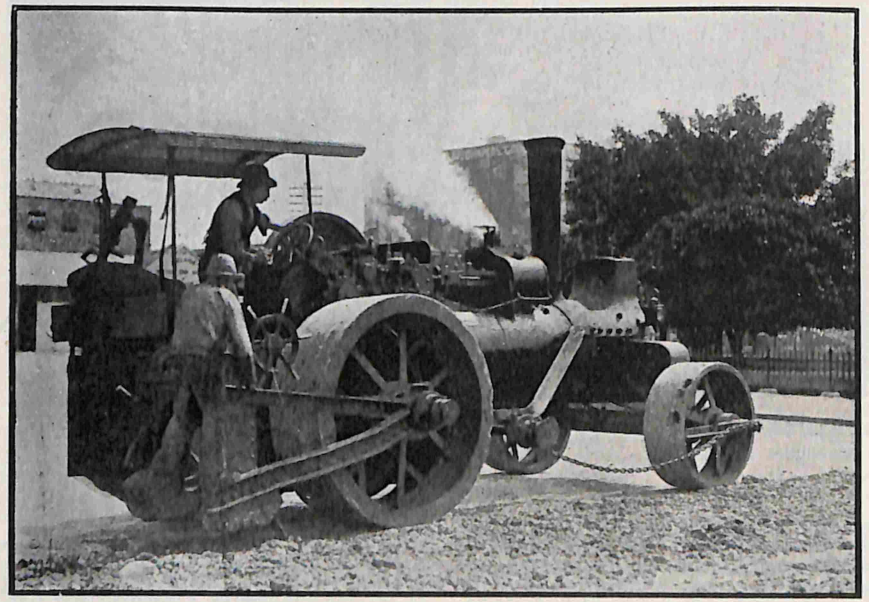
WOOD PAVING ON NORTH TERRACE.

LAYING WOOD BLOCKS ON THE NEW TRAM TRACK AT THE BANK OF N.S.W. CORNER.



THE STEAM PLOUGH AT WORK.

PUTTING IN THE NEW TRACK.

other apparatus necessary for the new service. In one sense, Adelaide is particularly well suited for the conversion, because but few engineering difficulties had to be overcome.

—Completing the Work.—

Immediately after the "turning of the sod" in May of last year, they speedily constructed the permanent way along Hackney-road and along North-terrace to King William-street, along King William-road to North Adelaide, along Avenue-road and Melbourne-street to Walkerville, along Wakefield-street, from where traffic to the South-Eastern suburbs will diverge, past Victoria Park Race Course to Marryatville, along Payneham-road to Payneham and Maylands, along Grenfell-street for the Kensington line, and the western end of North-terrace towards Hindmarsh, Thebarton, and Henley Beach, and at an early stage completed the more difficult passage by way of embankment across the eastern park lands from the end of Grenfell-street to the Kent Town Brewery. The completion of these lines necessitated particularly heavy work in connection with the crossings at Victoria-square, at North-terrace, and at the intersection of Hanson and Wakefield streets.

—Permanent Way.—

The construction of permanent way is being carried out in a very substantial manner, and the type of rail adopted throughout the major portion of the system is the 95-lb. B.S. grooved rail. On certain portions of the track, however, the 80-lb. bullhead rail has been adopted. On all curves the weight of the rail has been increased to 101 lb. per yard.

Thermit welding has been adopted throughout the entire system for purposes of forming a continuous rail, with the exception, however, of the necessary expansion joints which are formed by the ordinary fishplate joint.

The rails are spiked to jarrah sleepers, which are in turn laid on rolled ballast, and the surface finish is effected by rolled tarred screenings with a tarred and sanded finish.

Certain portions of the track are laid through the park lands, and in two places an embankment had to be formed for receiving the track. The surface finish on this portion of the work is open ballast.

COMPLETING A COMBINED ELECTRIC LIGHT AND POWER CABLE POLE IN KING WILLIAM STREET.

