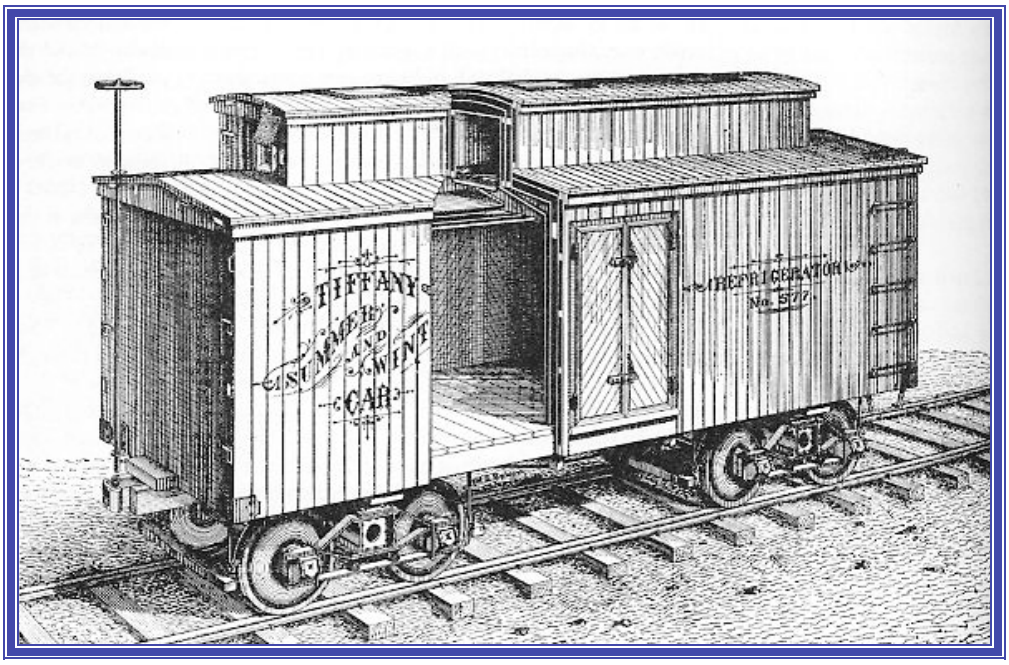
TRAIN REFRIGERATION



Tiffany's "summer & winter" refrigerated car of 1877
with ice stored in the clerestory roof

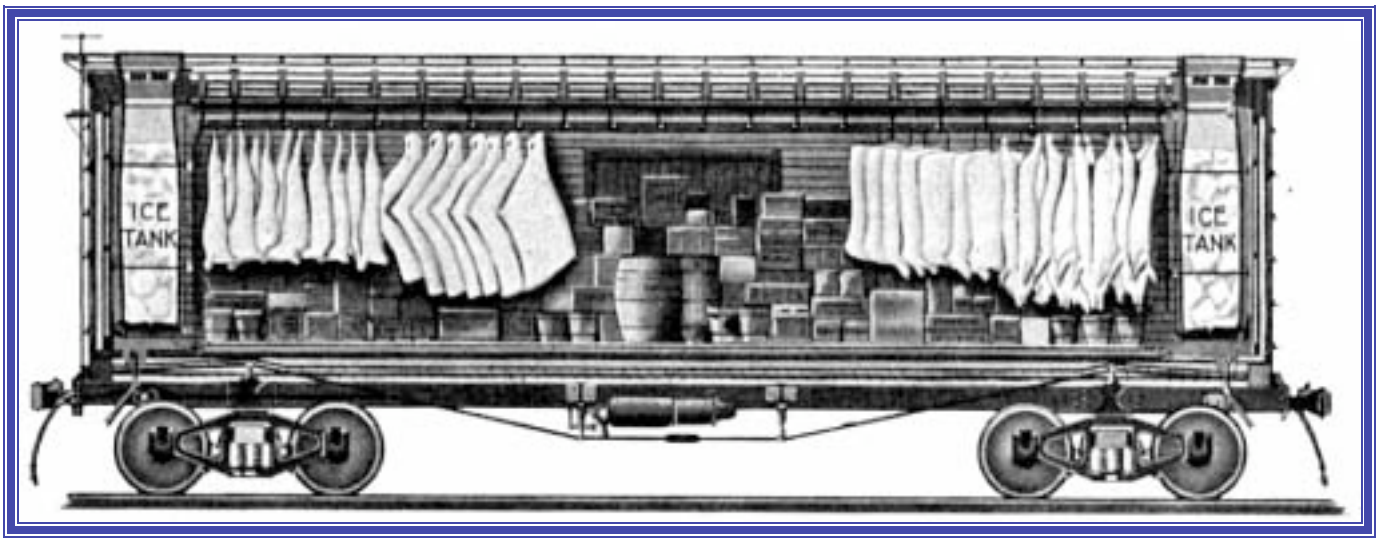
The text extract is from "A History of Refrigeration Throughout the World,"
Roger Thévenot (translated from the French)
International Institute of Refrigeration, Paris, 1979,

