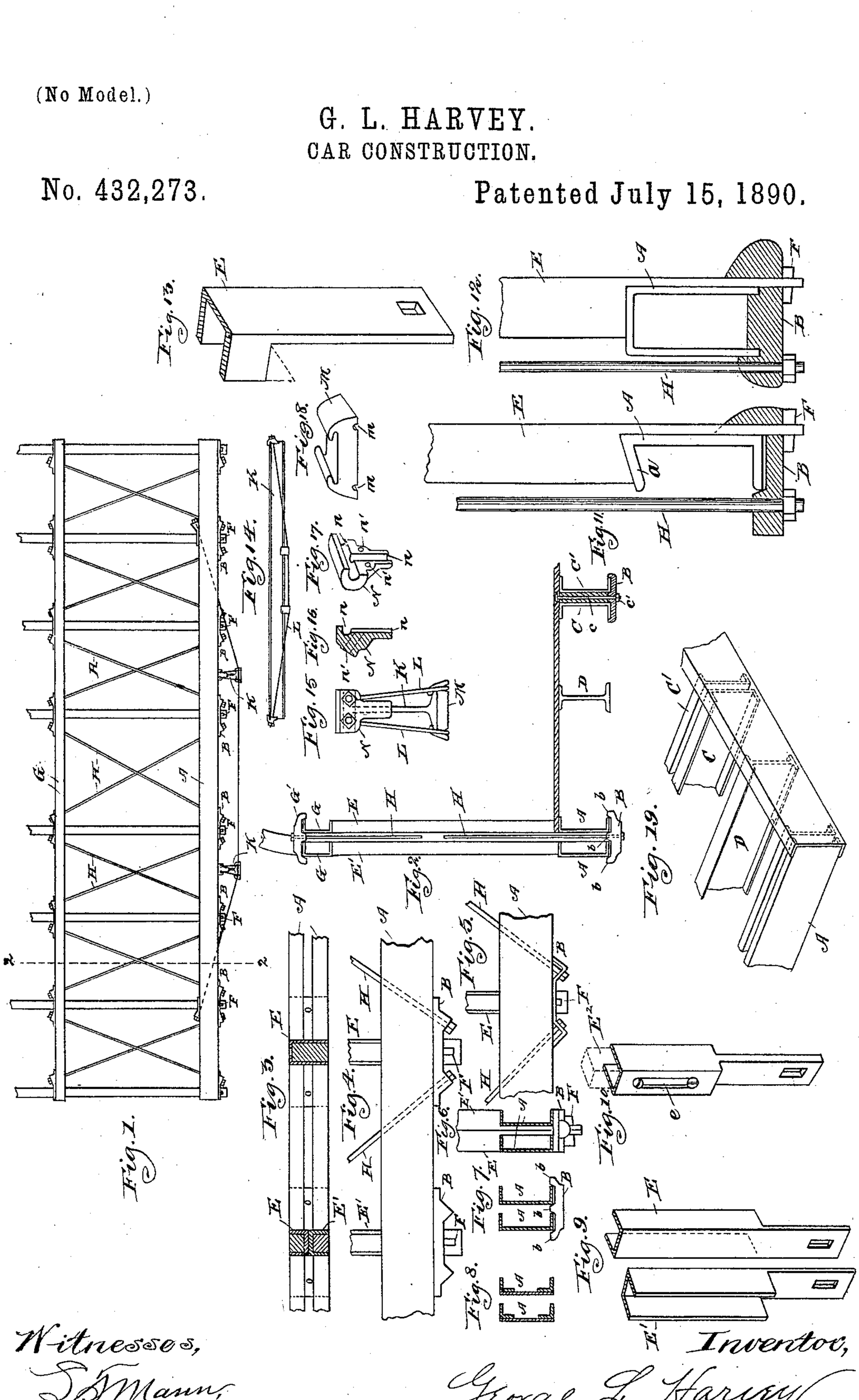
(No Model.)

G. L. HARVEY.

CAR CONSTRUCTION.

No. 432,273. Patented July 15, 1890.



