

triple valve test rack as superior to the older types, it does not consider it so much as to recommend that older types be discontinued.

It is recommended that when brake cylinders and triple valves are cleaned, they be stencilled on one side in two lines, one showing the place, month, date and year of cleaning, the other line showing the road on which the work was performed.

In connection with retaining valves for

freight cars, a large number of different types and capacities are required to make proper repairs to foreign cars. The recommendation is made that two pressure spring type retaining valves of such capacity as may be required by individual roads, be used, leaving the question of standard capacity open for further consideration.

Detailed recommendations for recommended and standard practice are embodied covering the foregoing points.

## Design, Maintenance and Operation of Electric Rolling Stock on Heating of Passenger Trains Drawn by Electric Locomotives.

An American Railroad Association's mechanical section committee, C. H. Quereau, Superintendent, Electrical Equipment, New York Central Rd., chairman, submitted a report of which the following is an abstract:

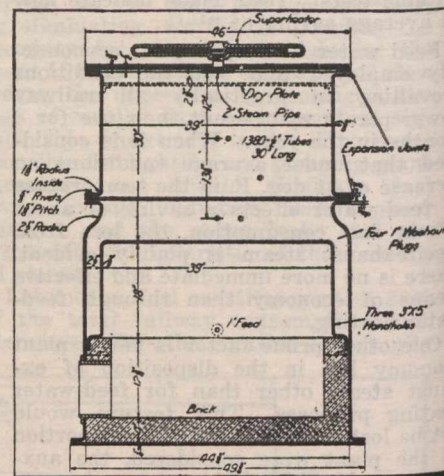
Successful electric operation of through passenger trains over the usual steam railway division, or for any distance approximating this, would be impracticable unless the locomotive can furnish sufficient steam to satisfactorily heat the train. A study of the problem was commenced in 1902, and from then until 1913, there were 9 designs of boilers built and tested, 4 of them using electricity as the source of heat, and 5 using fuel oil. The electric boilers did not prove satisfactory, while the oil-fired type has been finally developed to a point where it is quite generally adopted.

oil and water storage tanks and piping, but without fuel oil or water, the heater equipment weighs 5,850 lb., and occupies a circular floor space less than 5 ft. in diameter for the boiler, and about the same for the storage tanks. Under service conditions, these boilers evaporate over 5 lb. of water per sq. ft. of heating surface, and over 6 lb. of water per lb. of oil, though in carefully conducted tests, the evaporation per lb. of oil has frequently been over 10 lb.

When using eastern fuel oil, which has a paraffine base, or kerosene, the lower section of the burner, which carries the steam or air for atomizing the oil, projects beyond the oil orifice, forming a lip or shelf on which the excess oil may flow and still be atomized. Where it is more economical to use the heavy western oils, having an asphalt base, it has been found necessary to leave off the lip,

the steam is somewhat superheated, it requires less steam per car per hour to satisfactorily heat it.

The type of boiler illustrated is standard for the New York Central Rd. electric passenger equipment, where the capacity is rated at 2,200 lb. of steam an hour; on the Chicago, Milwaukee and St. Paul Rd., where it is rated at 2,600 lb. of steam an hour; on the New York, New Haven and Hartford Rd., where the maximum capacity is given at 2,700 lb., and an average of 2,200 lb. an hour. It has been adopted for the Canadian Northern Ry.'s electrified zone, where the heating plant is installed in a separ-

