

THE TRAMWAY SYSTEM. THROUGH THE POWER-HOUSE. ENGINE AND DYNAMO.

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It only costs a penny to ride in a tram-car. That penny is one of the least thought-of expenditures that the average Aucklander makes, but what a multiplicity of ends its fractions serve! Each small coin contributes to the cost and profit of a huge industry, whose activities are obvious in the main thoroughfares of Auckland, and extend in long lines into the suburbs. The Auckland Electric Tramways Company owns between 23 and 24 route-miles of lines, whereon are now running 100 cars.

It seems, perhaps, a strange statement to say that each of those cars, with its 80 or 100 horse-power motors, is in effect burning coal in a furnace in lower Hobson-street. There the current for the system is generated, and thence it flows out in its mysterious way by the copper web that spreads its filaments over the city, along quiescent wires that seem as inert as so much clothes-line, but which are indeed as full of pulsing energy as a Titan. Too little is known of the working of the great and up-to-date system that rushes Auckland to work in the morning and home again for meals; there is too little realisation of the fine collection of machinery that converts the familiar heat of coal into the inscrutable energy that mankind has done so much to harness and employ. The true story of the system can be seen in the power-house, not in the street.

Modern Boilers.

In the central station in Hobson-street, there is a great show of energy, as the iron mills spin the strength of steam into the finer-built power of the current, and pump it into the distributing mains that go out, literally, through a hole in the wall, into the city and the streets beyond. In the first place, where all the work is started, there is a big boiler-house. This building is 170ft long and 62ft wide, and it is filled for nearly all its length with boilers. Whereas in the beginning of the use of steam, the boiler was but a simple closed pot standing above a fire, these modern appliances are intricate devices of steel tubes, ranged in rows, and full of water, the flames and hot gases playing among them. Nine of these boilers, which are of the Babcock and Wilcox type, and all alike as peas, stand in a long row, and there is room for three more at one end of the range.

Mechanical Stoking.

Of stoking, in the ordinary sense, there is none. The grates are wide, endless chains; running slowly over rollers at the front and back of the furnaces, and the coal is simply dropped through a hopper upon the front of the grate, and at a regular rate carried slowly through the furnace to the back. By the time the length of the fire has been traversed, the coal has been completely burnt, and the remaining ashes drop down into the ash-pit. The wheelbarrow is almost unnecessary. When coal is delivered at the power-house it is dumped into a receptacle and thence on to a tray conveyor. This deposits it into a rotary filler, which in turn empties into the bucket conveyor, which travels up and over the hoppers which feed the respective furnaces. If any hopper needs filling an arm is elevated, and as each bucket passes it is upset and throws its load into the hopper. "The actual work of the human stoker consists of pulling a chain, by which is measured out a couple of hundredweight of coal; and at the same time a counter registers the number of deposits. When the ash accumulates below the grate it is raked out and dumped into the coal conveyor. By this handy slave it is placed in a reservoir, from which it can be easily loaded by its own weight into drays and removed. The boilers have attendant appliances in the shape of a couple of big Weir feed pumps, which force water into them to keep them full to the working level; and the stoking machinery is driven by a couple of small steam engines.

Economising Coal.

When the new boilers which have been ordered are installed, one more feed pump and another stoking engine will also be put in. In all steam plants the coal bill is an object of constant solicitude, and a valuable help in keeping it as low as possible is an "economiser." One of these is fitted at each end of the powerhouse between the end of the main flue and the chimney stack. The economiser is a system of tubes through which the feed water is pumped passed before it goes into the boiler. The hot gases on the way from the boilers to the chimneys pass about the tubes, and heat the water up to about boiling point. As the tubes would by themselves become coated with soot very quickly, they are kept clean by an automatic set of scrapers driven by a motor.

The Engineroom.

By big pipes, carefully insulated to prevent waste of heat, the steam is conveyed to the engine-room—a building of the same size as the boiler-house. The big engine-room is the home of labouring giants, orderly and mighty servants of a public that rarely gives a thought to their toil. There are six of these steady workers, and they know nothing of an eight hours' day. They run whenever they are wanted, and so far have never asked for an increase in wages.

Three sets consist of horizontal compound engines, made by Cole, Marobent, and Morley; and they drive dynamos which each have an output of 300 kilowatts. (A kilowatt is roughly equivalent to a horsepower and a-third). There are two 600 kilowatt sets, in which the engines are of the triple-expansion, vertical type, running at a very much greater speed than the horizontal ones, hut occupying much less floor space. These sets are the product of the Brush Electrical Company. All five sets produce a direct current of 550 volts, which is used for the parts of the system in the city and on the shorter lines. The outlying parts of the system are furnished with current by another system, in which a big Brush set of 600 kilowatts capacity, and very similar to the other two in appearance, plays a leading part. There are other machines, electric motors which drive dynamos that “boost” up the voltage, and others which act as pumps to draw the current out of the rails, and a big motor-generator that, using low-pressure current as a driver, produces high-voltage alternating current for use on the outlying parts of the system when the load is not large enough to require the running of the big Brush alternator.

Control of the Current.

ALL the current generated in the power-house passes through the intricate mechanism of a very handsome switch-board, by means of which it can be directed wherever it is required. There also it is measured in all particulars; and there too are clever and alert devices which, if accidents occur, or if the pressure of the current becomes too high, or if other untoward things happen, act with wonderful promptitude and, by cutting off the current, avert danger; Into the switchboard by many lines the current goes; and from it, in black snake-like cable, it is led, out through the hole in the wall, into the city and the streets beyond. It is a great and fearful genie, this spirit of the dynamo, but it has been well-harnessed. It does its work perforce; and held in the proper course by strong bonds, it is a very powerful servant.

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