Coal is delivered to the plant in hopper cars, which are run over a wooden trestle leading above the receiving hopper, into which it is dumped by gravity. The coal-receiving hopper feeds directly into the crusher, which has a capacity of about 30 tons an hour, and which acts at the same time as a feeder, delivering the coal at a uniform rate to the vertical bucket elevator extending to the top of the building. From the vertical elevator the coal is fed by chutes on to a conveyor belt, from which it is discharged by an automatic tripper arranged to deliver the coal at any point above the bunkers. Slow speed induction motors of the squirrel cage type drive the coal handling apparatus, a 20 h.p. motor being used in the crusher and a 10 h.p. motor installed in the pent house at the top of the building for the operation of the elevator and conveyor. The coal bunkers are constructed of reinforced concrete resting on the steel building columns. The space occupied by them, located in front of and above the boilers, is separated entirely from the boiler room by metal lath partition, thus practically insuring the exclusion of coal dust from the boiler room. In a similar way the coal crusher pit and the coal elevating mechanism are enclosed as completely as possible. Coal for firing purposes is drawn directly from the bunkers, through sheet metal chutes, into the stoker hoppers, which are located in front of the boilers. The ashes are drawn from the grates of the boiler furnaces on to the boiler room floor, where clinkers are broken and delivered through a coarse grating into the ash hoppers which are suspended underneath the floor. From the hoppers they fall by gravity through ash grates into the push cars, and are dumped into an ash chute connecting with the coal elevator. The elevator, when handling ashes, discharges into a spout leading to a small ash bunker at the end of the building. From this bunker they can be delivered by gravity into cars alongside the power plant.

Underfeed stokers are installed in the plant, six being used for each battery of two boilers, making a total equipment of twelve stokers. Forced draft is supplied for each battery by a steel plate fan 11 ft. in diameter and 3 ft. 5 ins. wide, driven by 10 x 10 x 10 type B enclosed vertical engine directly connected to the fan shaft. These fans are located in the pit of the turbine room. By means of a special blast grate in the galvanized iron duct leading from the fans to the boilers, either battery of stokers may be supplied from either of the fans. Each battery of stokers is controlled by an automatic regulator, which is driven from the shaft belted to the fan engines. Friction clutches on this shaft supply cross connection for driving either of the regulators from either engine. This driving mechanism, together with the galvanized iron ducts and gates, is suspended from the ceiling of the boiler room basement. On account of the very great variation in the load on the power plant, special precautions were necessary for the control of the fires under the boilers, in order to keep the steam pressure fairly constant. This is accomplished by means of the stoker equipment, which controls the fire automatically, both by regulating the air forced through the stokers and the rate of feeding of coal into the boiler furnaces. This regulation is accomplished by means of a regulating valve, which acts as a throttling valve on the fan engines. The potential piping leading from the regulator is connected to the main steam header between the superheater and the turbine. In case the pressure in the steam lines tends to drop, the regulating valve increases the supply of steam to the fan engine, thus at the same time increasing the amount of air supplied to the boilers, and the frequency of operation of the stockers. In case the boiler pressure tends to rise, the valve decreases the supply of steam to the fan engine, thus decreasing the amount of air and coal supplied to the furnaces. This apparatus is entirely automatic, and has been found to control the steam pressure very closely.

