

riser pipe, is turned over and pointed down the downflow pipe. The connection to the expansion drum is made from around and behind this nozzle. Water we know is practically incompressible; steam under pressure exerts an equal force in all directions. When steam forms in the riser pipe, water must be displaced out of the heater pipes as rapidly as the steam forms. The only place the water can go is into the expansion drum, but the more contracted the opening from the riser pipe to the expansion drum the more apt is the steam to force back on the water in the pipes in the car and up the downflow pipe to the expansion drum. A return bend with a back outlet because of its freer connections is much to be preferred as an accelerator fitting.

Extra heavy lap welded pipe and grey cast iron bends, ells and tees, with malleable or wrought iron couplings are best for the heater pipes. Extra heavy butt welded pipe is too apt to open on the seam in bending, and the use of the lap welded pipe will always save a considerable percentage of new work having to be stripped down after testing with the usual annoying delays. When a car happens to freeze up with the water in the pipes, the butt welded pipes will open at the seams, but with the lap welded pipes the bends and tees will fail and comparatively little of the pipe will be damaged. Grey iron fittings also provide means for getting the water out of the pipes in the car if the crossover pipes are frozen, or if for any other reason the car cannot be drained in the usual way. A hammer will break the cast iron fittings easily and the water can be got out in this way.

Lagging the expansion drums is also unnecessary. Steam is formed in the process of moving or circulating the water. If that steam does not condense, pressure will build up in the expansion drum, raising thereby the boiling point of the water and slowing the circulation by increasing the time required to bring the water up to the boiling point. The increased pressure also adds to the liability of loss of water through leakage. The tin jacket or cover, to prevent cinders lodged around the drum or entering the car through the holes around the pipes, is all that is required.

In piping a car it is always wise to have the warm water pass directly to the top and circulate downward through the coil, particularly if it is a high coil, as in baggage or mail cars, etc., as it affords some small aid to circulation. But in sleeping cars and coaches the advantage to be gained is so small that it need not be considered. If the water passes upward through a coil twelve inches high and then straight down, the water in the downflow pipe must in every case be