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The Construction of a Railway Passenger Car.

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In presenting an article upon the construction of a passenger railway car, I will not try to go into all the minor details, but give a general synopsis of the most important points. One of the most important things is the care and drying of the lumber. All hard-wood lumbers, after being sawed, should be carefully piled up in the lumber yard with about 1 in. strips between each layer of boards, one end of the pile should be placed even, with the top of the pile projecting over the bottom about 12 in., and the strips between the layers of boards placed opposite one another and even at the end. After the pile has been finished, it should be carefully covered over to prevent the sun and rain from warping and checking the boards. A great deal of lumber can soon be wasted in the lumber yard if it is not properly taken care of, and it is necessary to give this part of the work as much attention as any of the others in the construction of cars, and it should remain in the yard for about a year to air dry, to allow the sap to evaporate, and then be put through the dry kilns. When the lumber is going through the dry kilns, it has to be carefully watched that the right temperature is maintained. Some advocate the steaming of lumber the first day that it is placed in the kiln; the object of this is to heat the boards through and to drive out the sap; but others advocate the drying of lumber by systems of air circulation with steam pipes for heaters, while others with hot air alone. The different systems of drying lumber all have their own merits. Locality may have something to do with the preference of some of them, but the point they all look for is to thoroughly dry the lumber in the shortest time possible, without checking or discoloring. After the lumber comes out of the kiln, it should be piled up under a cover, from two to three weeks, before it is taken into the wood-mill to be cut up. The object of this is to allow the lumber to take a set under natural conditions. In working up lumber for outside and inside finish, the shops should be kept free from moisture and maintained at a fair heat, to prevent the lumber from absorbing dampness, until it is finished and varnished; after the pores are filled and varnished, it will then take a more permanent set, and will not so readily swell or shrink with the change of the weather.

Commencing with the bottom of the car. Sills without splices are always preferred

where this length of timber can be obtained, but there are not many car-building companies which are fortunate enough to be so located that they can conveniently purchase sills the required length of car without splicing. When sills are spliced, it is customary to zig-zag the splices, so that they will not all come opposite to one another. A splice illustrated on page 509 was invented by one of the men at the C.P.R. shops, and, in my opinion, this is the best splice for splicing of sills that is known to-day, as you will all note that the ends in this splice are all square, and in the bumping of a car there is



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no part of the splice that can give. The bumping of a car is considered to be a much harder strain than the pull. This cut shows two iron plates, one on top and one on bottom. But this can be buried with an iron plate on the side. A splice of this kind is made on the hollow mortising machine, and there is but very little hand labor used in trimming it up to put together. The key in the centre is used principally for drawing the two pieces together to make the shoulders tight.

Of late years, considerable iron has entered into the construction of the bottom of passenger railway cars. The side sills are

plated with plates of iron about $\frac{3}{4}$ x 7 in., some running them the total length of the sill, and others only to the centre needle beam. On the inside of this plate there is an extra sub-sill placed to receive the mortises for the bridging. In some cases I have seen cars built where this inside sub-sill was left off and the mortise put through the iron plate, but as this cuts the plate nearly in two, I would consider this bad practice, and the benefit received from the iron plate would be very small. The steel platform and wide vestibule was a decided improvement and an advance over the older style of non-vestibule cars and wooden platforms. With the present car, with steel platform, wide vestibule, and anti-telescope plate, and the end post, end plate, and end sill re-inforced with iron, the travelling public can feel secure, as it is almost impossible that a car built as mentioned, can be totally destroyed or telescoped by rear-end collision; a part of the end would only be broken, and, in most cases, the damage would not go beyond the end of the car. The passengers in the centre would possibly not receive any more injuries than a shaking up.

In building the bottom of a car, the majority are framed as follows: Two centre sills, two intermediate sills, two side sills, with $\frac{3}{4}$ in. tie rods running clear through, about 4 ft. apart. After the bottom has been thoroughly bolted together, and lined up, a false floor is nailed in between the sills, resting on cleats about 2 in. from bottom of sills; this is to receive shavings and fillings in the bottom of the car. Steel platforms, needle beams, truss rods, etc., can now be put on, and the camber of the car set, and the bottom, deafening floor laid cross-wise of the car. The bottom is now filled up with dry pine shavings, which are cheap, and answer all purposes. Some may vary from this, putting in a filling of mineral wool. This filling is put in about from $4\frac{1}{2}$ to 5 in. deep. After this, a third floor is laid on top, usually diagonally, and given a heavy coat of paint and covered with tar paper; the object of the tar paper is to make the floor warmer and also to prevent the floor from creaking; a good top floor, out of quarter-sawed hard pine, or maple, is then put on, running length-wise of the car, for coaches. In sleeping cars it is customary to lay both the top floors diagonally opposite one another, so that one will form a brace against the other, but on account of the wear of the floor in the centre of the aisle in passenger coaches, it would not be advisable to do this on the latter kind of a car on account of repairs; if the floor, diagonally laid, was worn in the centre, it would all have to be taken up, but

(Continued on page 509.)