—The Official "First Car."—

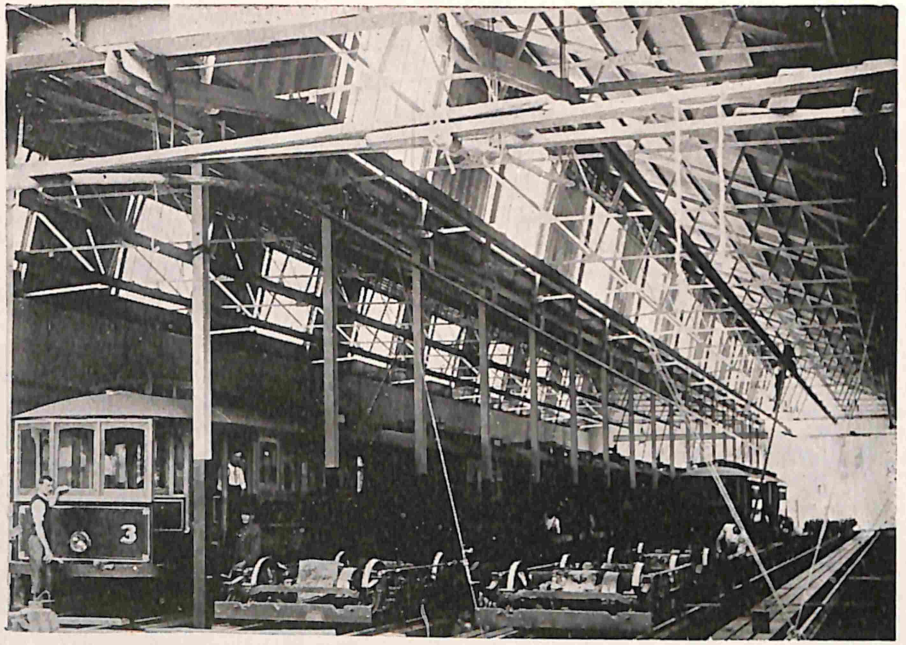
Monday, November 30, was a red-letter day in Adelaide, for it witnessed the trial trip of the first electric car which Adelaide has seen. Everything turned out splendidly. The car looked symmetrical and handsome, and the electrical motor and brake attachment sustained successfully a severe working test. The first trial was made in the morning, and a second one was made in the afternoon, when the car ran from the Car Barn, at Hackney-road, as far as the Botanic Gardens' gate, and back again. In the evening—at the mystic hour of 10.15, in order to accommodate Sir George Le Hunte—the official trial took place in the presence of a large number of people. His Excellency, the Premier, and a lot of other people were on board, and the run was made successfully.

—The City Bridge.—

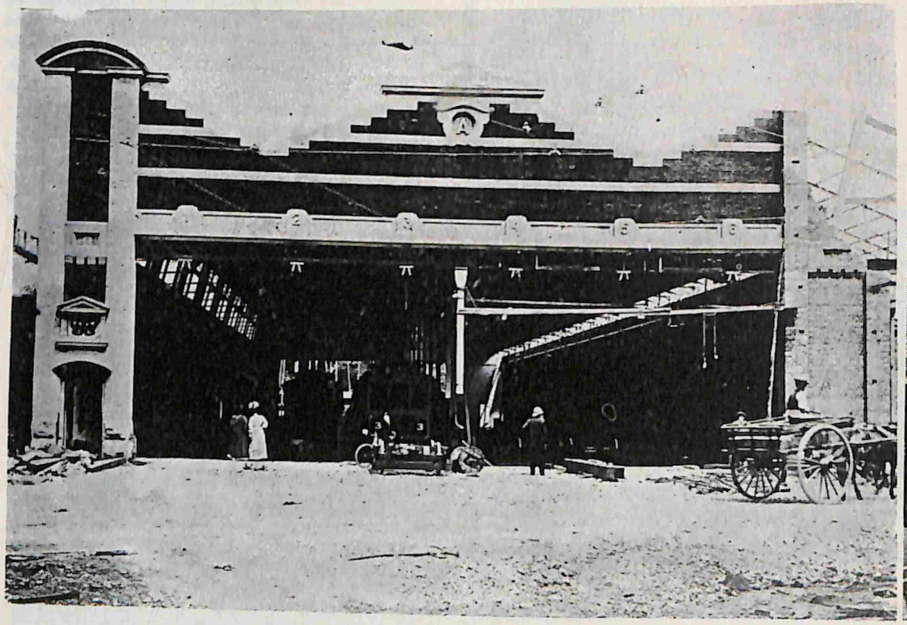
Another important work incidental to the Municipal Tramways Scheme was the strengthening of the Adelaide Bridge, which connects North and South Adelaide across the Torrens Lake. The Trust adopted a scheme for putting in two extra girders and other detail work in order to enable the bridge to stand the extra strain of the heavy electric cars. Messrs. James Martin and Co., Ltd., of Gawler, were entrusted with the contract.

Before proceeding with the work the City Council received an offer from the Trust to contribute the amount necessary for strengthening the bridge (viz., £3,586) towards the cost of rebuilding the whole structure, which the City Engineer estimated would cost between £8,000 and £10,000. The Council gave very careful consideration to the offer, but the heavy expense of providing a new bridge for tramway purposes, chiefly out of the city's funds, did not appeal to the Council, and at the meeting of the General Purposes Committee in November, 1908, the matter was finally disposed of, and the offer of the Trust was rejected. It was, however, deemed advisable to provide for a further con-

THE CAR DEPOT ON HACKNEY ROAD.