By the eve of the first world war, refrigerated rail transport had already developed to an extraordinary extent, almost unbelievable, in the United States. The count of thermally insulated wagons, most of which were cooled by ice, was 100 000 in 1913 (1).

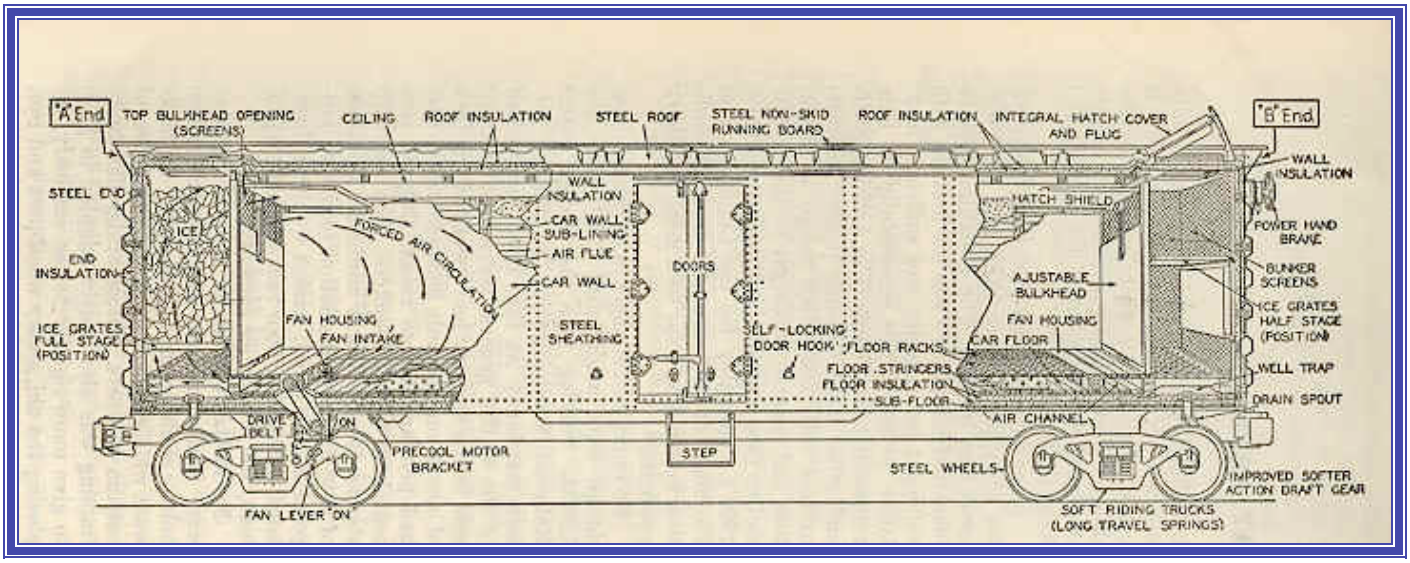
There are records in the United States of some "refrigerated" rail transport, more or less successful, from 1842. There were game, fish, butter, poultry, etc., shipped in wagons haphazardly insulated with sawdust, and holding containers of natural ice. But the true refrigerated wagons date from the patents and productions of J.B. Sutherland (1867) and D.W. Davis (1868) at Detroit. The former placed an ice bunker at each end; Davis produced successively two models, one with four cylindrical containers (diameter 40 cm) holding ice and salt, and then in 1870, a wagon with lateral ice bunkers, loaded from the roof. In 1877, J. Tiffany made a wagon with an overhead ice bunker.

