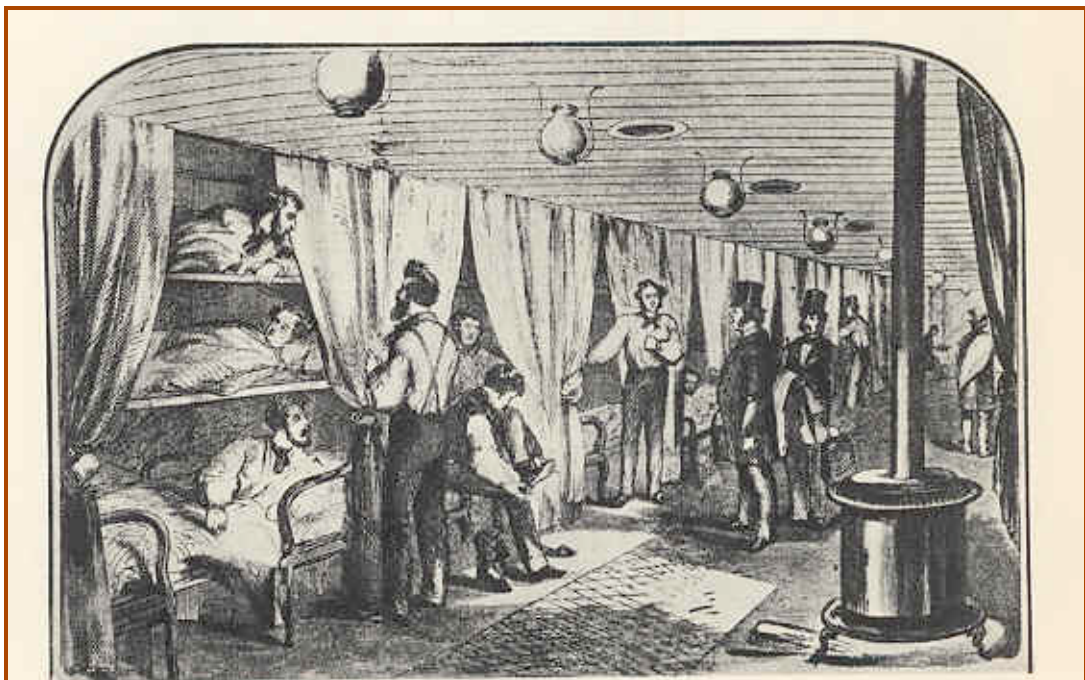


# EARLY DAYS OF TRAIN HEATING



*Sleeping car (heated by stove) New York Central Railroad 1806*

*The text extract is from "Railways: The Pioneer Years,"  
Malcolm Fletcher & John Taylor, Studio Editions, London 1990.  
The black & white illustrations are the French magazine "La Nature"*

*Early heating in passenger coaches was by portable hot water containers or "foot warmers"*

## HEATING IN PASSENGER COACHES

For a long time the heating system consisted of placing two flat, long, hot-water containers in each compartment. This was thought to be the most efficient means of heating, given the internal layout of the coaches, divided as they were into three separate compartments. Because the compartments were narrow and separate, the hot-water containers gave out sufficient heat.