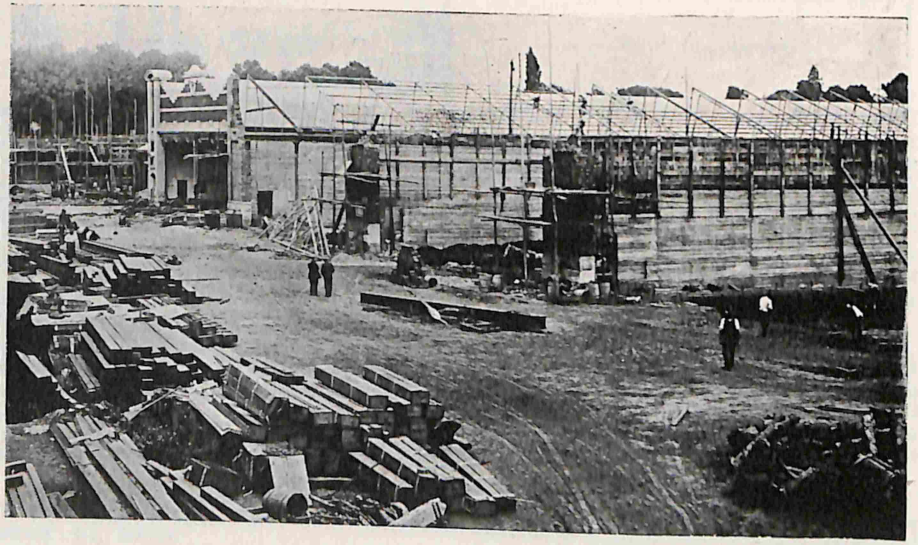


NO. 1 SHED AT THE CAR DEPOT.



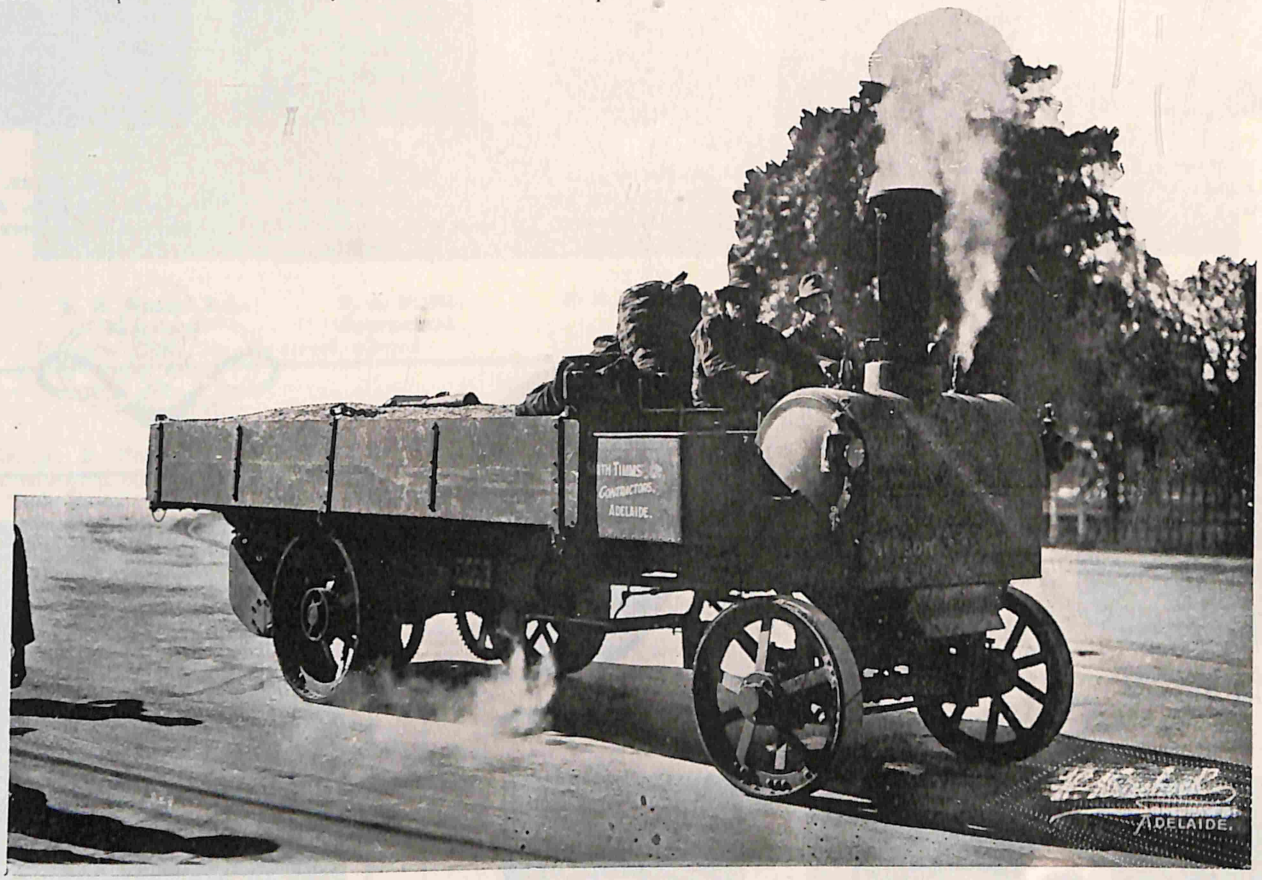
Critic photo.

CAR DEPOT, HACKNEY ROAD.



A GOOD VIEW SHOWING THE GREAT AREA OF BUILDINGS AT THE NEW ELECTRIC CAR DEPOT.

sideration of the question of widening the roadway, if found necessary, at a future day, by absorbing the present footways and providing separate sidewalks for pedestrians outside the present railings. For this purpose the Council has placed a sum of £3,000 on its estimates, but nothing will be done until after the electric cars are running to North Adelaide, when it can be seen whether any extra space on the bridge is really needed for ordinary vehicular and pedestrian traffic. The opinion at present generally held is that no expenditure will be required.