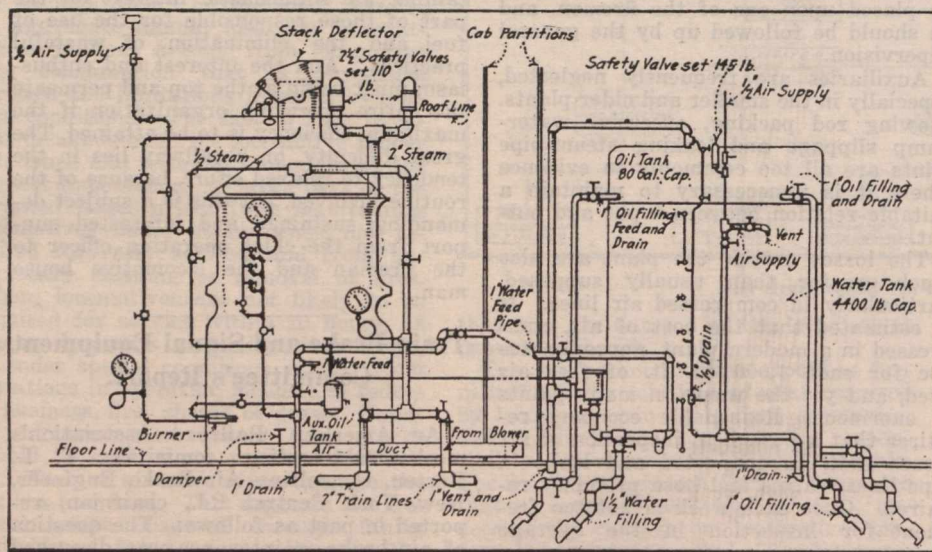


Cross Section of Oil-Fired Boiler.

ate car, or trailer, instead of on the locomotive. Each of the railways reports satisfactory results from these boilers. In each case, the cars are heated from a steam header at terminals before the locomotives are attached, or are delivered, properly heated, by steam locomotives to the electric locomotives.

The amount of steam necessary to satisfactorily heat the car depends on a number of governing factors, such as outside temperature, wind, size of car, etc., but it would appear that for the average modern car, with outside temperatures between 20 and 30 degs. F., each car takes about 200 lb. of steam an hour, and with outside temperature of 0 deg. F., the consumption of steam per car approximates 225 to 250 lb.

Considering the extra plant required for electric heating, it was estimated a few years ago that with a 35-locomotive installation, electrically generated steam would cost about \$45,000 a year more than oil generated, not including fixed charges in the cost of current. If fixed charges are included, there would be a saving of over \$100,000 a year in favor of oil as a source of heat.



Assembled Installation of Oil-Fired Heating Equipment.

The type of oil-fired boiler shown in the accompanying illustrations was that finally adopted as giving the most satisfactory results. It was designed in 1912 and applied to 29 locomotives. They have 436 sq. ft. of heating surface, with a working pressure of 110 lb., and a capacity of 2,200 lb. of steam per hour. Though based on previous designs, there were several radical changes, the most important being the use of a water leg 18 in. deep and 2½ in. wide, increasing the bridges between the tubes to ¾ in.; the substitution of a forced draft in the fire box with a closed door for the natural draft used previously; and the use of two expansion joints of the bellows type in the boiler shell. Complete with

because of the liability of oil accumulating at that point and interfering with the steam jet. Only when the boiler is started is air from the main reservoir turned into the stack blower to insure a draft, and on to the burner to atomize the fuel oil. When the steam pressure approximates 50 lb., a 3-way cock substitutes steam for air. It only requires 10 min. from starting the fire to develop 110 lb. steam.

There is a superheater in connection with the boilers, as shown, and it is possible to obtain any reasonable degree of superheat. Good practice indicates that about 15 degs. is desirable, as a high superheat damages the steam hose and gaskets. Tests show that when

English Valley and Hudson Bay Ry.—In connection with the application of the company, for which H. A. Stewart, Toronto, is solicitor, to the Dominion Parliament for an extension of time for the construction of a railway from near Brereton, Man., station, on the National Transcontinental Ry. from Moncton, N.B., to the English River, Ont., between the eastern boundary of Manitoba, and the 9th meridian of longitude, the House of Commons railway committee reported that the granting of the extension would not be in the public interest. The House of Commons adopted the report on June 10, and directed that the fees paid, less cost of printing and translation, be returned.