolt 25′, and the threaded shanks of this bolt project through the side girder 18, close to the point of connection of the cross tie-braces 14 and tie-plates 17. As the girder is reinforced by said cross tie-braces and tie-plates, the deflection mentioned cannot occur, and thus the stake-pocket will be held firmly in vertical position.

26 represent the end stake-pockets, and 27 the U-bolts thereof, the shanks of which project through the end sill-plate 23 and end sill 24 and are fitted with retaining-nuts 28.

To further strengthen the framing and prevent injury from what is known as "poling" of cars in yards or from the effects of "side

wipes," I have provided at each corner of the framing a diagonal tie-brace consisting of a steel channel-beam 19, extending between the central end or attaching plate 8 and contiguous side tie-plates 17 and united to the extensions thereof by rivets 19′ 19^2, as shown. These diagonal tie-braces effectually prevent distortion of the side girders longitudinally. The side extensions of the center end tie-plate 8 are strengthened by angle-brackets 22, united thereto by rivets 22′.

The end sills 24 are preferably constructed of timber provided on the inner side thereof with the metallic plate 23, before referred to. This plate is united by rivets 23′ to an angle-bracket 23^2, secured to the lower end of the sill. The sill may also be provided with an angle wear-plate 23^3.

The central girder 2 is of sufficient width to receive the draw-gear and central bearings of the trucks and also to permit of the buffer-blocks 29 being connected to the end sills 24 directly in line with the side channel-beams 3 of the central girder. The base-plate 5 of the central girder is dispensed with at the point of connection of the trucks and draw-gear.

Inclosed within the central girder at each end thereof are the draw-bar guides 11, consisting, preferably, of upper and lower plates bolted or riveted to the channel-beams 3.

11′ represents the draw-bar, which slides on a carry-iron 11^3, arranged below the end sill 24, and the said bar carries at its inner end a yoke 11^5, which extends between the said two guides. In each guide is a draw-spring 11^4, and these springs are arranged, as usual, between the transverse followers 11^6 11^7. The inner ends of vertical stop-plates 3′ 3^2, bolted to said channel-beams in rear of each guide, project between the upper and lower plates of the guide and limit the movement of the follower 11^6. The ends of follower 11^7 in practice bear against similar stop-plates (not shown) also bolted or riveted to the channel-beams 3 adjacent to the end sill 24. The inner end of the plate 3′ is formed with an eye 3^3, which engages a bolt 2^2, connecting the upper and lower guide-plates. The center plates 12 of the truck-frame and king-bolt or center-pin 12′ and attached parts are also inclosed in the central girder 2, as illustrated in Fig. 2.

From the above description, taken in connection with the accompanying drawings, my invention will be clearly understood. It will be seen that I have provided a floor-framing for cars which while simple in construction possesses great strength, rigidity, and durability and also capability of withstanding the various strains to which freight-cars are subjected, and that by its use a car may be built of steel that will not weigh more than one of timber of equal capacity, which is of great importance in that the weight of the car must be kept as low as possible in order to allow for a large proportion of paying load. The lifetime of the car will be greatly prolonged, amount of annual repairs kept at a minimum, and the chance of loss by wrecks or fire greatly diminished.

I desire it understood that I do not limit my invention to the specific construction and relation of parts herein shown and described, but reserve to myself the right to make such changes and modifications as fairly fall within the spirit and scope of my invention.

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

1. In floor-frames for cars, the combination with the end and side sills, of a longitudinally-extending central box-girder, comprising side channel-beams having their webs facing outwardly, and top and bottom plates, and cross tie-braces each consisting of a web-plate and an upper and lower pair of angle-beams having their ends connected with the webs of the side sills and channel-beams of the central box-girder, substantially as described.

2. In floor-frames for cars, the combination with the end and side sills, of a longitudinally-extending central box-girder 2 comprising side channel-beams 3 having their webs facing outwardly and top and bottom plates 4 5, cross tie-braces 13 connecting the central girder and side sills, each consisting of a web-plate and upper and lower pairs of connected angle-beams 14, the lower pair having their outer ends resting upon the lower web of the side sill, and tie or attaching plates 16 17 connecting the outer ends of the upper pair and inner ends of both pairs of cross tie-beams to the side sills and central girder, substantially as described.

3. In floor-frames for cars, the combination with the end and side sills, of a longitudinally-extending central box-girder, comprising side channel-beams having their webs facing outwardly, and top and bottom plates, cross tie-braces each consisting of a web-plate and an upper and lower pair of angle-beams having their ends connected with the webs of the side sills and channel-beams of the central box-girder, and distance-plates between the channel-beams of the central girder and the junction of the said cross tie-braces, substantially as described.

4. In floor-frames for cars, the combination with the end and side sills, of a longitudinally-extending central box-girder 2 comprising side channel-beams 3 having their webs facing outwardly and top and bottom plates 4 5, cross tie-braces 13 connecting the central girder and side sills, each consisting of a web-plate and upper and lower pairs of connected angle-beams 14, the lower pair having their outer ends resting upon the lower web of the side sill, tie or attaching plates 16 17 connecting the outer ends of the upper pair and inner ends of both pairs of cross tie-beams to the side sills and central girder, and the vertical angle-braces 7 20 fitted in the recess of the side sills and channel-beams

of the central girder and attached thereto, substantially as described.

5. In metallic floor-frames for cars, the combination with the end sills, of a plate on the inner side of each end sill, a longitudinally-extending central box-girder, tie or attaching plates connecting the end-sill plates and ends of the girder, buffer-blocks connected to the end sills directly in line with the side beams of the girder, draw-bar guides inclosed in each end of the girder and bolted to the said side beams thereof, and draw-bars projecting through the ends of the girder on a line between said buffer-blocks and having followers movable in said guides, substantially as described.

6. In metallic floor-frames for cars, the combination with the end and side sills, of plates secured to the inner sides of said end sills, a longitudinally-extending central girder, end tie-plates connecting the ends of the girder to the sill-plates, cross tie-braces connecting the girder and side sills, and end tie-braces extending diagonally from the outer ends of the cross tie-braces to the ends of said end tie-plates, substantially as described.

7. In metallic floor-frames for cars, the combination with the end and side sills, of a plate on the inner side of each end sill, a longitudinally-extending central girder, end attaching or tie plates connecting the ends of the girder to the plates on the end sills, cross tie-braces, tie-plates attaching the ends of said cross tie-braces to the central girder and side sills, and end diagonal tie-braces connecting between the said end tie-plates and side-sill tie-plates of the adjoining cross tie-braces, substantially as described.

8. In floor-frames for cars, the combination with the end and side sills, of a longitudinally-extending central box-girder comprising side channel-beams and top and bottom plates, buffer-blocks connected with the end sills directly in line with said channel-beams, cross tie-braces consisting of an upper and lower series of angle-beams having their abutting webs connected and their ends attached to the webs of the side sills and central girder, and diagonal tie-braces extending from the side sills to the channel-beams of the central girder, substantially as described.

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

CHARLES C. WENTWORTH.

Witnesses:

A. BLAIR ANTRIM,

S. B. MOSBY.