THE STEAM TROLLEY USED FOR CONSTRUCTION PURPOSES BY MESSRS. SMITH & TIMMS.

—Cost and Completed Work.—

In connection with the cost of electrification, which is limited by Act of Parliament to a maximum of £12,000 per mile on the average, it is interesting to note that the Sydney electric service cost on an average over £22,000 per mile. It is very difficult to arrive at an analysis of the causes contributing to this big difference in expenditure. When questioned on the subject, Mr. Goodman merely said that it indicated the extreme care which had to be exercised by the Trust and its officials in keeping down cost while inaugurating a maximum of utility and comfort. One heavy and unexpected item of expenditure has been caused by the recent imposition of Customs duties. It was originally estimated that about £30,000 would be sufficient to cover duty payable on material imported in connection with the scheme. Owing, however, to the new duties, that amount has been more than doubled, a sum equal to over £60,000 being actually required for the purpose. The total value of contracts let to date is about £514,800, and the total value of work completed, about £281,000. Out of the total permanent way of 54 miles 55 chains, which constitutes the Inner Area, 35 miles have been laid.

—Power and Paving.—

Under present conditions, the Trust is drawing electricity for its motors from the Electric Lighting and Supply Co., but tenders are being invited for the erection of a power house for this purpose which will belong to the Trust itself.

A. E. FORD,
Traffic Superintendent.

J. Bowman,
A.M.Inst.C.E.,
Per. Way As. Engineer.

P. W. Shaw,
M.Inst.C.E., M.I.M.E.,
Resident Engineer.

J. A. Macdonald,
A.M.I.M.E., A.M.Am.I.E.E.,
Chief Draughtsman.

F. G. Ayers,
A.M.I.M.E., &c.,
Overhead Superintendent.

E. V. Clark,
B.Sc., A.M.Inst.C.E., A.M.I.E.E.,
Station Superintendent.

A. Wilkinson,
Building Superintendent.

Engineering Staff

of the

Adelaide
Municipal
Tramways
Trust.

E. W. Luckwald.

E. S. Moulden,
A.M.I.E.E.,
Chief Assistant Engineer.

T. Kerslake.

T. W. Mellor.

W. C. Hotten.

A. V. Simpson.

Hammer & Co., Rundle-street, photos.

SECRETARIAL, ACCOUNTANCY, AND STORES STAFF.

S. R. Booth, B.A., Secretary. **C. A. Smith, Accountant.** **F. E. Lester.** **J. Burns.** **G. L. Lindsay, Comptroller of Stores.**

Hammer & Co., Rundle-street, photos.

—Personal.—

Mr. A. E. Ford, born at Kapunda, S.A., educated at Way College, Adelaide, and Technicological College, Sydney, was engaged on the Sydney Tramways during conversion to electric traction. Was appointed tramway superintendent and resident engineer of the Electric Supply Co., of Victoria, Ltd., at Bendigo, which position he resigned in January, 1909, to accept the appointment of Traffic Superintendent under the Municipal Tramway Trust.

Mr. E. S. Moulden, A.M.I.E.E., born at Adelaide, S.A., occupies the position of Chief Assistant Engineer. After a course at the Adelaide University and S.A. School of Mines, he served four years with the firm of Messrs. J. H. Holmes & Co., of Newcastle-on-Tyne. He then went to Chicago, and joined the Metropolitan West Side Electric Railroad as Assistant Engineer. Mr. Moulden returned to Australia in 1905, and was appointed Lecturer in Electrical Engineering at the S.A. School of Mines, after which he joined the firm of Messrs. Todd & Samuel as managing engineer, until he relinquished that position to take up his present duties. Mr. Moulden is a member of the Australian Tramway Officers' Association, and associate member of the Institute of Electrical Engineers.

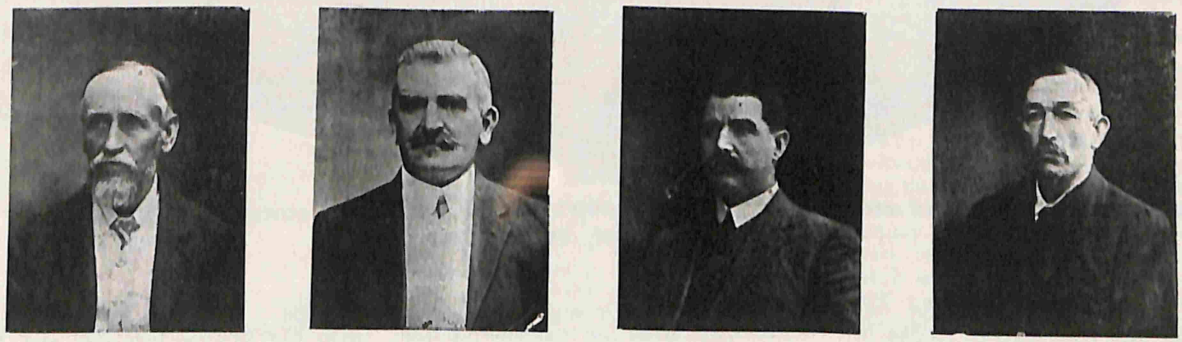
Mr. John Bowman, A.M.I.C.E. Educated at the Sydney Grammar School and the Royal Indian Engineering College, Cooper's Hill, England, where he took the diploma in 1889. Was employed on the construction of the Southern Punjab Railway, India, from 1895 to 1897; in the tramway construction branch of the Public Works Department, Sydney, from 1897 to 1903; on the construction of the Dunedin Electric Tramways, N.Z., from 1903 to 1906; was appointed Permanent Way Assistant to the Adelaide Municipal Tramways in October, 1907.