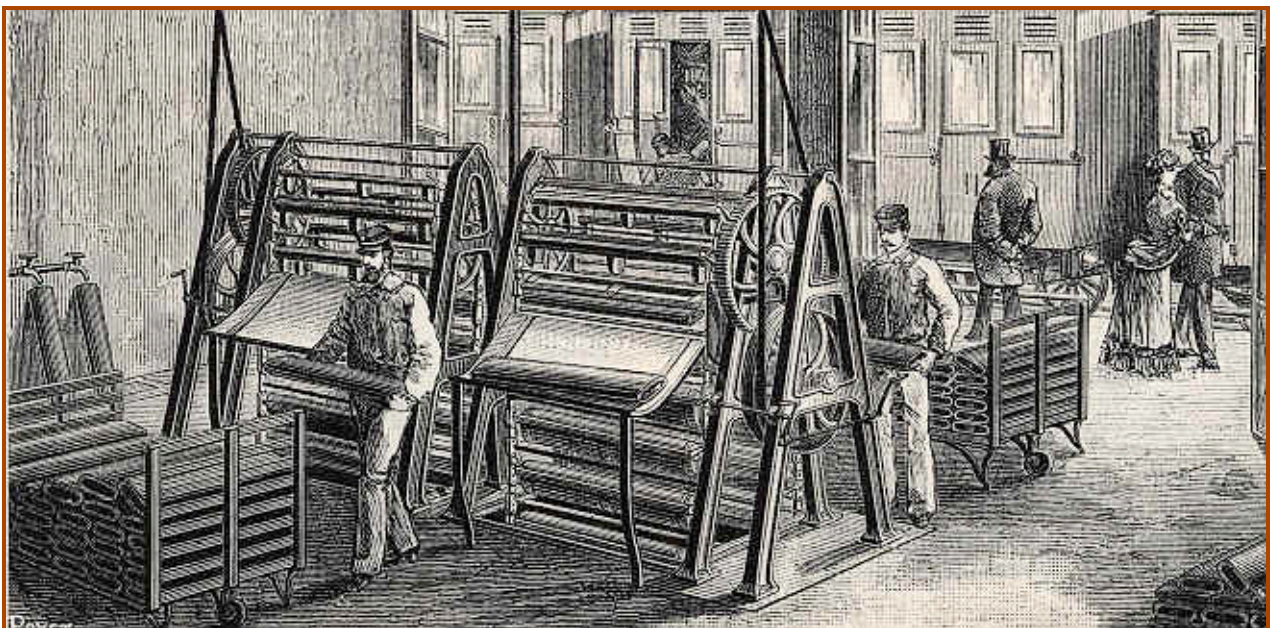
After use, they were not emptied but simply passed by means of a noria conveyor through a vat of boiling water, an operation which delayed the train for only five minutes. A quicker system was to heat the water inside the containers by a high-pressure jet of steam. However, both systems required special equipment and could be operated only in reasonably large stations. Moreover, such systems proved to be inadequate in severe winters.

Some railways tested containers filled with sodium acetate since this has the property of maintaining a temperature of approximately 55°C for several hours, at which point it starts to crystallise. In Germany, containers filled with hot sand had been tested but were not successful.

The Belgian State Railway experimented with foot-warmers, which had a double casing. A red-hot steel bar was placed between the two walls and its heat passed into a padding of mineral wool inside the double casing, mineral wool being a poor conductor of heat. However, with use, the material disintegrated and was no longer efficient. Passengers sometimes burned their feet



*Providing foot warmers*



*Machine for heating feet-warmers 1885*

on the device and it lost its heat too quickly.

In Germany, foot-warmers were placed under seats or beneath passengers' feet. They contained a specially manufactured chemical in the shape of a slow-burning coal brick. However, it proved difficult to prevent the fumes which were given off from entering the compartment. The French Northern Railway, therefore, devised a system which involved the use of both water-filled and coal brick-filled foot-warmers. Heated by the coal-brick containers, the water-filled foot-warmers were placed in the compartments. In this way, passengers were no longer bothered by fumes from the coalbricks since these were placed at some distance from the compartments.