The very first American iced wagons were made for the carriage of meat and dairy produce. Wagons for fruit immediately followed (the extraordinarily rapid development of the traffic in refrigerated fruit across the American continent has already been noted). The total of refrigerated wagons was already some 50 000 in 1900 (on this date, less than in quarter of them belonged to the railway companies; three quarters belonged to industry or to private traders). About 1890 the American refrigerated wagon was 10 m long, had a carrying capacity of 20 t and a dead weight of 21 to 24 t. At the beginning of the 20th century, the length was increased, the load increased to 30 t, the interior capacity to 50 m^3, and the wagon was lighter in weight (17 t). Fairly soon, differentiation took place, with a "beef type" for meat and a wagon with fans for fruit and vegetables. From 1908 to 1916, the American Department of Agriculture thoroughly studied how these wagons could be improved (especially in experiments carried out by Mary Pennington from 1912).

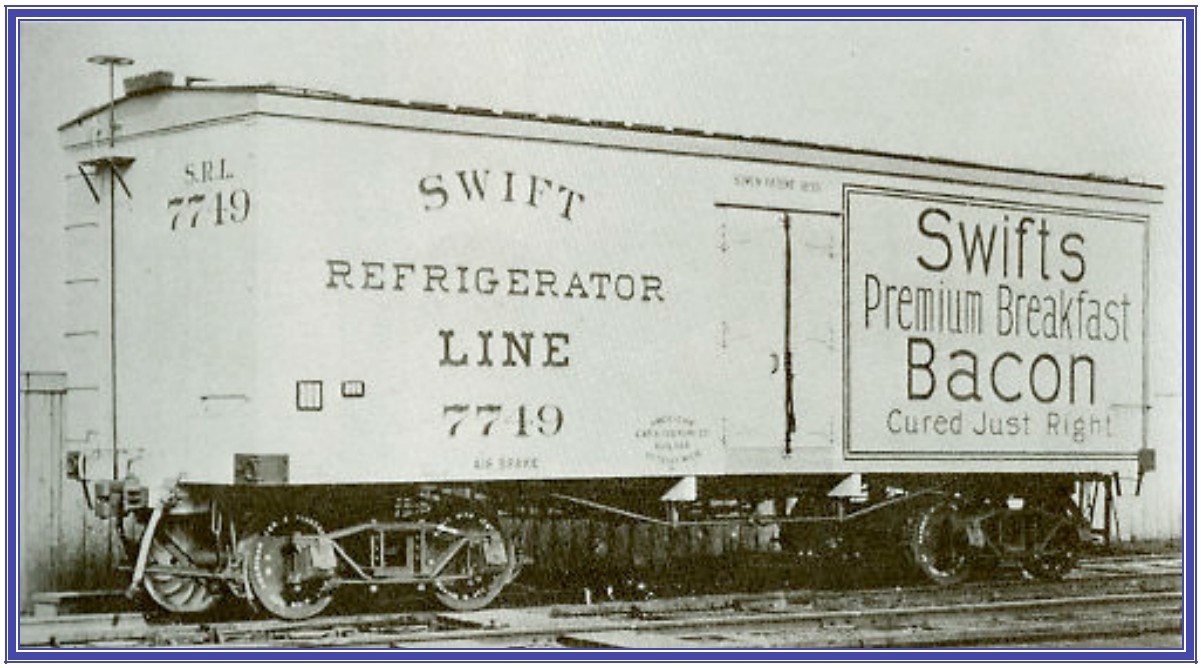
Some American engineers studied the possibility of mechanical refrigeration of the wagons; a first patent was taken out in 1880. In 1888, there was a trial of a wagon with a methyl chloride compressor for transporting beef from Chicago to Florida. But it was not until after the second world war that mechanical refrigeration of wagons became really commercially significant. Until then, ice was practically the only cooling agent; the crossing of the American continent required reicing during the journey, and large reicing stations were built, which could recharge 18 wagons simultaneously.