Mr. P. W. Shaw, M.Inst.C.E., M.Inst.Mech.E., holds the position of Resident Engineer. He was educated in England, and arrived in New South Wales in 1885. He had five years experience in N.S.W. Government Railway Drawing Office, two of which as chief draughtsman, 12 years' experience as resident engineer on N.S.W. Government Tramway Construction (steam, cable, and electric systems), three years supervising engineer in charge of the tramway construction for the N.S.W. Government, 18 months chief engineer in charge of designs and erection of Australian Smelting Co.'s new works at Port Kembla, N.S.W.

Mr. Macdonald, A.M.Amer.I.E.E., who holds the position of Chief Draughtsman, has been engaged in electrical and mechanical work for the last 20 years. Educated at King's College, London, and Glasgow University, he has since been on the staffs of Messrs. Caird & Co., shipbuilders, Granock, N.B., Messrs. Latimer Clark, electrical engineers, London, and the P. & O. Steamship Co. Previous to his appointment in the Trust he was chief draughtsman to Mr. Goodman in New Zealand for five years, engaged in designing the city electric lighting plants for Christchurch and Auckland, and afterwards in the electrification of the Dunedin tramways and the Waipui hydro-electric power tramway scheme.

Mr. F. Gordon Ayers, A.S.A.S.M., A.M.I.Mech.E., M.I.M.E., born at Adelaide, S.A., is the Superintendent for Overhead Construction. He obtained

INSPECTORIAL STAFF.



T. Jones. **W. Davies.** **J. T. Dempsey.** **J. Barnes.**

Hammer & Co., Rundle-street, photos.

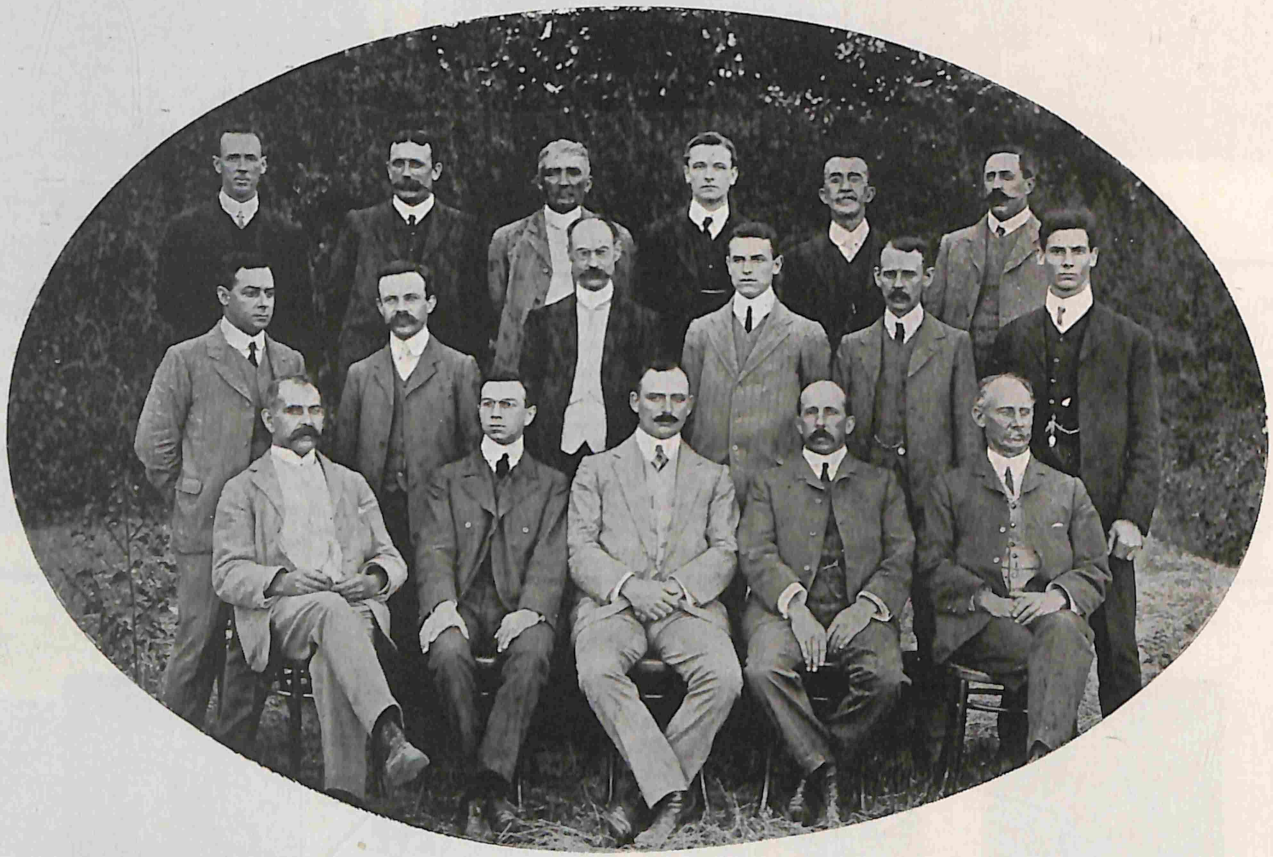
first place for the first diploma for mechanical engineering at the S.A. School of Mines, and spent 11 years at the design and superintendence of the erection of mining and smelting plants at Kilkenny, Broken Hill, and Mount Lyell, Tasmania. He was then engaged, after two years in England and the Continent visiting the leading engineering works, as designing draughtsman for up-to-date locomotives and machine tools at the