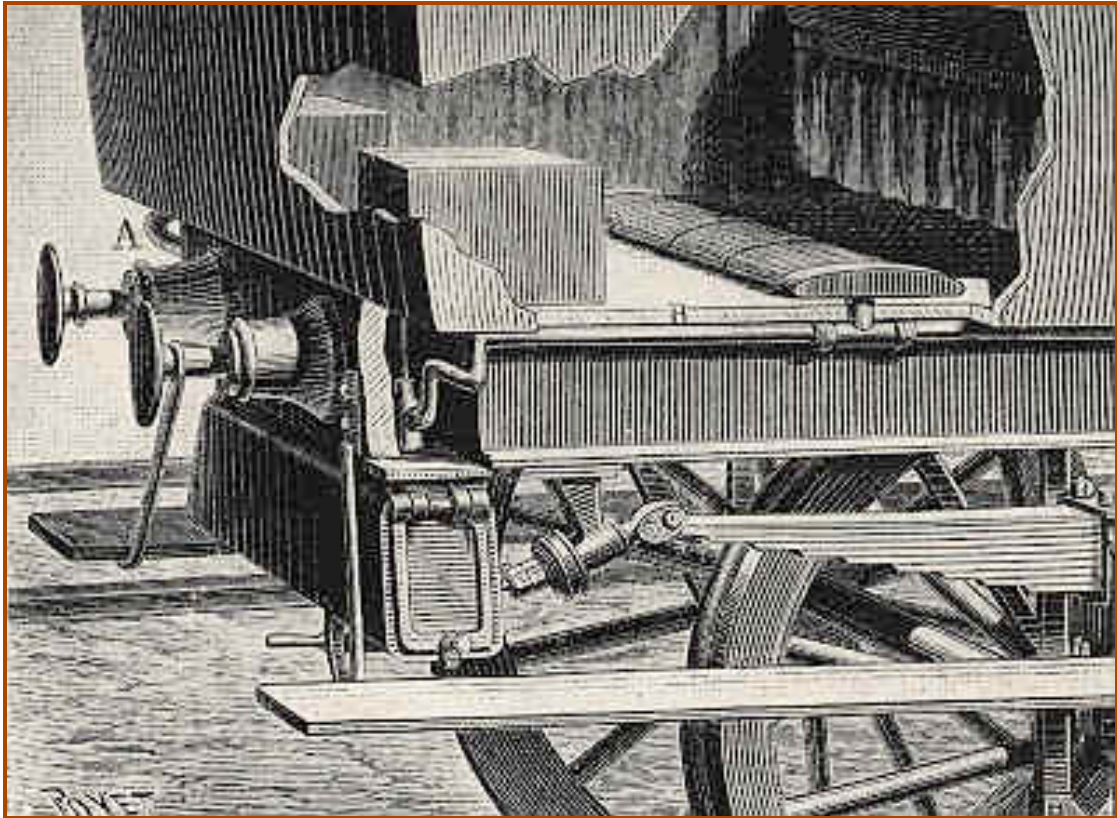
In countries which experienced periods of intense cold, such as Germany, Sweden, Switzerland and the United States, stoves were preferred for a long time. With this system, a firebox was placed beneath each coach. The air circulating inside the firebox was heated and then distributed through the stoves in each compartment.

In France, during the bitterly cold winter of 1891, some trains without any heating system at all still operated and this provoked violent protests from the public to such an extent that carriage-heating became a matter of urgent concern. The Eastern Company was the first to develop the thermo-siphon. Beneath each coach, a double firebox filled with coal heated a water-filled container. This water passed along a pipe and then entered the radiator placed in each compartment. This system was used on certain types of coach on the Eastern, Western and P.L.M Railways, but variations did occur from

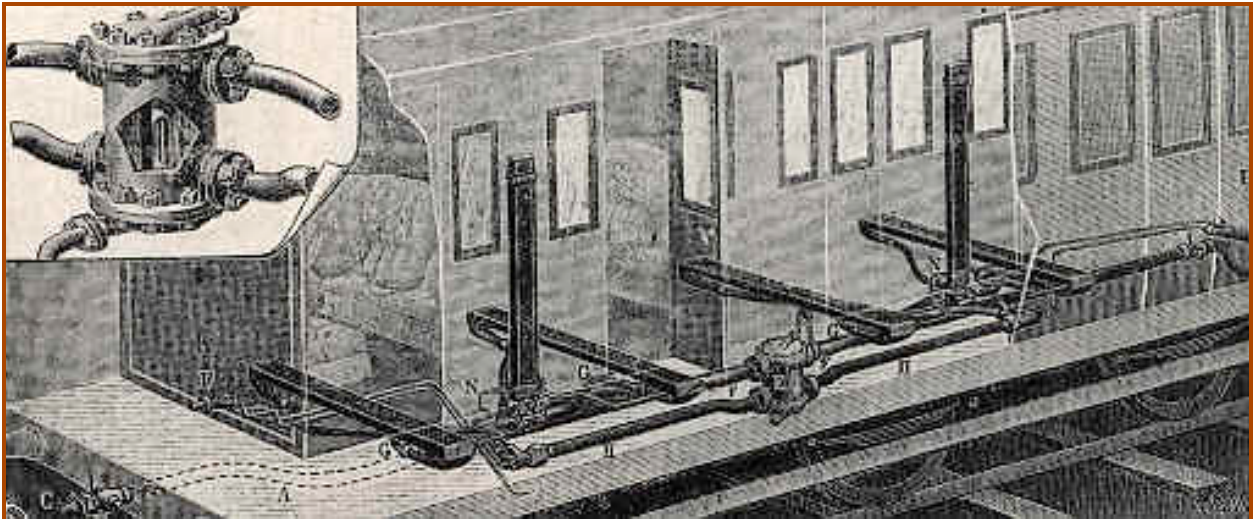
company to company. The fuel used in the system was either anthracite or peat coal.

