be taken into account; the speeds must be common to both frequencies under consideration.

The following table shows the synchronous speeds which are available at the three frequencies in use in Australia:—

Poles.	25 Cycles.	40 Cycles.	50 Cycles.
2	1,500	2,400	3,000
4	750	1,200	1,500
6	500	800	1,000
8	375	600	750
10	300	480	600
12	250	400	500
14	215	342	428
16	187	300	375
18	166	266	333
20	150	240	300
22	—	218	272
24	—	200	250

The following speeds are thus available:—

Cycles.	Speed available.
25 and 40	300.
25 and 50	250; 300; 375; 500; 750; 1500.
40 and 50	300; 600.

The 25 and 50 cycle systems are the most important here, and it will be seen that there is a wide choice of speeds for the interlinking of these two.

ELECTRIC LIGHTING OF MELBOURNE CABLE CARS.

Battery System to be Installed.

The travelling public of Melbourne has for 30 years past patiently borne the lighting system—kerosene oil—in the 42 odd miles of cable tramway in the city and suburbs. The tramways belonged to a public company, and of course the expense in improving the system or providing modern equipment was eschewed. Now that the tramways are invested in a government board it is proposed to install an improved method of lighting. Recently a premium of £100 was offered for the design and specification of an approved method either by electricity, acetylene, or other illuminant. Twenty-five applications were received. Two methods—electricity and kerosene gas—were selected for trial. Each proved successful, but with kerosene gas it was found that the upkeep of mantles would prove to be excessive, so a scheme of electric lighting has been decided upon. The board's rolling stock consists of 56 bogie cars. 468 box cars, and 490 dummies, making a total of 1014. There are 14 car-houses, and it is proposed to provide a motor generator charging set at each of the houses, and two sets at the Brunswick car house. Tenders for the necessary plant are now being called.

Each dummy car is to be equipped with two head lamps with reflector, corrugated lens, Edison screw lamp receptacle, 10 watt, 6 volt metal filament lamps with alba or other suitable shade, and a 6 volt 6 amp. gas-filled bowl frosted lamp. There is also to be one 20 amp. combined single pole switch and fuse in a moulded insulating case, and one 10-ampere two-way snapswitch for the headlights. A five cell alkaline storage battery of 75 amp. hour capacity, at the 8-hour rate, with two point plug and insulated flexible copper connections between the battery and the car wiring is to be installed on each dummy.

For the 468 four-wheel cars two Edison screw lamp receptacles suitable for bracket mounting, with 6 volt 2 watt metal filament lamp are to be provided for the destination indicators. For the inside lighting one 5 cell battery of 113 amp. hour at 8-hour rate, and suitable lamps are to be installed. For the protection of the wiring of the dummy car from the main axle oil and wheel splash a solid drawn heavy gauge steel conduit is to be run from one end of the car to the other below the floor level.

The bogie cars are to be equipped in a similar manner to the four-wheel cars with the exception that three lamps are to be installed for the inside lighting.

Each battery charging set is to consist of a 400 volt, 3 phase, 50 cycle, 4 pole standard squirrel cage motor, of open or semi-enclosed type, direct coupled to a direct current generator with a full load capacity of 100 amperes at 125 volts and necessary switchboard.

KALGOORLIE ELECTRIC POWER AND LIGHTING CORPORATION LTD.

In their report for 1916 the directors state that operations in Kalgoorlie have been continuously maintained, and all important customers are still taking current, though in some cases, in less quantity than formerly. The continuation of the war has accentuated the shortage of labor, and from this shortage the most important of their difficulties, and largely those of the whole of the goldfield, have arisen; it has also caused a further increase in the cost of supplies and in taxation. The result of these unfavorable factors is shown in the decrease of gross profit for the year of £4167, and (due to heavier taxation) in the net profit of £4926. Notwithstanding the reduced profit, the dividend of 4 per cent. has been paid on the preference shares. £7000 has been added to the debenture redemption fund, and £2000 depreciation has been written off the value of the property. £1007 is to be carried forward. The payment of the debenture issue falls due on December 31st next. Arrangements have been made to repay £31,200 of the amount upon the due date, and the balance by annual payments of £7500. These deferred payments carry an additional 1 per cent. interest. The property has been maintained in good condition, and notwithstanding some difficulty in get-

STANDARDISATION IN THE ELECTRICAL INDUSTRY IN AUSTRALIA.

