STEAM MOTOR CARS FOR BRANCH LINES.

In our issue of November 27, 1897, we gave an illustrated description of a steam motor car built by the Schenectady Works for the New England Road. We now present illustrations of a similar type of car constructed by the Baldwin Locomotive Works for the Cincinnati, Hamilton and Dayton Railroad.

The body of the car is divided into three compartments. Entrance is had from a platform at the rear end into a passenger compartment in which are twelve seats with seating accommodation for twenty-eight persons. A toilet and lavatory is provided at one end of the compartment. A door leads from this compartment into the baggage room. The latter is six feet in length and is provided with the usual sliding doors on each side. From the baggage room a side door opens into the engine room.

By reference to our description of the Schenectady car, it will be seen that the boiler was carried directly upon the truck, the floor of the car resting upon a ring of rollers laid around the base of the boiler. In the Baldwin car the boiler is carried upon the floor of the car, and the steam connections to the cylinders are made by means of flexible metallic joints. The boiler is of the vertical tubular type, the fire passing through the tubes, and it is provided with a central tubular magazine for feeding the furnace. The grate is circular, the bars inclining from the magazine outward and downward. The coal is shaken down by a lever actuating a rod which passes up through the center of the grate into the coal, where it terminates in a ball. A dozen water tubes project down into the firebox at the juncture of the magazine with the bottom tube-plate and form a kind of circular cage to guide the coal as it descends from the magazine and spread it out evenly over the grate. These tubes are two inches in diameter, and circulation is secured by dropping a thin tube of iron from the top end of each tube. The flow of the water is upward on the outside of the circulating tubes and downward on the inside.

With a view to getting rid of the steam when the car is running through the streets, a condenser has been placed on the roof of the car. It is built up of 360 thin brass tubes of 1½ inches diameter, connected with cast iron headers of such a pattern that the exhaust passes through the entire length of tubing and so far condensed that no exhaust can be either seen or heard.

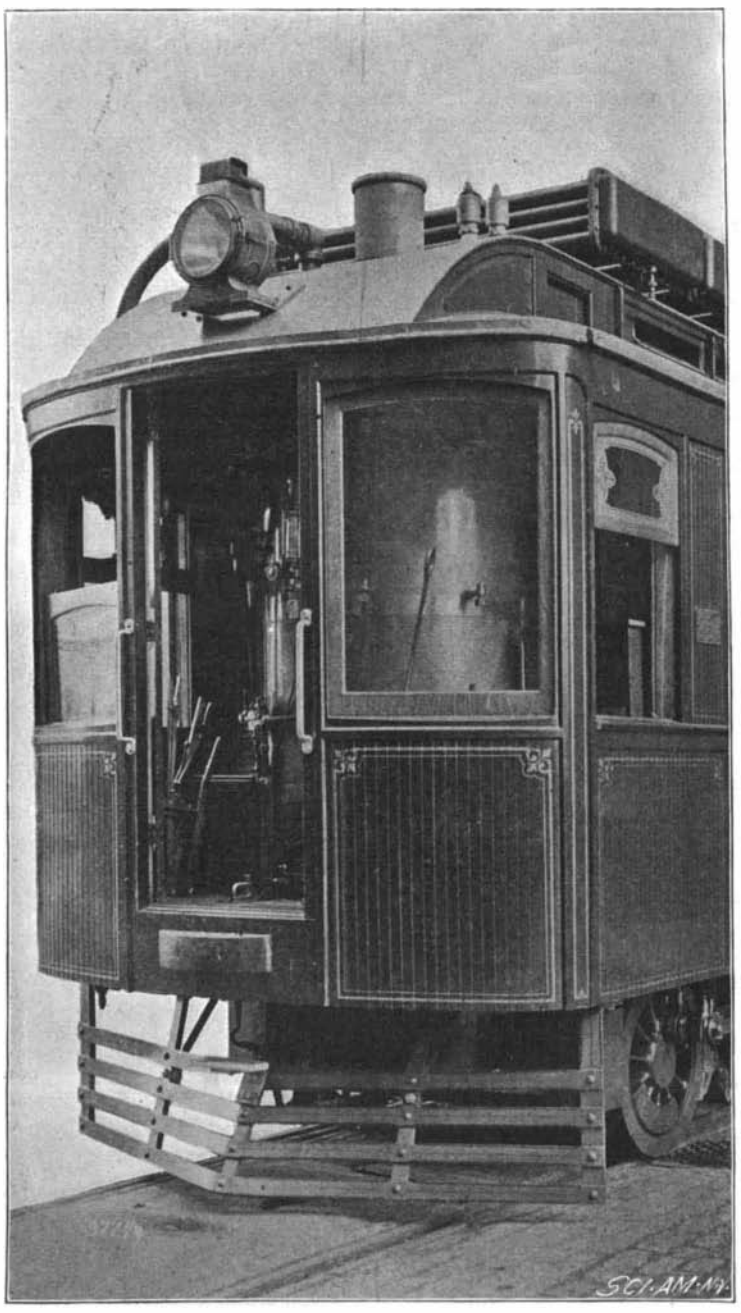
Two tanks, with a combined capacity of 300 gallons, are carried beneath the car between the trucks. One of these supplies the feed water, while the other receives the water of condensation from the roof condenser. The tanks are connected, and both are thus available to supply the feed.