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CAR CONSTRUCTION.

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To all whom it may concern:

Be it known that I, GEORGE L. HARVEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Car Constructions, of which the following is a specification.

My invention relates to certain improvements in the construction of the frame-work of cars; and its chief object is to secure a very strong and durable car at a minimum of cost and of the lightest weight consistent with serviceability.

The leading feature of my improvement is a construction which will permit of the frame members being secured together without the necessity of welding, bolting, riveting, or of weakening them by gaining, mortising, slotting, or puncturing with bolt or rivet holes. Incidental to this main feature of my invention are certain novel structural features adapted to the carrying out of the principal invention in an economical and efficient manner.

In carrying out my invention I employ, preferably, for the principal parts of the frame-work of the car metal beams having the maximum strength with minimum weight and size, and I find well adapted to these ends the channel-beams of commerce, which are adapted for use in a car of my improved construction for sills and top plates without change of form, and I can buy in the markets beams of the precise length required and use them exactly as they come from the dealer. For certain reasons channel-beams are best adapted for the sills and top plates; but other forms of beams may be found entirely suitable, such forms including, among others, I and T beams and angle-irons. Keeping in mind the desirability of securing great strength without unduly increasing the weight and bulk, metallic beams of the sort mentioned are preferably employed; but my invention is capable of embodiment in a car wherein these beams are of wood, and in the particular construction herein described the metallic beams are in some cases lined or filled with wood to secure increased strength, and also to provide for securing to the frame the siding, roof, or sheathing. I take, by preference, as the substructure of the car side sills consisting of two metallic beams, channel or U beams being the best, and for the longitudinal beams or sills to support the floor of the car between the side sills I may employ for the central sills channel-beams turned back to back, and for the intermediate sills the I-beam is well adapted. For the end sills I use, by preference, a channel-beam turned with its open side to receive the ends of the longitudinal beams or sills and secured thereto in any convenient manner. The standards or uprights, which form the frame-work for the vertical walls of the car, are also preferably composed of metal beams, channel or angle bars being well adapted for the purpose, and these standards are secured with the side sills by having their lower ends projected below the bottom of said sills and passed through plates on the under side of said sills, the lower ends of the standards being apertured to receive keys or bolts, or threaded to receive nuts, whereby they are clamped, together with the plates, securely to the sills.

In the preferred form of construction the side sills will be composed of two parallel beams arranged side by side and a suitable distance apart to permit the lower ends of the standards to pass between them, and the plates through which the lower ends of said standards pass will be fitted to receive the beams and apertured for the passage of the lower ends of the standards, as before stated. The top plates may consist of similar beams having caps fitted to embrace their upper edges and apertured for the passage of the upper ends of said standards, which are perforated for the passage of the key or bolt or threaded to receive nuts. In this way the sills, standards, and the plates are all firmly anchored together, and the frame may be further strengthened by diagonal struts or braces secured with the beams and plates in the same way as the studs.

The needle-beams may be of the usual or any approved construction; but I have added thereto a bracing or strengthening tie-rod by the employment of certain novel features of construction, which will be fully described hereinafter. The roof-frame may be made by extending the standards or some of them bent to the proper form, or the roof-timbers may be separately formed and connected to the side walls.

In the accompanying drawings, Figure 1 is

a side elevation of a frame of a car containing some of my improvements. Fig. 2 is a transverse sectional elevation thereof on the line 2 2 of Fig. 1. Fig. 3 is a broken plan view of the side sills, the standard showing in transverse section. Fig. 4 is a side elevation of the same parts shown in Fig. 3. Fig. 5 is a detail in broken elevation of one of the side sills at the junction of a standard therewith, and showing a peculiar form of securing-plate for the tie-rods and said standard. Fig. 6 is an end elevation of the parts shown in Fig. 4. Fig. 7 is an end elevation of the side sills and the bottom plate for securing the standard and tie-rods. Fig. 8 is a section showing composite channel-beams suitable for use as side sills. Fig. 9 is a perspective view of the lower end of a double standard, as shown in section at the left of Fig. 3. Fig. 10 is an inside view of the lower end of one of these standards adapted to receive a wooden lining, and showing provisions for securing the lining, the same parts being shown in transverse section at the right of Fig. 3. Fig. 11 is a transverse section through the side sills (single in this instance) and through its securing-plate, a tie-rod and standard showing in broken elevation. Fig. 12 is a transverse section through a side sill, which in this instance is a U-beam, and showing also the lower end of the standard and the tie-rod secured with the sill by a cap. Fig. 13 is a perspective view of the lower end of an upright standard, the flanges whereof are cut away and the web left intact and apertured for the passage of a securing-wedge. Fig. 14 is a side elevation of a needle-beam. Figs. 15 to 18, inclusive, are detail views of castings for securing the tie-rods to said needle-beam, and Fig. 19 is a broken perspective of the longitudinal and end sills.

