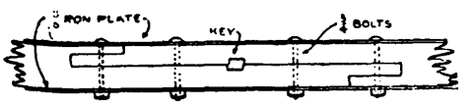
## The Construction of a Railway Passenger Car.

(*Continued from page 505.*)

when it is laid length-wise of the car, the boards which are worn can easily be replaced.

In old cars, with wooden platforms, you, no doubt, have noticed how the ends droop; this is because the sills gradually bend, but with the steel platforms and plating the sills, this has all been overcome; and in trussing the cars it has been the custom for most builders to turn the ends up from ⅛ to 3-16 in. to ensure a straight car without drooping ends after the strain comes on to the truss rods and woodwork after the car goes into service. The side sill plates are hammered by the blacksmith, on the flat side, to take the shape of the chamfer of the car.



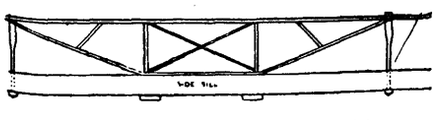

Sill splice invented by C.P.R. employe.

The next parts of the car to put on are the posts, top plate, and elevation deck. In lining up the top side plate, it is customary to pull it in ⅛ in. on each side in the centre. Iron deck carlines are put in about 6 ft. apart, and wherever partitions cross the car there is an iron carline placed with a lug projecting at the bottom of the deck rail, so that a rod can be run across the car to tie it together. In setting up frame, it is tied together and braced by strips of boards, some cut the right length for supporting the elevation deck, and for the width of the upper deck boards are cut out with notches in them, and nailed temporarily in the deck sash openings. The frame is now in its right position and securely held by temporary bracing.

The next parts of the car to put in are the belt rail, ribs, braces, and blocking. When the blocking of the frames was first introduced, it was a decided improvement over cars formerly built without blocking; it makes a warmer car and more rigid. The mode of applying the blocking is by rabbetting the posts about ¼ x ¾ in. deep, and fitting the blocking in tight, and glueing and nailing the same.

The next process is to put in the belt rail, ribs and braces. Great care has to be taken in fitting the ends of the braces; a piece of 1-16 in. sheet iron is driven into the joint to ensure a perfect fit. This also makes a stronger job, and prevents the braces from pressing into one another. After the brace has been applied, the blocking is put in. In some cases, the long bracing and ribs have been discarded, and in their place the car sides are sheathed up with 1½ in. poplar planks, fitted tightly together and glued, also gained to fit tightly around the post.

The inside truss rod, size ½ x 2 or 2½ in., with round ends, and supported with cast iron truss posts (located usually over one of the bolsters), is for two purposes, one for holding up the end of the car, the other for holding down the centre of the car when the car received heavy blows from shunting. For heavy cars the inside truss rod is sometimes varied as shown in this sketch.



The present mode of applying inside truss rods is to gain the posts in the mill all the same distance from the bottom, and this raises the inside truss rod in the centre the same as the camber of the car. I consider this wrong practice; this rod should run perfectly horizontal, after the camber of the car has been put in; this, then, would make it serve a third purpose, of holding up the centre of the car in place of pulling it down, and in place of gaining posts in the mill all the same distance from bottom, these gains should be cut into the posts by hand. It can be readily seen that the weight of the ends of the car and the downward blow the ends receive from hard shunting, has a tendency to straighten this rod, and in so doing pulls the car down in the centre. This slackens up the inside rod and lets the ends down, but if the inside truss rod is put in straight, there is no chance for it to slacken. If the bottom outside rod should get slack, the inside rod would commence to pull, and the weight of the ends of the car will help to pull the centre of the car up.

The side of the car is bolted together with ⅝ in. rods running from the plate through the sill. If the pillar is 4 in., one rod is placed through the centre, for pillars of about 12 in. down at the side; if it is a very wide pillar, these rods are put in about 12 or 14 in. apart. The end rods running down through the end plate are usually about ⅞ in. The elevation deck is bolted in a similar manner, and all the pillars between the deck sash are framed up solid.

The roof boards are usually white pine or poplar; for the lower deck about 2 in., and the upper deck about 2½ in. wide. Great care should be taken in laying the roof boards; they should be both nailed and screwed to prevent the roof from creaking, and any high joints should be dressed off to prevent them from showing through the canvas.