was engaged on the preliminary work in connection with the Trust's undertaking.

Mr. E. V. Clark, B.Sc., A.M.Inst.C.E., A.M.I.E.E., Assistant Engineer, is also a South Australian. Educated at Prince Alfred College, he gained an exhibition to the Adelaide University in 1893, where in 1895 he graduated as Bachelor of Science. 1898 he won the Angas En-

Department, and Messrs. Bramwell and Harris, consulting engineers, of Westminster. Mr. Clark was appointed lecturer on electrical engineering and assistant lecturer on mechanical engineering at the School of Mines, Adelaide, but resigned in December, 1907, to join the Tramways Trust.

Mr. Arthur Wilkinson served with the London and North Western Railway 1889



PHOTOGRAPH OF CHIEF ENGINEER'S STAFF IN CONNECTION WITH THE CONSTRUCTION OF THE ADELAIDE ELECTRIC TRAMWAYS.

islington Railway Workshops for two years. He then entered the service of Messrs. Noyes Bros. as chief assistant engineer on the Fremantle Tramways, W.A., for three years. He took up his present position with the Municipal Tramways Trust on July 1, 1907, and

gineering Scholarship and proceeded to England, studying for a session at University College, London. He then entered the shops of Messrs. Siemens Bros., and Co. Subsequently Mr. Clark was connected with the Stuart-street Station of the Manchester Corporation Electricity

to 1898. He was assistant engineer with the British Insulated and Helsby Cables, Ltd., in connection with the Bendigo and Ballarat Electric Tramway schemes, 1901-1903, and assistant engineer with the Victorian Railways and Adelaide Corporation; also engineer-in-

charge of the North Melbourne Electric Tramways Construction, 1906-1907. He joined the staff of the Municipal Tramway Trust in September, 1908, as Building Superintendent.

Mr. Sydney Russell Booth, B.A. (Cantab), Barrister-at-Law of Lincoln's Inn, the Secretary of the Trust, was born at Sydney, N.S.W., and was educated in England. In September, 1898, he proceeded to Trinity College, Cambridge, when he was elected to a Sizarship of £100 per annum, in addition to a scholarship which he held from the City of London School. In 1901 Mr. Booth graduated in classical honors and went to London, where he read for the Bar and took an active part in electrical enterprise, being in the service of the British Electric Traction Company from July, 1901 to April 1907, in various important administrative positions; during this period he was, in 1905, called to the Bar by the Honorable Society of Lincoln's Inn. In 1907 Mr. Booth returned to Australia and entered the service of the Trust in July, 1907.

Mr. C. A. Smith, Accountant to the Trust, has for the past 25 years been in a similar position in the Engineer-in-Chief's Department of the S.A. Government. He first entered the Hydraulic Engineer's Department, which shortly afterwards became amalgamated with the Engineer-in-Chief's Department. He has from time to time held positions in the different branches under the Engineer-in-Chief and the Hydraulic Engineer, and has become well acquainted with the methods of accounting in connection with all the important public works of this State, which came directly within his treatment.

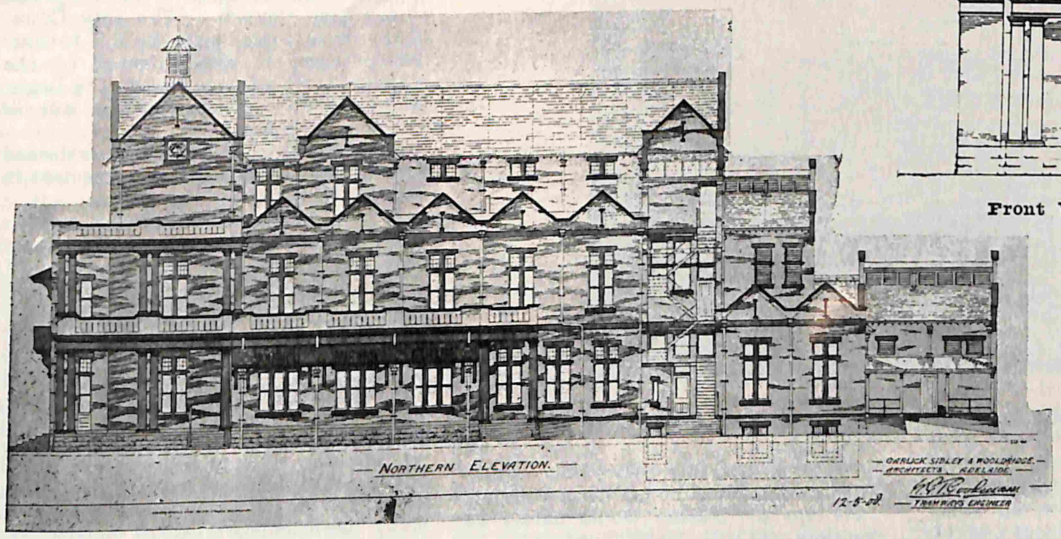
Mr. W. C. Hotten, A.S.A.S.M., Mechanical Draughtsman, gained the diploma in mechanical engineering in 1901, and went through a course of training in electrical engineering at the University. In 1900 he was appointed as draughtsman in the Engineer-in-Chief's office, and, receiving an offer for a similar position with the Proprietary Co., at Broken Hill, proceeded there in 1904. In the following year he accepted the position of chief engineer to the Block 14 Co. He then accepted the position of constructing engineer and chief draughtsman to the Block 10 Co., in

