From No. 2 sub-station to No. 3 sub-station, through "A" and "B" tunnels, is 79 chains, "A" tunnel being 15 chains long and "B" tunnel 64 chains long, grades varying from 1 in 10 to level, average 1 in 17, in favour of the load, minimum curve 5 chains radius.

"A" tunnel has been run purely for construction purposes, but coal will be won in all the other tunnels.

As the mine is developed, track will be continued through "C" and "D" tunnels, extending 110 chains beyond No. 3 sub-station, and excellent coal has been proved for two miles beyond this point. The track is single at present, and is provided with necessary turnouts to handle the traffic. In the whole layout, however, provision has been made for double tracking throughout.

OVERHEAD CONSTRUCTION.—With regard to the overhead construction. This is also of a most substantial character. The trolley used is General Electric Co.'s grooved No. 0000 throughout, and in parallel with it for the whole run is a bare stranded cable of 600,000 c.m. The feeder cable is tied to the trolley on an average every 150ft. The trolley wire is 7ft. 8in. from the level of the head of rails.

SUB-STATIONS.—Three sub-stations feed the overhead trolley network. These are identical with regard to electrical equipment. In each sub-station is a motor-generator composed of a d.c. 280 volt flat compound 200k.w. generator direct connected to and on common bedplate with a 3-phase 6300 volt form K. 300 b.h.p. motor, the set having three bearings.

The switchboard consists of three panels of white marble.

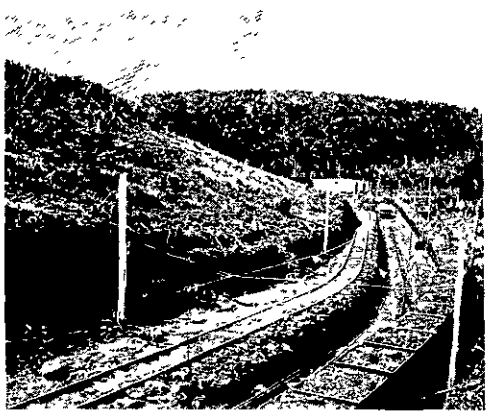
From left to right,—

Starting panel for motor with automatic oil switch.

D.C. generator panel.

D.C. feeder panel with voltmeter on swinging bracket.

TRANSMISSION LINE.—The three sub-stations operate in parallel, and are served



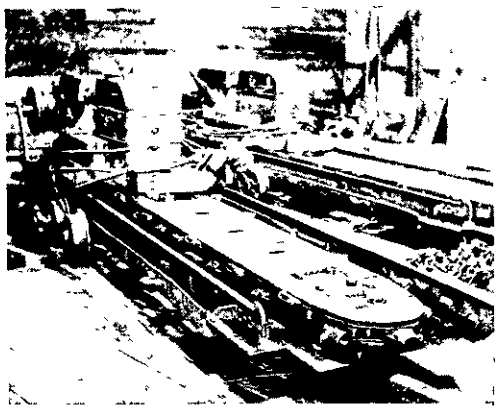
SIDING IN ELECTRIC TRAMLINE.

with 3-phase current at 6600 volts, the transmission wires throughout being No. 0 hard drawn bare copper: total length of transmission line, six miles.

A lightning arrester ground wire of five No. 16 stranded galvanised wire is run throughout the high tension line, stapled to the top of each pole, and is effectively grounded on an average every fourth pole, the distance between poles averaging 150ft. There are nine transpositions in the transmission line.

TELEPHONES.—Telephone lines connect the three sub-stations, power house, offices, etc., on metallic return, and are run on the transmission line poles from the power house to the beginning of the tramway track, and from that point to the end of the line follow the overhead construction. Each locomotive carries a portable telephone, by means of which a train can at once communicate with any of the points on the telephone network.

VENTILATION.—With regard to ventilation. The mine is exceptionally fortunate in this respect, in that but small fan capacity is required to assist and maintain the natural ventilation. Two fans, each driven by a 30 h p. B.T.H. 3-phase 500 volt motor, are used, one being located in the centre of "B" tunnel and the second in the centre of "C" tunnel. These motors are belted to centrifugal fans. The object in using 500 volt 3-phase motors for driving the fans is that this service will be con-



THE ELECTRIC COAL CUTTER.

tinuous, irrespective of any possible interruptions to the trolley overhead network. In addition to the above there are six Sturtevant blowers, each belted to a 5 h.p. d.c. 250 volt motor, which will be located as required at different parts of the workings, the motors taking current from the overhead trolley.