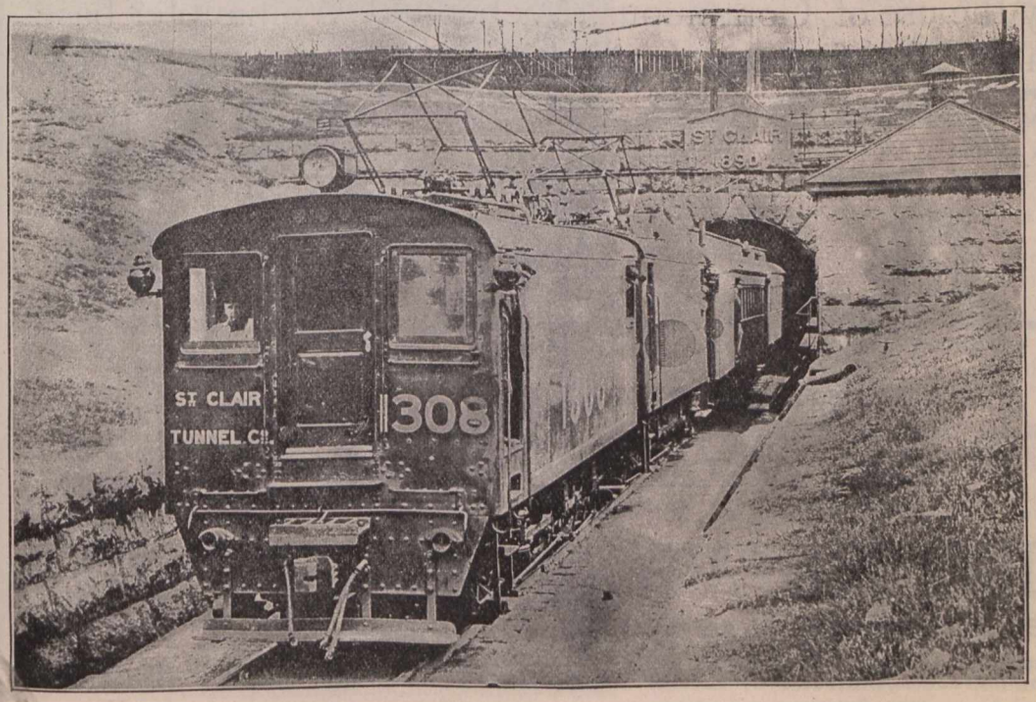
The boiler equipment consists of four 400 h.p. Babcock & Wilcox sectional water tube boilers arranged in two batteries of two each, each boiler having three drums 42 ins. in diameter and 23 ft. 4 ins. in length. This results in an unusually wide boiler, the tubes being arranged nine high and 21 wide, in order to secure quick steaming. This requirement is a necessary complement to the automatic stoker control referred to above. In addition the three drums provide storage for a large quantity of heated water available for quick steaming on any decrease in pressure. The boilers are designed to carry 200 lbs. steam pressure, each unit being equipped with two tandem connected 2½-in. blow-off valves, the necessary pressure gauges, water columns, check valves, high and low water lines and other fittings.

The smoke flue, located in the boiler room basement floor, is built of reinforced concrete. The boiler flues open directly down into the smoke flue, which in turn leads in a straight line through the south building wall to the reinforced concrete stack. The height of stack from the top of the smoke flue is 150 ft., or 162 ft. above the basement floor. The inner shell is of standard construction, and the outer shell, which is the same height as the building, has a square exterior, being faced with brick above the grade line to conform with the building construction. Lightning protection has been applied to the stack in the form of standard equipment.

The separately fired superheater is located between two batteries of boilers. The superheater has a capacity to add 200 degrees of superheat to 36,000 lbs. of steam per hour. The superheater is hand-fired, but requires very little additional attention, as it is provided with automatic temperature regulator, which, by admitting air either above or below the fires, serves to control the superheat within narrow limits, approximately 30°. The regulator consists of a thermal coupling installed in the superheater steam outlet, which in turn operates through a relay and solenoid on the by-pass valve of the hydraulic cylinder, the piston of which directly controls the dampers in the air ducts. The regulating device is so adjusted as to provide a superheat of about 100° under actual working conditions, and has been found in operation to very closely control the temperature of the steam, notwithstanding the great variation of load to which the power plant is subjected.

The steam is supplied by the boilers at 200 lbs. pressure, and is delivered through the system of high pressure piping either to the superheaters and thence to the turbines, or through by-pass connections directly to the turbines, steam separators being installed in the piping system adjacent to the latter. The long sweep bends connecting the boiler nozzles with the main header are of 6-in. extra heavy pipe. The short header connecting the two batteries of boilers, in which are located the valves leading to the superheater and turbines, is 8 ins. in diameter, while the lines from the header to the turbines are 7 ins. The fittings throughout are of mild steel, and designed for heavy pressure with superheated steam. All high pressure piping is provided with welded flanges. The necessary drips have been supplied for the proper draining of the high pressure system. An auxiliary header 6 ins. in diameter, operated at 125 lbs., is installed along the boiler room wall at the rear of the boilers. From this header the steam supply is taken to all of the steam auxiliaries in the plant. The free exhaust piping from the back pressure relief valve is of 14-in. spiral riveted steel pipe, extending through the boiler room basement and thence up through the roof. The auxiliary exhaust is made of 8-in. pipe, supported in the boiler room along the fire wall, and receives the exhaust steam from the various auxiliaries in the plant. Steam is delivered by the header to either of the enclosed heaters installed in the boiler room just back of the superheater. A 12-in. oil separator is installed in the exhaust steam line just before it enters the feed water heater. Vertical water tube heaters, each of 700 h.p. capacity, are used. A 4-in. spiral riveted pipe for free exhaust leads from each heater up through the roof.

The condensing water is obtained from the St. Clair River, a concrete intake provided with structural steel grid and woven wire screen being installed along the dock line.



ELECTRIC LOCOMOTIVE AND PASSENGER TRAIN EMERGING FROM ST. CLAIR TUNNEL.