1906. Being desirous, however, of returning to Adelaide, in June of last year Mr. Hotten took up his present position as mechanical draughtsman on the staff of the Municipal Tramways Trust.

—Tramway Building at Hackney.—

The Municipal Tramways Trust have been particularly fortunate in obtaining such a magnificent site for their car depot and offices. It is situated in the Hackney-road, a very short distance from North-terrace, and has an area of over nine acres. On the north it is bounded by the Botanic Park and on the west by the Botanic Gardens. Over one-half of the total area is covered by a most substantial class of building.

Under the direction of Mr. W. G. T. Goodman (the Chief Engineer and General Manager) Mr. H. E. Sibley and Mr. C. W. Wooldridge, of the firm of Messrs. Garlick, Sibley, and Wooldridge, architects, prepared the plans, which comprised 19 large sheets of drawings and about 100 sheets of detailed drawings, and this firm are supervising the erection of the buildings.



Administrative Buildings, Northern Elevation.

—Administrative Block.—

The administrative block is a dignified and imposing set of offices for the large staff that will be required to administer the complete system.

The car depot will be as nearly as possible in keeping with the administrative block, and is also lit by electricity, with a supplementary gas service. There will be permanent way sheds of a total length of 380 feet, tarred metal mixing sheds, bicycle shelters, two foremen's residences, emergency house, &c., the whole forming a very complete and up-to-date block of buildings. Tenders were called for these and received by the Trust last July, and that from Messrs. Smith, Timms, & Co., was accepted.

—Prevention of Fire.—

The Municipal Tramways Trust have given every consideration to the protection from fire of the car sheds and contents on Hackney-road. Apart from structural features to this end, such as dividing the sheds into four separate units, thereby confining or restricting any loss to one fourth of the total, the Trust are protecting the whole of the sheds, accommodation block, workshops, and stores with a complete system of the Grinnell Sprinkler and Automatic Fire Alarm. The administration block will be fitted throughout with the Kirkby Expansion and Compensating Thermostat. Besides the above means, throughout the building at points indicated are placed Simplex Chemical Fire Extinguishers. The whole of the foregoing work was let by tender to Messrs. Wormald Bros. and Wears, fire protection engineers of Adelaide, Melbourne, and Sydney, who have had a large experience and trade as specialists in fire protection engineering. A brief description of the principles of sprinklers, thermostats, and chemical extinguishers will be of interest to our readers. An installation of Grinnell sprinklers consists of a series of pipes reticulating through a building on the ceilings. At intervals along the pipes are placed the sprinkler heads, so that each 100 square feet is protected by a sprinkler.

In the case of car sheds, there are other pipes and sprinklers besides those on the ceiling, and these are so placed as to run down the aisles and between the cars. If a fire should occur, the ascending heat releases a valve in the sprinkler, which is held in position by fusible solder. Immediately this valve is released, the water from the pipe is released and a heavy downpour of water results. If the fire should spread, other sprinklers are released. At the same time a sprinkler opens, and within a few seconds an alarm is sounded on the fire gong. Thus the fire is assisted to be extinguished, and the alarm is sounded through the agency of the fire.

Front View of Administrative Buildings, Eastern Elevation.

The service is supplied with water primarily from the town's main, and for this purpose two 6-inch mains have been installed, and as a reserve, a secondary supply is provided by means of a pressure tank of 5,000 gallons capacity. Such is a brief description of the Grinnell sprinkler installation as installed throughout the Government Car Sheds in Sydney, N.S.W., and also the Dudley-street Car Sheds for the Victorian Railway Commissioners.