For roof covering, no. 6 canvas, 40 in. wide, the weight of which is 1 lb. 8 oz. per yard, has been almost universally adopted, and it is found that this gives a much better roof than the old style of tin, which would crack in the joints form the working of the car. When the canvas roof was first applied, it was thought necessary to coat the canvas underneath with paint, but later this was found not to be necessary, and it makes a much better roof without the paint on the underneath side on account that the canvas can be stretched much better and put on tighter without the underneath coat of paint. Copper flashing is applied around all the iron carlines where they run through the canvas on the side, and this flashing is soldered at the top, to the carline, to prevent water from getting in or running down into the car. Some builders apply copper flashing on the lower deck the whole length of the car at the deck sashes; this is quite expensive, and is found not to be necessary, as the canvas will last as long at the deck sash as at any other part. It is very important that the right kind of paint is properly applied on new canvas roof. A new roof should have no less than four coats of good paint, and one day between each coat. Canvas on the lower stretch is brought down about 1 in. on the face of the eave moulding and nailed with a double row of 16 oz. cut tacks; on the upper deck one row of tacks has been found to be sufficient, but in both cases the canvas should be pulled over and nailed on the face of the moulding, in place of at the edge.

In fitting in the sash rest, the window post should be gained on the side about ⅛ in., and sash rest should be fitted tightly in the window post so as to prevent water from getting in at the corners of the window stops.

The letter board is usually about 1¼ in. thick. In my opinion, the best practice for applying letter boards is to use two thicknesses of ⅞ in.; the first thickness is screwed on from the outside into the post, and the outside letter board is then, in turn, screwed from the inside so that there are no screw holes or plugs to show on the outside. The joints of all letter boards and sash rests should be thoroughly oiled or white-leaded; for cars finished in natural wood, oil only can be used, as white lead has a tendency to show through the varnish.

In applying the sheathing on the outside of the car, for a painted car this is usually poplar or other woods, according to location, and for a natural finished wood car, cherry, mahogany, or B.C. pine. In my opinion, the most economical way to sheath up the outside of a car is with sheathing with 3 in. face with a V groove through the centre. By using 3 in. sheathing it saves one joint where the stock is wide enough, and in cutting up the lumber all the narrow widths are used up and cut into sheathing with 1½ in. face, and both sizes used.

A great deal of trouble has been experienced from varnish peeling on the outside, and, in most cases, the painters are blamed; but after giving the question of paint-peeling a thorough study, it was found that in nearly every case it was caused by the dampness getting in behind the sheathing, especially at washstands, stove room, etc., but in some cases from the inside of the cars from washing the floors, also from the traps underneath the car from the steam heat; this was especially the case where the joints in the deafening floor underneath were bad; the steam would soak the shavings between the floors, and some cases have been seen where the dampness has penetrated the whole side of the car, and caused the paint or varnish to peel off. On natural finished wood cars these were serious questions, but they have almost been entirely overcome by soaking the sheathing in boiled oil for half an hour, and then putting it into a dry box; this forms quite a heavy coat of oil on the back and in the joints, and, in addition to soaking the sheathing in oil, the inside of it is coated, when applying, with a heavy coat of white lead, which protects the sheathing from any small amount of moisture which may get in at the back of it. I feel safe in recommending this mode of treating sheathing, even for painted cars, in the place of glueing, as the glue on the inside of the sheathing is no protection whatever from dampness, but will loosen right up. In some cases no. 28 zinc has been used for covering the whole side of the car before the outside sheathing was nailed on, to prevent water or dampness from getting in at the back.

The inside truss plank is put in the whole length of the car, about 3 in. thick, and from 10 to 11½ in. wide, with cove piece rabbetted into the plank on one side; and tongued and grooved on the other to match the flooring; the object of this is to form a water-tight corner. The truss plank is gained for post to fit into, and screws through the face into the post, and bolted to side sill with hook bolts that are also screwed to the plank with two screws that are placed at a distance of about 2½ ft. The object of the truss plank is to bind the bottom and side of the car securely together. With this mode of applying the truss plank and perfectly kiln-dried flooring, driven tightly together, the inside of the car forms nearly a water-tight compartment, so that the danger of water coming through the floors and reaching underneath floors and sills has been reduced to a minimum.

In laying out the frame of the car, the carline should be so placed in the roof that the partitions on the inside can be screwed through the face of the partition into the carlines. The edge of the partitions should also be securely screwed to the side of the car, and resting in a groove ½ in. deep, and should be solidly on the bottom of the groove at the side of the car, and about ¼ in. off