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ELECTRIC RAILWAYS.

ELECTRIC railways are just now attracting much attention and our readers will be interested in the adjoined illustrations showing the Van Depoele system in operation. Its inventor is Mr. Charles J. Van Depoele, of the Van Depoele Electric Manufacturing Company, of Chicago, Illinois. His experiments in generators, motors and the transmission of power began in 1874 and have been continued to the present time. The Van Depoele generator is shown in Fig. 2. In its original shape it differed considerably from the present form, several very important changes having been made to adapt it to the work of transmission of power. The motors of the Van Depoele system are made of different styles and sizes, ranging from a motor weighing but one pound to the eighty-horse power motor weighing 8,000 pounds. Figure 3 illustrates the large motor which is employed in running railway trains.

The Van Depoele electric railroad was established in Toronto in 1884. The train was run in connection with the street cars, making a connection between the horse cars and the Exposition grounds. An underground conduit was used and the road was highly successful. It was operated during the Exposition. The train carried 200 passengers on each trip at a speed of about thirty miles an hour, doing the work smoothly and easily and to the satisfaction of all concerned. In the fall of 1885 the distance between the street railway and the Exposition grounds, one mile, was again successfully traversed by an electric train. In this case a motor-car and three passenger cars composed the train and an overhead wire was substituted for the underground conduit used the year before. There was only one track and it was necessary to run at high speed. An ordinary forty-light dynamo was used. This was driven by a 10x16 Doty engine. The train carried from 225 to 250 persons on each trip, and made an average speed of thirty miles an hour. The train traversed the road from 40 to 50 times a day and carried an average of 10,000 passengers daily with the consumption of only 1,000 pounds of coal a day. Much attention was attracted to the wonderful road, and the business done during the Exposition was limited only by the capacity of the cars composing the train. In the autumn of 1885 a portion of the South Bend Railway was equipped and small motors driven by a water-power generator used to run several independent cars. The success was pronounced, the cars travelling in either direction from the same conductor. Owing to a change in management the equipment of this line has not yet been completed. During the late Exposition at New Orleans, La., a train of three large cars was successfully operated, fully answering every demand made upon the system. At Minneapolis, Minnesota, the authorities compelled the Minneapolis, Lyndale & Minnetonka Railway Company to discontinue the running of their locomotives in the more densely settled parts of the city of Minneapolis, and an arrangement was made to employ electricity to draw the cars into the city and back again to the limit at which the steam locomotives were held. On this line the motor is placed upon a cheaply-constructed motor-car and takes the current from an overhead copper wire. The generator, placed at a considerable distance from the track, is driven by an old slide-valve engine with a 12x18 cylinder, making 125 revolutions a minute. For a run of 17 hours the consumption of coal is about 3,000 pounds. On this road, between 6 a. m. and 11:30 p. m., 48 trains are run each way daily. The trains are composed of three or four closed railway coaches weighing 11 tons each, or of a larger number of open cars weighing six tons each. Eight of the latter cars have been hauled at one time up a grade of 3½ per cent., all the cars being crowded to their utmost capacity, giving the train a total weight of 91 tons.

The Capital City Street Railway, in Montgomery, Alabama, has been running two cars on this system for some time. On the Montgomery line the distance is 1½ miles and the grades are over seven per cent. The motors are placed on the platforms of these cars and the work is successful. On the grades they make six miles an hour. They are run 16 hours a day. The generator is driven by an old-fashioned slide-valve engine located 250 feet from the boiler. The amount of coal consumed a day is 3,000 pounds, including the getting up of steam from cold water.

At Windsor, Ont., a two-mile track on this system has been in successful operation since June 6. This line is owned by the Windsor Electric Street Railway Company. The operation is a complete success in every way. Other lines are being equipped. At Appleton, Wisconsin, the Appleton Electric Railway is about completed. This line will have five cars run separately and the generator will be run by water power. At Detroit, Michigan, the Dix road has been completed and is now running. At Scranton, Pa., the Van Depoele system has been adopted by the Scranton Suburban Railway Company. The figures quoted in this article show the decided economy of electric railways and the work is in every instance fully satisfactory. In the light of the success achieved by the electric railways already in operation, it seems to be a safe prediction that these silent, clean and convenient railways will before long supersede the slow, noisy, unpleasant horse cars, which have so long been considered a necessary nuisance in large towns and cities. The advantages of using electricity as a motive power on short tramways, street surface railways and elevated railways over steam or cables, are numerous. In cases where steam is used in cities, either for surface or elevated roads, the substitution of electricity for steam does away with the objectionable noise and constant smoke of the locomotives. Trains can be more easily and quickly stopped and started. It has been estimated that the cost of construction of an elevated road for electricity would be one-third less than for steam, and the running expenses may be decreased in at least as large a proportion. In the case of a cable a striking difference exists between the two systems. It is stated by good authority that it takes seventy-five per cent. of the engine's power to drive a cable of over three miles in length, leaving but 25 per cent. of utilizable power to propel the cars; whereas electricity has given as much as fifty-three per cent. of mechanical efficiency and that after being transmitted over a distance of some thirty-five miles. This is something wonderful and is perfectly authentic, coming from such authority as Marell Depres. By no known means can power be distributed so extensively and economically as by electricity. Wherever water power is used to drive the electric generators, the saving can not be disputed, and where steam is used as a prime motor to run the generators, there is a large difference in favor of electricity over animal power. There is also saved in the use of this system the expense of large stables and the annoyance of having a large number of laborers to care for the same. Less space for cars on track is required and there is no wear of the track between the rails. Elevators and other machinery can be run from this power at the stations and anywhere along the line, or in its vicinity where needed.