A paper with the above title was read by Mr. J. P. Tivey before the New South Wales section of the Electrical Association of Australia at their last meeting. The author first dealt with what had been done by the American Institute of Electrical Engineers in America, the Engineering Standards committee and the British Electrical and Allied Manufacturers' Association in England, the V.D.E. in Germany, and the Italian Electrotechnical Association in Italy, and by the International Electrotechnical commission at meetings in Paris, Zurich, and Berlin.

The advantages accruing both to the manufacturer and to the purchaser from the standardisation of electrical machines of moderate sizes were pointed out, as also was the present burden of the enormous number of types and sizes which the manufacturer has to stand prepared to supply. The rating and testing of machines, etc., and the standards for wires and cables, were also mentioned. Discussing the subject of standards for illumination, the author pointed out that no standards were recognised, and that the whole matter was deserving of more attention than it received in Australia. The convenience to the public of uniformity in such small accessories as plugs and sockets for flexible connections would be inestimable. The author touched upon one of the most important points, as far as Australia is concerned, when he mentioned standards for the voltages, frequencies, and phases of public supplies; the Western Australian government system recently installed being instanced as the type of anomaly which should be avoided. The paper concluded with some suggestions as to the steps which might be taken to ensure the adoption of standards in Australia.

HYDRO-ELECTRIC POWER FROM KING RIVER, TASMANIA.

The proposal to expend a sum of £10,000 on preliminary work in connection with the contemplated King River hydro-electric power scheme, Tasmania, has been favorably reported upon by the public works committee, which has recommended expenditure on the following lines:—

(1) To construct a small crib weir above the dam site.

(2) To construct a tunnel through a spur forming a bend in the river right at the dam site, to enable the flow of the river to be diverted from the site of the proposed dam.

(3) The preparation of access to the site.

(4) The accommodation of the necessary workmen and surveyors.

(5) The preparation of surveys and plans to enable the chief engineer and manager of the hydro-electric department to submit a final report with plans and estimates.

The chief and most costly item of engineering work in the large scheme, the report of the committee says, will be the construction of a concrete dam of considerable dimensions, estimated at £150,000. An excellent position, presenting great natural advantages, has been adopted tentatively as a site for this structure. The King River gorge narrows at this spot, and the country rock (conglomerate), so far as examined, appears to be of a solid character. The proposed dam will be 180 feet in the water level as high as possible for the purpose of obtaining a better head for delivery into the large pipe running along the side of the gorge towards the point of development at the power station. The magnitude of the scheme may be gauged by the fact that the size of the first section of the pipe required for this purpose will be 12 feet in diameter, and its length about 3½ miles. The pipe will deliver the water into steel pipes, running down the steep sides of the gorge, and giving a minimum pressure of 435 feet at the nozzles operating the turbines. The water after actuating the turbines will be returned into the natural water course of the river about 3½ miles below the point of intake at the dam. The power station will be equipped with four electric generators and accessories, each with a capacity of 16,000 horse power, one of these units being held as a standby. The transmission line will proceed in as direct a course as possible to a sub-station at Zeehan, where the current will be transformed and from which the proposed electrolytic works and other customers for energy will be supplied. The minimum power available at the dam site from the flow of the King River is estimated at 45,000 horse power. Allowing for losses in transmission, the energy available for sale at the sub-station at Zeehan will be about 40,000 horse power.

The gross cost of the whole scheme for water conservation, power production, transmission, transformation, and distribution to consumers is estimated by the chief engineer of the State hydro-electric department as £900,000, in which sum is included the expenditure of £10,000 for preliminary work.

Electric Lighting for Melbourne Trams.—The tramway board accepted the tender of the Australian General Electric Company last month for the installation of a storage battery system of lighting. Details were published in the August issue of this journal. The contract price is approximately £40,000, and the battery to be installed is the Edison type. Over 1000 cars are to be equipped, and the batteries will require 5070 cells. This will be the largest installation of this type of lighting in Australasia. The battery charging sets to the number of 15 will be of the General Electric Company's manufacture.