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heated cars the steam does not enter the water at all, but heats it by means of a steam jacket or sleeve of various construction.

Steam jackets have to be made with sufficient heating surface to keep a car comfortably warm in the coldest weather with not more than 15 lbs, steam pressure, as this is as much steam as could be expected to be obtained on the rear of a ten or twelve car train in weather 20° and 30° below zero. Such weather, as you know, is not extreme, and lower temperatures are not man mal. Steam pressure lower than from two to five prands, ressure are not, with systems using steam jackets, within int to cause the water in the radiator pipes to move on circulate. The importance of this latter point is not generally clearly understood, so much so that one company manufacturing hot water heating equipment actually supplied a system in which it was proposed to heat and make the water circulate by vapor. An explanation of the causes of circulation will make clearer the chief difficulty in the heat regulation.

Hot water heating, as applied to passenger cars, is usually arranged with the pipes along the sides of the car, just above the floor, with the stove and the heating point above the level of the radiator pipes. The hot water has therefore to go down to the radiating pipes and the cool water must rise to be heated, which is the opposite of what we would expect. Let us consider the conditions as they actually exist. Assuming that the lowest heating point is two feet from the floor and that above the heater coil or steam jacket, there is a return bend with a back outlet, the pipe to the expansion drum on the roof connected to the back of the bend and the downflow pipe to heater pipes in the car on the opposite side. The situation in service might be considered as this: 2 feet of water at 80°, 6 feet of water at 212°, balancing 8 feet of water at 210°; the 2 feet of water at 80° being the water re. turning to the heater to be reheated; the water at 212° the water in and above the steam jacket, and the water at 210° the water which is going out to heat the car. From these figures it will be seen that the average temperature of the water in the riser pipe is less than that of the water in the downflow pipe and the circulation would tend to reverse, which, as a matter of fact, under such conditions it does. But the difference in the weight of the two columns is so small, about 23 grains or one-twentieth of an ounce, that the backward movement is very small. The water in the coil, however, gets hotter and hotter and finally boils. When boiling commences stcam will form very rapidly, due to the

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