The thermo-siphon system was also used in Belgium, but not as an independent system serving only one coach. As the heated water left the tender, it was driven by a steam-injector along heating pipes which ran the full length of the train. After being distributed to the various radiators, the water returned to the locomotive and was reheated. Under this system, the coaches' water pipes were linked by flexible connections.

From 1900, the heating system in general use was steam heating. Steam was taken from the locomotive and then passed through a valve which reduced its pressure. It was then directed along a central pipe which ran from one end of the train to the other. The steam was distributed to each compartment by a special system of piping. The coaches were linked by a flexible pipe fitted with an automatic safety-valve which remained open when the system was not working so that any condensed water could be released. The valve closed automatically when the pressure rose above 7 lbs per square inch. The problem was that the further away the compartment was from the locomotive, the less efficiently the system



*Coach heater 1891*



*Steam-heated "thermosiphon" 1899*

worked. And so, on the Prussian State Railway, a heating-van was positioned in the middle of the train to heat coaches at the rear. When operating such a system, the locomotive consumed  $4\frac{1}{2}$  lbs of coal per coach per hour.

Certain variations were to be found on French railways. Sometimes the radiators were steam radiators, sometimes they were a mixture of steam and compressed air. Sometimes in each compartment a non-freezing liquid was heated by steam from the locomotive. Sometimes in each compartment water was heated and then distributed under the pressure of steam from the locomotive.

About 1910, on the Valteline line in Italy and the St Moritz line in Switzerland, a system using an electric current was tested. A series of resistors slowed the current down and this generated heat.

Generally speaking, the problem of heating passenger compartments was one of the most difficult to solve. The public failed to understand the technical complications involved and thought it was being ignored. As for cartoonists, they found in this subject a rich vein of material which they exploited, of course, at the expense of the railway companies.

(Circular No. 307.)

## GREAT WESTERN RAILWAY.

### STORAGE OF FOOTWARMERS—SPRING, 1878.

Be good enough to have every Carriage (in Traffic, Carriage, Storing, and Shop Lines), Lamp Room, Footwarming Room, and other places on your Station thoroughly searched on Sunday, May 5th, at 8.0 a.m., for the purpose of collecting Footwarmers of *all* descriptions.

A correct account must be taken on a form to be ruled as under—

| No. on Warmer. | Company's Initials. | No. on Warmer. | Company's Initials. | No. on Warmer. | Company's Initials. |
|----------------|---------------------|----------------|---------------------|----------------|---------------------|
|                |                     |                |                     |                |                     |

The whole of the Warmers collected must be loaded in a Horse Box or, when the number is not large, in the Guards Break Vans of the Train, and booked through the Parcels to

MR. SMITH,  
LAMP INSPECTOR,  
PADDINGTON.

A copy of the account of the Warmers so collected and forwarded must be sent to my Office the same day.

Any in Coaches in Trains that may be running at the time appointed for the collection must be dealt with by the Station where the Coaches terminate their journey.