In the drawings, the double side sills are indicated by A, and in the construction shown in Figs. 2, 3, 6, 7, and 8 are composed of channel-beams placed side by side and preferably with their flanges extending in horizontal planes and projecting toward the middle of the car. These beams need no special preparation whatever for use in the car, as they may be purchased in the markets of lengths adapted to the standard lengths of cars without cutting; but as it is cheaper to use composite beams than those integrally formed I have shown in Fig. 8 types of this sort of beam which are adapted to my purposes.

B indicates a bottom plate, which may extend along the entire length of the sill; but it may be constructed in separate sections and will have its upper surface adapted to receive the particular form of sill selected. As shown particularly in Figs. 2 and 7 of the drawings, the upper surfaces of these plates have the projecting ribs *b*, the central one separating the channel-beams and the outer ones confining them to prevent lateral movement, at the same time equalizing or distributing the strains on the parts of the side sills. These plates may be cast of the form shown in Fig. 4 or wrought to the form shown in Fig. 5.

Referring particularly to Fig. 2, C C′ represent the members of the central sills, which members are channel-beams, whose lower flanges are seated upon a bottom plate B and whose upper flanges are adapted to support the floor, which may be anchored by means of the bolts *c*, passed between the webs of the channel-beams and through an aperture in the plate B and secured by the nuts *c*′. The intermediate sills D may be I-beams.

E E′ represent the members of a standard whose lower ends have their flanges cut away and their webs perforated, as shown particularly in Figs. 9 and 10, and these beams may be placed together back to back and have their lower ends passed between the members of the side sills, as shown in Figs. 2 and 6. The apertured ends of these standards are projected through suitable openings in the bottom plate B, and will be secured by bolts or keys F; or they may be threaded and secured by nuts. The plates are marked G G, Fig. 2, and they may be formed of channel-beams the same as the side sills—that is, two of them being employed and separated to permit the passage of the upper ends of the standards, which may be formed in all respects similar to their lower ends.

G′ represents a cap for the top plate, which may be formed in short sections; or a single continuous plate might be employed. As an additional means of strengthening the frame, I may employ the tie-rods H, (see Figs. 1, 2, 4, and 5,) which may be extended diagonally between the side sills and plates, their ends projected between the members thereof, respectively, and passed through apertures in the cap and bottom plates and secured by nuts or keys. The end sills are shown in Fig. 19 and are channel-beams whose flanges receive the ends of the longitudinal beams.

Instead of the double sills heretofore described, I may employ a single sill, as shown in Figs. 11 or 12, the former showing a single channel-beam supported by means of a standard having its web passed down on the outside of the channel-beam, and preferably welded thereto, and its extreme end passed through an aperture in a bottom plate, the other side of said plate being supported by a tie-rod H, while in Fig. 12 the U-beam is shown, the open side of the U turned downwardly. In Fig. 13 is shown the manner of forming the lower end of the standard when used as just described. In Fig. 11 the upper flange *a* of the channel-bar forms an acute angle with the web, and the standards have their flanges correspondingly inclined, the result of which construction is that when the parts are secured together the inclined surfaces prevent lateral separation. In Fig. 10 the lower end of the standard has its web offset at the junction of the sills or plate, and the web also has longitudinal slots *e* for the passage of screws or nails to secure the wooden

filling E^2, and also providing spaces for the passage of nails to secure the inside sheathing.