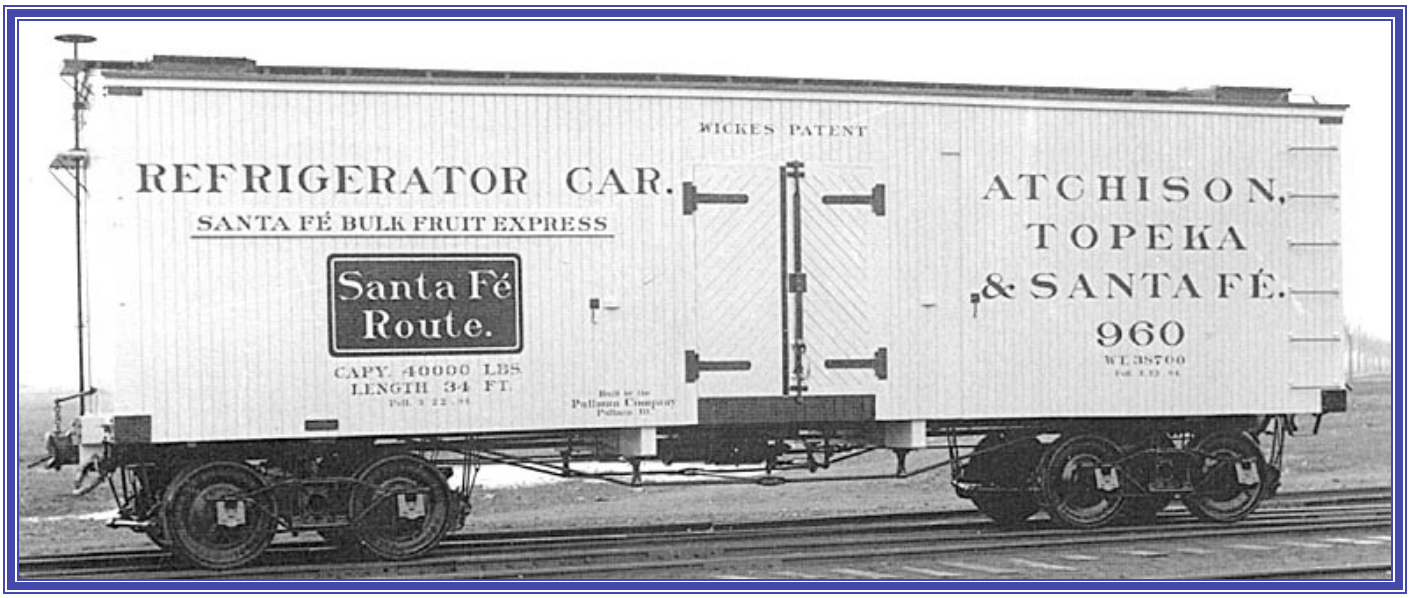
Ice bunker type refrigerator rail car, 1870, probably J B Sutherland design