The engine is of the well-known Vauclain compound type, with four cylinders; the high pressure cylinders being 5½ inches diameter, the low pressure of 9 inches diameter, the common stroke being 12 inches. The drivers are 30 inches in diameter. The driving mechanism is carried on frames which form part of the forward truck. The rear truck simply acts as a carrier for the rear end of the car. The car itself is 32 feet 9 inches in length over all; the total wheel base is 16 feet 8 inches, and the driving wheel base is 5 feet. The boiler pressure is 150 pounds to the square inch.

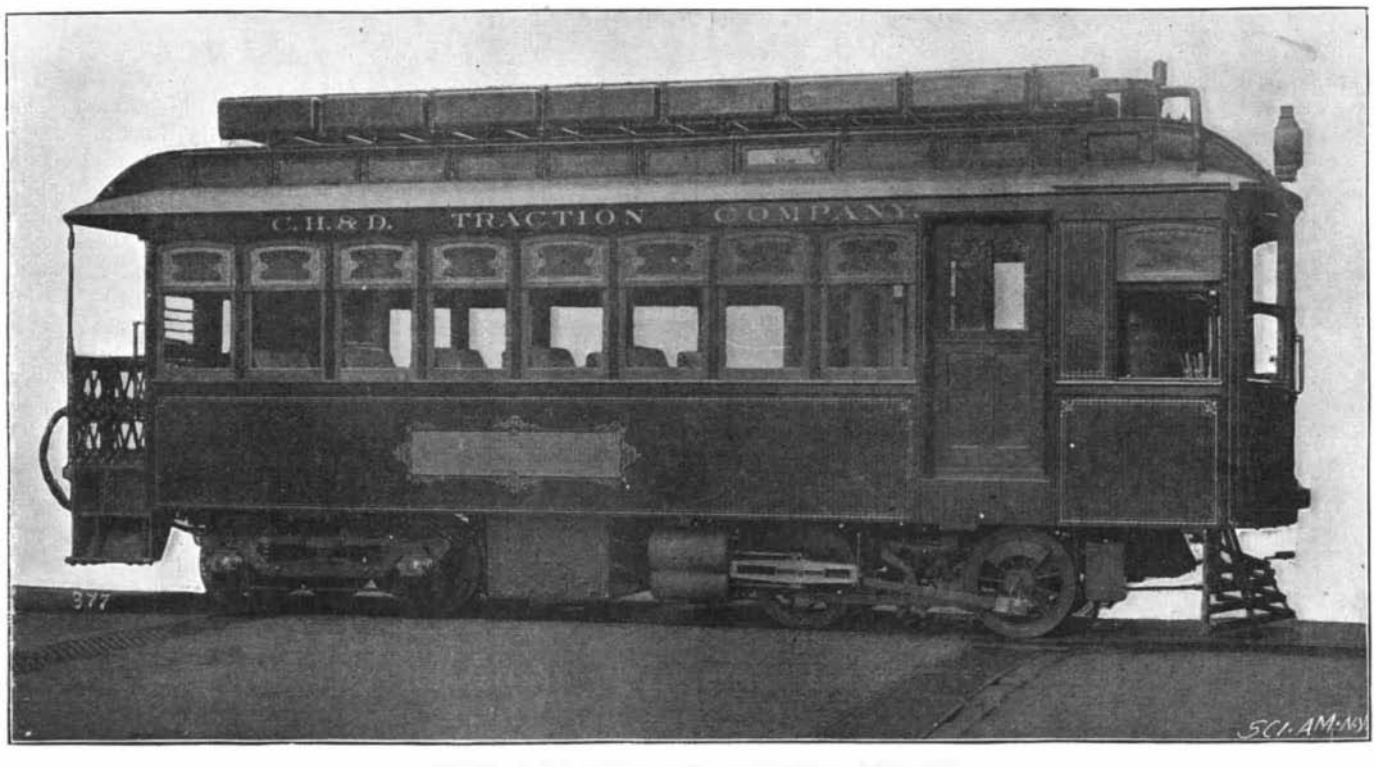
In the preliminary trials of the car it was run for 38 miles without any attention to the fire, the coal magazine feeding the furnace with great regularity. Seventeen miles out of the 38 were run at a speed of 42½ miles per hour.