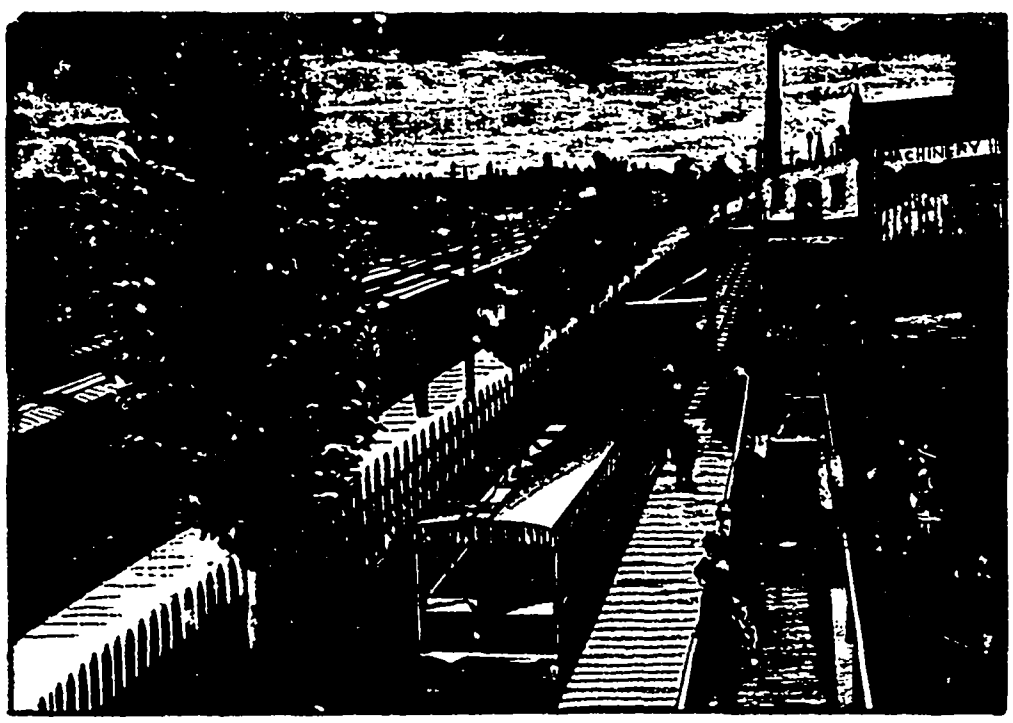

FIG. 1.—TORONTO ELECTRIC RAILWAY.

MECHANICAL DRAWING.

Almost any mechanic can strike out on a new idea and construct quite a machine out of any grade of material, but it takes a real practical draughtsman to bring out a design that shall be simple, durable and symmetrical when finished. There is something about the true beauty of form in engineering designs that follows the same rule as those which render a picture or a group of statuary pleasing to the eye. Every draughtsman must form a correct conception of every feature of the machine he is at work upon, and every part built up in the mind, so to speak, before being made in the workshop. Such a requirement demands a large amount of close observation of the practical department of engineering together with a thorough training in theoretical investigations. The pattern maker is the first to bring theory into practice. He not only must understand drawing as well as the draughtsman himself, but must be posted up in foundry moulding as well as a foreman moulder, and be able to make a neat, clean structure, that shall imitate the outline features of the drawings. The moulder who is to study out the imitated articles from the patterns, core prints and core boxes, must have a slight understanding of the draughtsman's practice to assist in following out what the pattern maker has been driving at. So in order to attain any degree of proficiency in any one of these callings we should have more or less knowledge of them all. With the draughtsman, he may be provided with all the latest improved drawing tools, and all that he can leave for the pattern maker is either straight or curved lines, which may be either dotted or drawn full, or left shaded. Dimension and centre lines have a broken mixture of them all, but with the three alone every class of material can be indicated, and material substances shown, by introducing them in the cross-hatching whenever a section is drawn.—Boston *Journal of Commerce.*

Paris, Ont., is to have a needle factory.