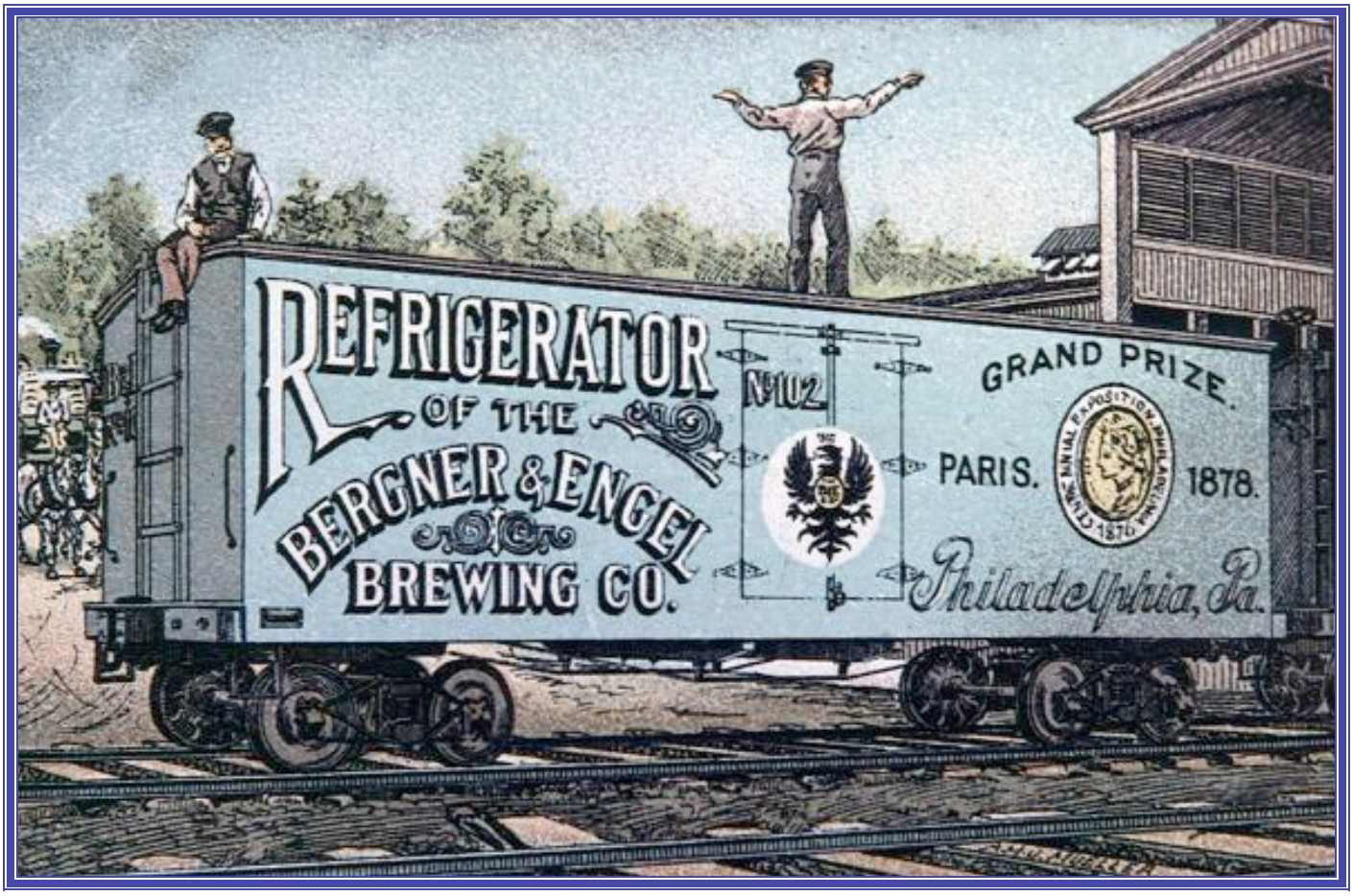
Refrigerator car using ice-bunker system 1954