Referring now to Figs. 14 to 18, inclusive, K represents a needle-beam, which may be an I-beam, and in order to stiffen this beam I employ the tie-rods L, which are passed beneath a block M, whose upper surface is fitted to embrace the lower flanges of the I-beam and whose under surface is grooved, as at *m*, to furnish seats for the tie-rods. The outer ends of these rods are passed through apertures in a clamp N, having grooves *n* in its front face to adapt it to embrace the end of the web and flange of the I-beam, and apertures *n'* for the passage of the tie-rods, and which will be supported beneath the bottom of the car transversely to its sills, as shown in Fig. 1, or in any other convenient manner.

I do not of course intend to limit my invention to the precise construction herein particularly illustrated and described, as the principle of my invention might be utilized where the structural adaptations were different. The resultant effect of my method of securing the frame members together is to obviate entirely any sheering effect, as the strains to which the joints are subjected are all tensile, and this is a matter of great importance in the construction of cars, which are subjected to continual and violent oscillations when in use. This method of construction has other features of utility, such as the interchangeability of parts, and a consequent reduction of the cost of construction and the capability of replacing worn or broken parts. For example, the standards are all interchangeable in cars of the same height. The cap and base plates may also be so made as to be interchangeable and adapted to cars of varying heights. These parts may also be used in the construction of various kinds of cars—such as freight and passenger cars—and a car may have its construction changed, for example, to provide for doors or for closing openings in cars by the insertion or removal of one of the standards—readily effected by the loosening of the wedges or nuts; and the height of a car may be changed by the removal of the standards and the substitution of others of greater or less length.

I claim—

1. A car-frame having in combination with the side sills and plates standards whose ends are projected above the plate and below the sill, respectively, and securing means applied to said projecting ends whereby to anchor the members together, substantially as described.

2. In a car-frame, the combination, with the side sills and plates thereof, of standards whose ends are projected, respectively, above the plate and below the sill and through suitable plates or washers and secured with said plates or washers, whereby said frame-work is tied or anchored together, substantially as described.

3. A car-frame having in combination with the side sills and plates thereof, each composed of a pair of separated members, standards whose ends are adapted to pass between the sill and plate members, respectively, and projecting above the plate and below the sill, and securing means applied to said projected ends whereby to anchor the frame-work together, substantially as described.

4. A car-frame having in combination with side sills composed of a plurality of members separated to permit the passage of a standard between them a bottom plate adapted to receive said sills and apertured for the passage of the ends of the standard, a plate constructed from a plurality of members, separated for the passage of the upper end of the standard, and a cap fitted to the top of said plate and apertured for the passage of the upper end of the standard, and securing means applied to the ends of said standards whereby to anchor or secure the frame-work together, substantially as described.

5. In a car-frame, the combination, with the sills and plates thereof, each composed of a plurality of separated members, of standards whose ends are projected between said members and above the plate and below the sill and having securing means applied to said ends, and braces secured with the sills and plates, respectively, substantially as described.

6. In a car-frame, the combination, with the sills and plates thereof, of standards composed of channel-beams whose ends are projected above the plate and below the sill and anchored at their respective ends to the sills and plates, and having a wooden filling embraced by the flanges of the standards, whereby to secure the car-covering, substantially as described.

7. In car construction, a sill constructed from a metallic beam having a web or body and angular flanges to impart strength to said body, in combination with suitable standards and plates, said standards having their ends projected below the sills and above the plate and being adapted for securement with said sills and plates, substantially as described.

8. In car construction, the combination, with a flanged metallic needle-beam, of castings having grooved faces to adapt them to the ends of said beam, and apertured for the passage of bracing-rods, and a plate secured with the beam centrally thereof, and having seats for said rods, whose ends are secured with the castings, substantially as described.

9. In car construction, the combination, with sills having their upper surfaces inclined, of standards having their ends fitted to the inclined surface of the sills, and having also a bearing on a side face of said sill, substantially as described.

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