steam pipe to atmosphere at end of last car only, the excess of water in hot well under each car being discharged intermittently by self-acting trap.

The continuous circulation and its control (when car is detached and fire is put under hot well) cannot be said to be perfect with either system, Emerson having to use a second series of pipes on car roof to act as a condenser or cooler, while the Sewall slowly loses its water supply, from the permitted escape of steam through a pin hole at end of the continuous pipe.

The pounds of steam condensed to water per car per hour are variously given, the independent tests (far too limited in number) shewing higher figures than those given by the patentees. The Chicago, Minneapolis & St. Paul Ry. Co. obtained an average of 75 lbs. at temperatures between 20° and 40° above zero; but even their careful experiments will not permit an approximation to the weight of steam required with high winds, and temperatures from 20° to 30° below zero. It may be deduced from some experiments with these systems, and a locomotive with a boiler so large that it is not generally worked up to its maximum capacity, that 1 lb. of soft coal burnt in its fire-box will radiate an amount of heat equal to 2 lbs. of anthracite burnt in the car; therefore, after allowing a margin for fuel used when car is detached from locomotive, the total or annual cost for fuel, when the rolling stock is fully equipped for steam heating, will be but one-half of that now paid for hard coal, ranging at present on various railways from $35 to $55 per year per car.

There is no information as yet, nor can any be obtained until next winter, as to the continuous action of "traps" in getting rid of local condensation at extremely low temperature.

Hot water heaters—that is to say, the contained coil and vertical boilers of Owen, Baker, Smith, Johnson, Coughlan, Salmon, etc.—fill all requirements, except "*b*" and "*c*," and various schemes have been tried and suggested to overcome these defects, such as enclosing the whole in a metal safe with self-shutting doors, or making the water-crown of stove boiler of thin cast-iron, so that it shall, in case of accident, instantly fracture, thus drowning the fire, or arranging that derailment open a reservoir of chemicals which shall discharge into and kill the fire. The dead weight of the safe and its contained stove would be dangerous in time of collision; self-quenching arrangements cannot be depended upon if left disused, say, for twelve months; and it is possible that the escaping vapours and acids might prove quite as dangerous to life as hot cinders would.

Exhaust steam from the locomotive cylinder and from the brake air-