It should be mentioned that in order to avoid transmitting the vibrations of the engine to the car a novel system of suspension has been adopted for the forward end of a similar car built for the Detroit and Lima Northern Railroad. Four heavy lugs are attached to the sides of the boiler, and through these pass four suspension rods which serve to carry the weight of the car at this end. The load is transmitted through long coiled springs which rest in spherical seats.

This form of motor car has been introduced by the railroads to work in competition with the electric trolley roads which are making such serious inroads upon the suburban railroad traffic. They are used on branch lines and sections of the road where the train service is infrequent or light, and where it is uneconomical to run a single passenger coach with a locomotive of the standard type.



THE CAB OF MOTOR CAR.



STEAM MOTOR CAR FOR SUBURBAN SERVICE.

Fermentation Without Yeast.

Last year a large international congress of chemists was held in the beautiful university of the city of Vienna. The congress was opened with a classic discourse by the famous savant Buchner. Prof. Buchner showed by experiments in the aula of the university his latest important discovery in the field of the physiology of fermentation. According to the same, the yeast plants, as living organisms, do not, as was presumed heretofore, directly mediate the decomposition of sugar and formation of the alcoholic beverages, but it is chemical substances that produce the yeast-cell and cause fermentation. These simple organic bodies can be obtained in the shape of a dry powder by pressing out the yeast-cells, filtering and evaporating. The properties of the new ferment are purely chemical. Among other characteristics, the newly discovered substance endures continued heating without losing its fermentative power. Considering these interesting facts, new and important possibilities are opened up to the fermentation industry. Since chemistry is continually becoming more perfect and productive in the field of synthesis, it is to be expected with certainty that in future this isolated chemical ferment will also be produced artificially, and that with the knowledge of this body further discoveries of similar as yet unknown substances will follow.

Moreover, experiments which have been conducted with other micro-organisms, in addition to those of Buchner, justify the presumption that the specific activity of the pathogenous bacteria in the diseased organism is a chemical process. Bacteria multiply very rapidly, if conditions essential to life are favorable, the most heterogeneous substances bringing about decomposition in the organs of the body, somewhat similar to the processes of decomposition in fermentation.

The bacillus of diphtheria, for instance, is known to produce a specific poison, which enters the circulatory system of man from the place of infection and causes a fatal sickening of the whole body.

With other germs, such as those of cholera, the products of change of matter forming in the digestive tract by the activity of the cholera vibriones constitute the starting point of a different but likewise typical disease.

In the same manner in which Behring, Kitasato, and others have prepared anti-toxines against these toxines of the inciters of infection, and have produced serum preparations by means of animal vaccination, it will be the mission of chemistry to isolate these assimilation products of micro-organisms, which bring about the decay of complicated organic structures, and to produce them synthetically in chemical laboratories.

On the other hand, science will discover a process which will solve the problem of producing suitable antidotes for all malignant infections, while the harmless artificial assimilation products of micro-organisms may be employed for perfecting various products of trade and industry.—Technische Berichte.

Holmes' Comet.

A telegram has been received at the Harvard College Observatory from Prof. J. E. Keeler, of Lick Observatory, stating that the comet Holmes was observed by Perrine on June 10. The comet was originally discovered by Holmes in London, November 6, 1892, and has a period of about seven years. By January 12, 1893, it had become very faint, but on January 16 it was found to have undergone a remarkable change, an outburst of light having occurred. It resembled a bright planetary nebula of about the seventh magnitude, the nucleus being at first hazy, but afterward becoming sharper and about as bright as a star of the eighth magnitude.

EXTENSIVE deposits of bauxite have been discovered in New South Wales. As this is one of the best raw materials for the manufacture of aluminum, the deposits will probably be of value.