DRAINAGE.—The natural drainage is so excellent that the only provision made is a small Worthington pump, direct geared to a 5 h.p. 250 volt d.c. motor, this outfit being portable and readily moved to any point in the mine where it is necessary to pump out any small dips that will occur in working.

COAL-CUTTING.—For the winning of the coal, machines will be principally employed. The company are starting with two Sullivan board and pillar chain machines with 6ft. cutting bar, each machine driven by a 30 h.p. G.E. motor. These machines are the first of their class to be used in New Zealand. The Company have already proved 30,000,000 tons of coal in sight, the coal averaging about 14,000 British thermal units, being practically as good as the very best Welch coals mined. The seams vary from 6ft. to 12ft. in depth in the workings already opened, and the coal is entirely free from slate and bands.

With regard to the actual workings, the mine is extremely fortunate in having a solid sandstone roof, which will necessitate the use of very little timber for its support, this fact necessarily greatly increasing the rapid winning of the coal, with a corresponding decreased cost of production.

STORAGE BIN.—The main bin into which the coal is finally delivered has a capacity of 5,000 tons. It is divided into three compartments, two of 2000 tons each for the storage of unscreened coal, and one of 1000 tons capacity for the storage of screened coal. The loaded tubs run into the bin by gravity, being thrown into any one of the tipples desired, when they then turn over and discharge the coal on to the travelling elevators, which in turn deliver it to the various bin compartments. The tipples work automatically, the loaded tub in turning over carrying up an empty tub, which is then run down on the siding ready to be made up in a train for its trip back to the mine.

The main bin is composed entirely of ironbark built on pile foundation. Its loading capacity, if required, is 35 trucks at a time. The loading doors work in a horizontal plane, and are opened and closed by hydraulic rams operated at a pressure of 220lbs. per square inch, the pressure being obtained from a small stream near the top of the main incline.

The three elevators are operated respectively by two 10 h.p. and one 15 h.p. General Electric Co. C.q. motors, and the shakers are operated by three 5 h.p. Co. motors.

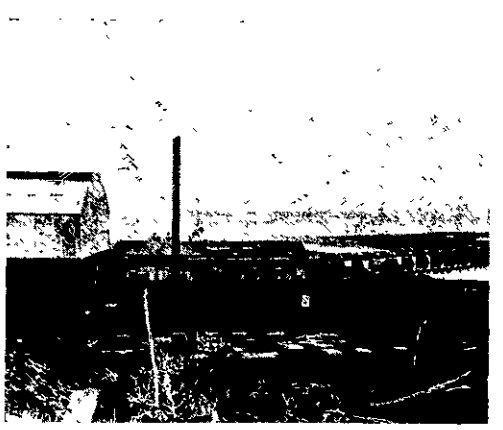
After coal is delivered from the bin into the trucks of the Government Railway, these trucks, averaging about 9 tons each, are pulled 22 miles to tidewater at Westport, on the West Coast of the Southern Island of New Zealand, this port at present admitting steamers to a draught of 22ft., although the Government (under the authority of an Act passed last session), have just authorised the expenditure of £200,000 to facilitate coal handling and enable steamers of 30ft. draught to enter the port.

Other large coal deposits in the neighbourhood are being taken up, and will doubtless be in full operation in the near future, making Westport one of the largest coal handling ports in the world.

Although the mine is on the coast, no harbour accommodation is available nearer than Westport, which at present is able to handle 1,250,000 tons of coal per annum.

The engineer of the company, Mr Broome, has proved himself a remarkably able man by the very complete and excellent layout he has made of the whole mine.

The complete contract for the electrical apparatus has been carried out by the Australian General Electric Co., and all the electrical apparatus is either General Electric Co., U.S.A., or British Thomson-Hous-



POWER HOUSE AND BINS.
Another view is shown in heading page 44.

ton Co.'s manufacture. The contractors have been ably represented by Mr. J. Schmidt, acting in the capacity of their constructing engineer.

The figures in centre picture, page 45, are:—From right: Messrs. Reece, Browne (mine manager), and Barlow (electric engineer), driving.

The General Electric Co., U.S.A., and the British Thomson-Houston Co., of Rugby, are represented in Australia by The Australian General Electric Co. The New Zealand representatives are the National Electrical and Engineering Co., Ltd., a purely New Zealand company, having headquarters at Dunedin, and branches in Wellington and Auckland.