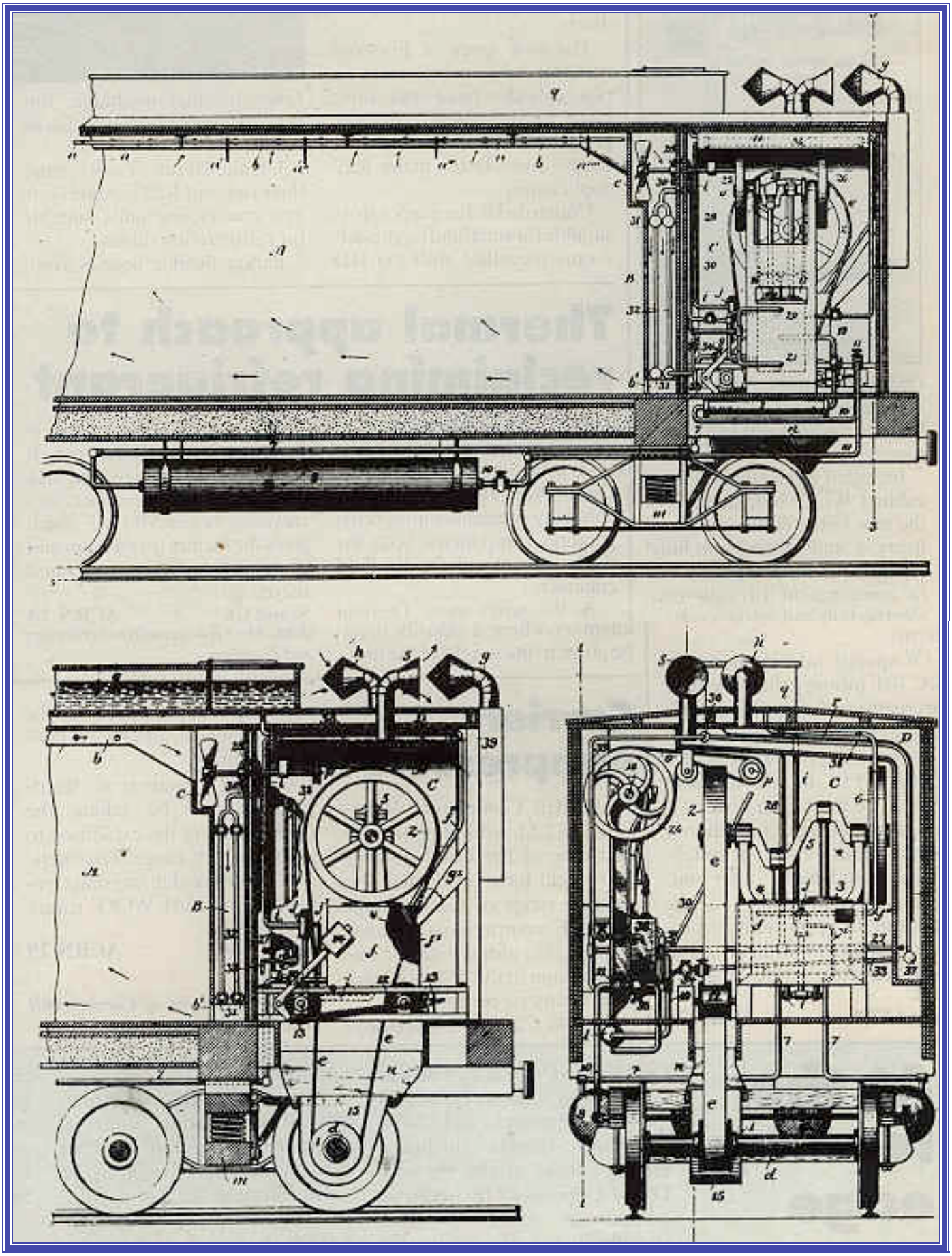
Early refrigerator car from 1899



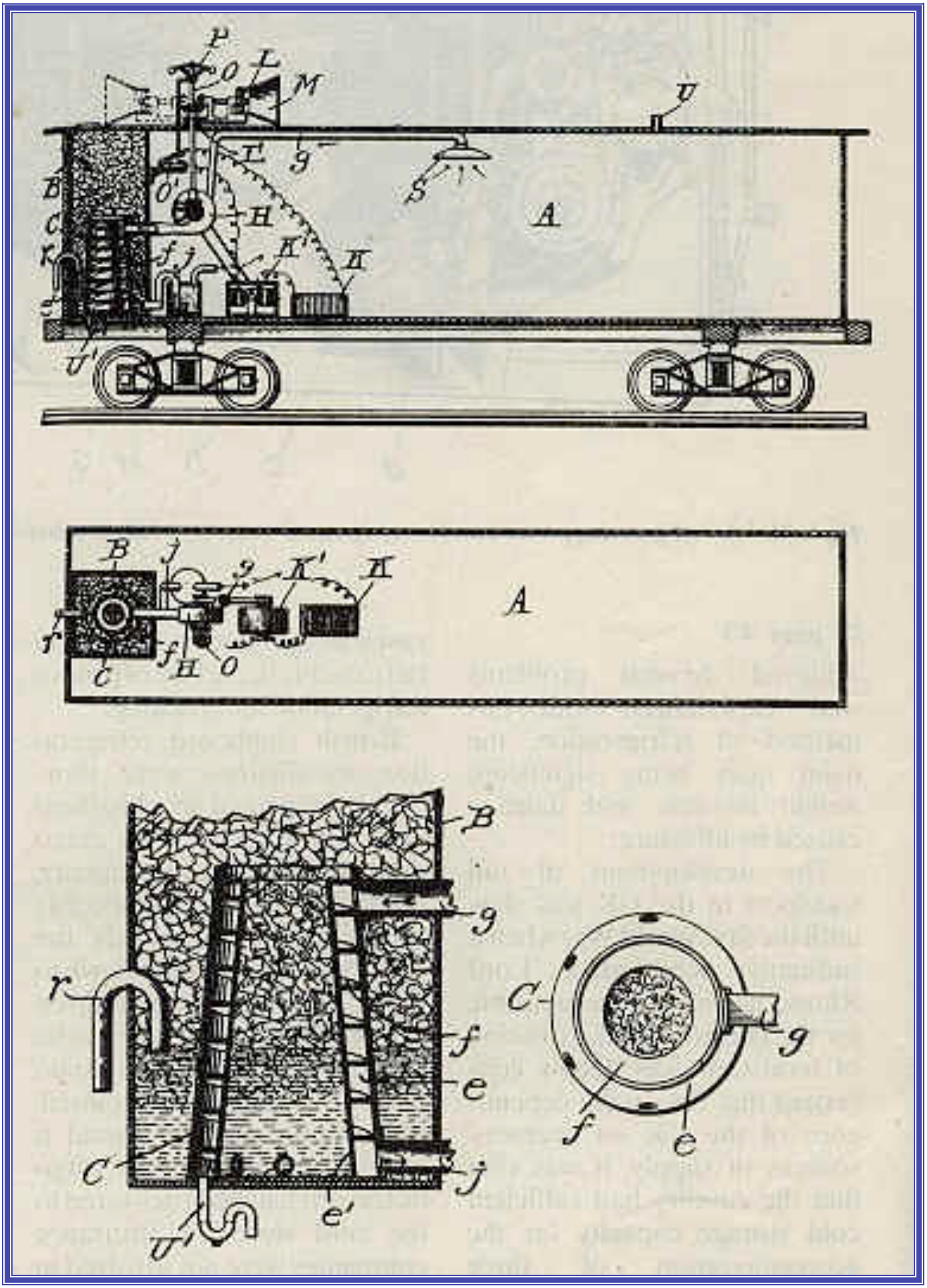
A shorty "reefer" refrigerated rail car with single centre ice bunker c.1898