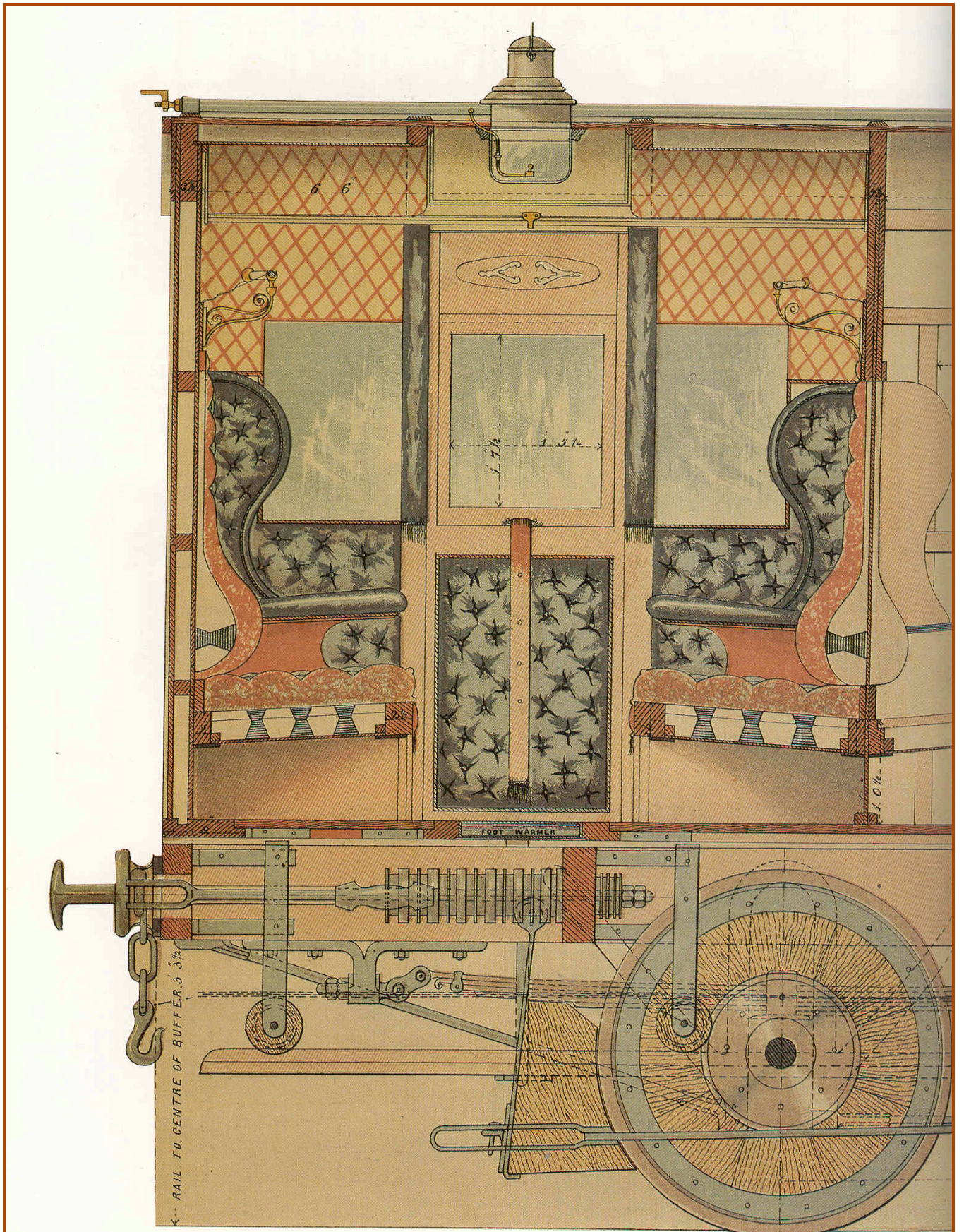
It is important that this muster be correctly taken by reliable men, and each Station Master must personally attend to the matter, and certify the Return as a correct statement of the whole of the Warmers on hand.

The receipt of these instructions to be acknowledged to the Divisional Superintendent.

G. N. TYRRELL,  
*Superintendent of the Line.*

PADDINGTON,  
*May 1st, 1878.*





*Drawing of a 1<sup>st</sup> Class compartment for the Northern London Railway from a supplement to "The Engineer" 1869*

*The note "Foot Warmer" indicating its location is shown (in small print) at the bottom of the carriage door*

# W. S. LAYCO

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*A heating advertisement from 1914*