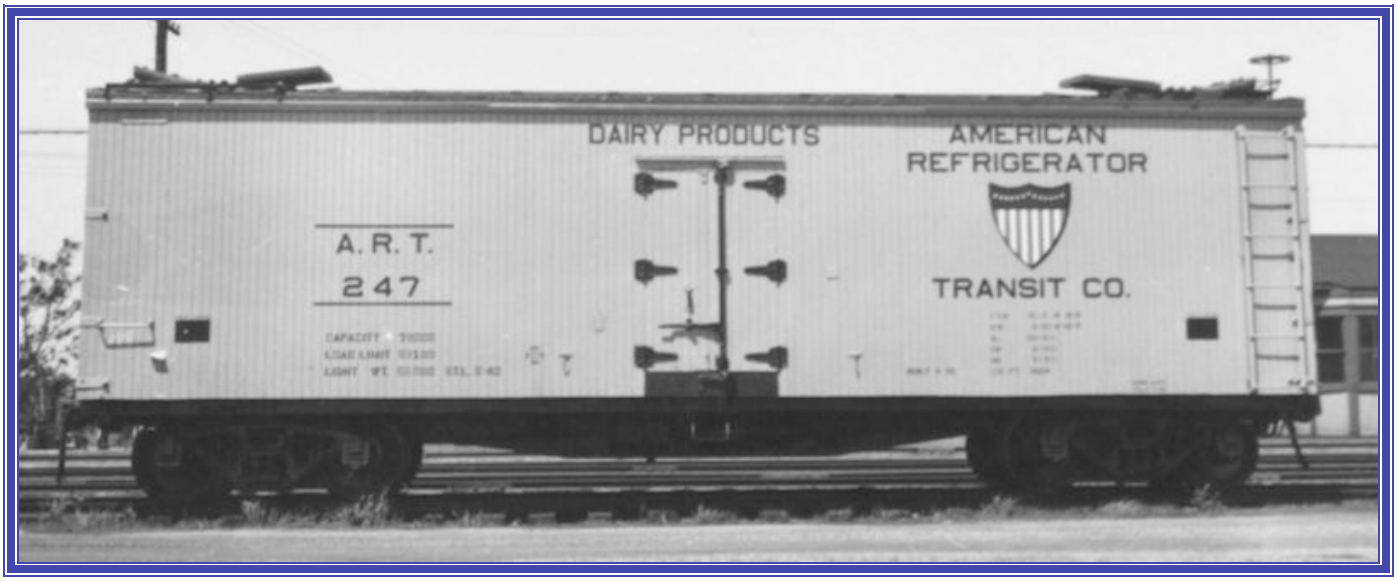
Ice refrigeration car for beer c.1880 (Image from www.eastcoastbrew.com)



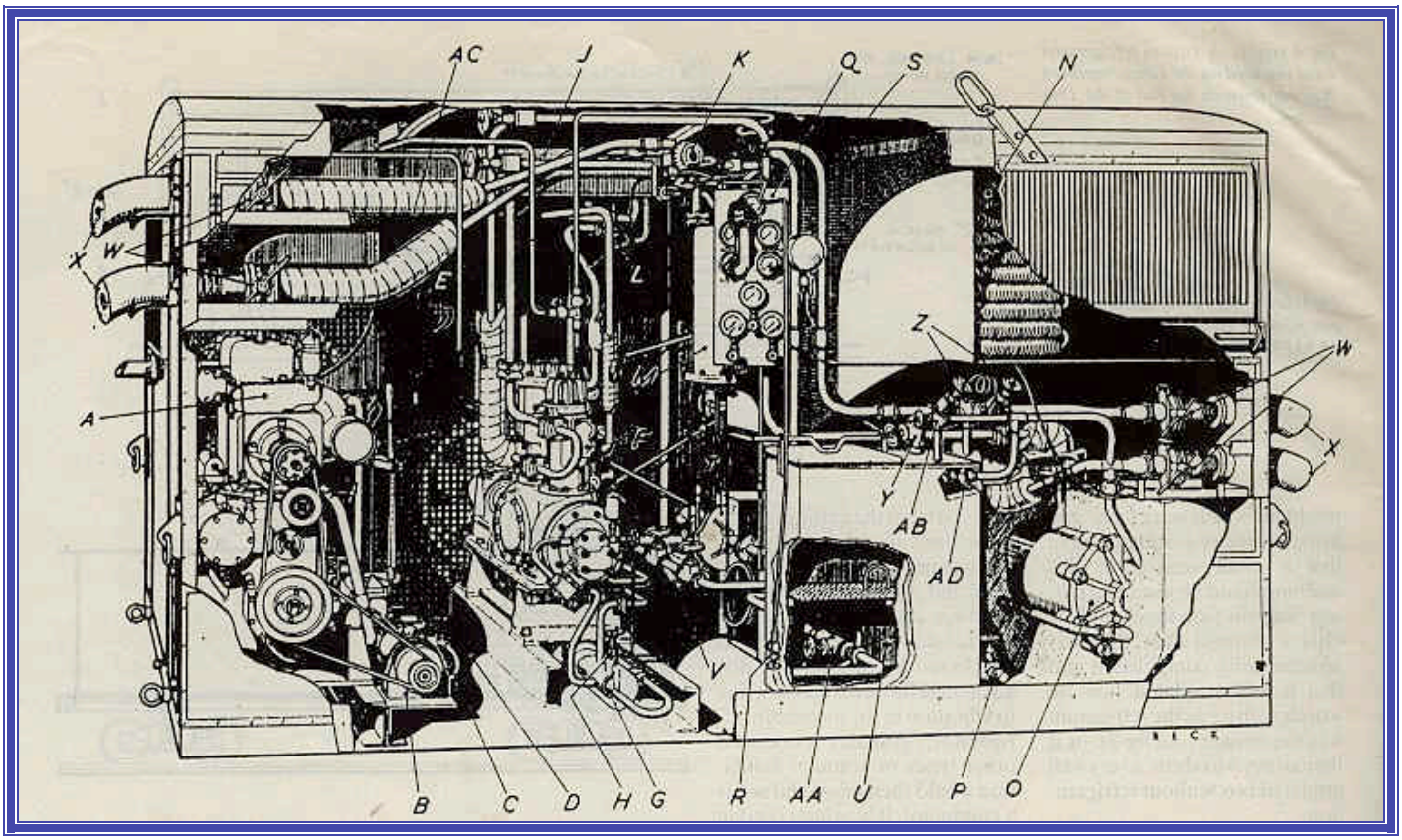
Refrigerated rail wagon with cold air machine Patent No. 5773 1883



Refrigerated rail wagon using ice for air cooling Patent No. 15,331 1898



Wooden-sided refrigerator car, American Refrigerator Transit Company, c.1940
(Image from www.trainweb.com)



Mobile refrigerating power unit for refrigerated train (APV Baker Hall Division)