A thermostats installation is one in which at points on the ceilings are fixed

contrivances, which are affected by heat, so that when a sudden rise of temperature takes place, electric contact is made, and an alarm is sounded. At the same time a shutter is dropped on the main instrument, generally placed in the main hall near an entrance door, which locates the fire if on the basement, ground floor, or elsewhere. The system could be so complete, if necessary, as to locate the very room. It will be seen that the difference between a sprinkler and a thermostat installation is that the former commences to put the fire out and gives an alarm, whilst the latter gives the alarm only. The latter can be installed in such places as hotels, offices, residences, &c., and where light stocks and inflammable material is stored. The Simplex Chemical Extinguisher is essentially a first-aid machine, and can be used often times, if human agency is about, to put out a fire, even before a sprinkler or thermostat operates. Chemicals require human aid. Sprinklers and thermostats are automatic and are on watch night and day and require no aid whatever. Throughout Australasia over 10,000,000 sterling of buildings and stocks are protected by Grinnell sprinklers. Throughout the world over 100,000 buildings are protected by over 30,000,000 Grinnell sprinklers, and over 10,000 fires have been successfully extinguished with an average loss of £60 per fire.

—Special Work.—

The special work in connection with the Adelaide tramways is of an extensive character. The lay-outs, however, are mostly of a symmetrical nature. Included in the special work is an extensive lay-out at the car depot, and the total number of tracks leading from the depot is 24, which are grouped into sets of three, and which groups are connected to the two main lines.

The buildings for No. 1 converter station are situated on East-terrace, and have a frontage of nearly 100 ft. The architects for this work were Messrs. English & Soward, who, under the direction of Mr. Goodman, prepared the necessary plans and specifications. The contractor for the erection of the building is Mr. C. H. Martin, of Hanson-street, Adelaide.

The building consists of a battery room, and main engine house and stores. In the engine room is situated the whole of the high tension apparatus, together with the rotary converters, boosters, and main switchboard. This latter piece of apparatus has a length of 78 ft., and is a fine example of a large traction board.

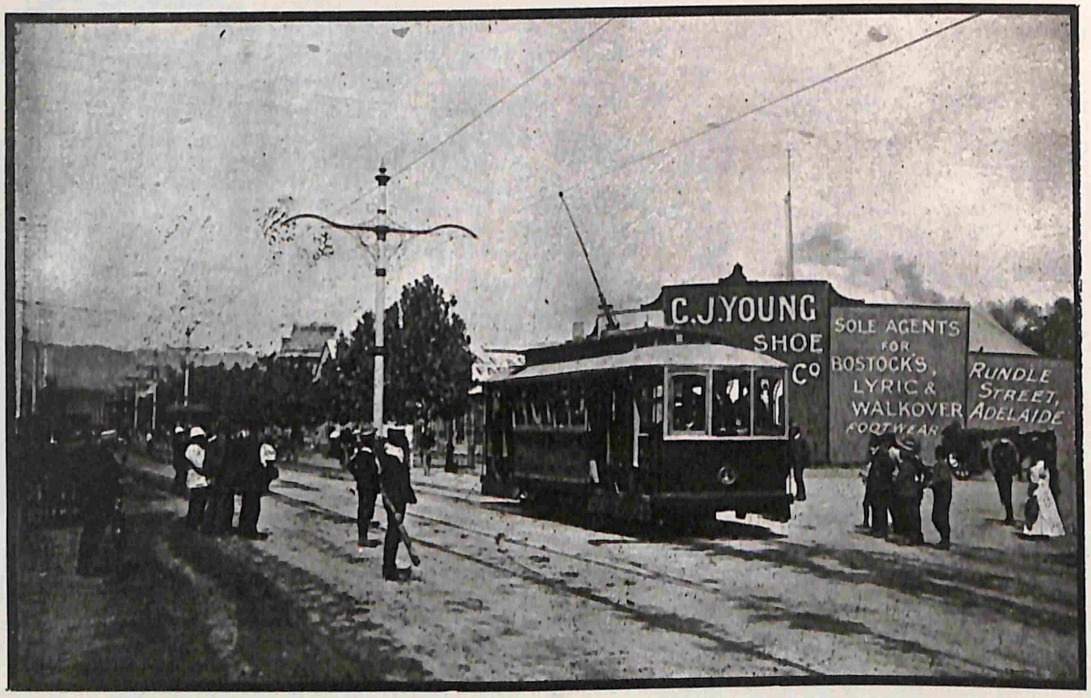
The only apparatus at present in use is the battery booster, which is temporarily situated in a switch house pending the completion of the main building.

Perhaps the history would hardly be complete without mention of

—The Bingham Scheme.—

In February, 1900, Mr. Bingham, on behalf of an English syndicate, wrote to the Adelaide City Council making certain proposals in regard to the Adelaide tramways, which after due consideration were agreed to, and an agreement with Mr. Bingham was entered into in April, 1900. Under the terms of the agreement the Council had to apply to Parliament during the session of 1900, seeking powers to authorise the Corporation of Adelaide to purchase by agreement or compulsorily, and to work various tramways in and about the City of Adelaide, and to lease the same to the company to be formed by Mr. Bingham, and to convert them into electric trolley lines. Under the agreement, Mr. Bingham had to deposit £1,000 with the Town Clerk of Adelaide for expenses in obtaining the Bill, which he did, and under the agreement he undertook to pay to the city a yearly rental of £1,000 for street rights, and 10 per cent. of the net profits of the undertaking. He also undertook to pay to the suburban local authorities £500 per annum as street rights, and to provide for a representative of the city and suburbs to be appointed to the Adelaide board of his company. The agreement was duly approved by the City Council with certain amendments, and conferences with the interested suburban local authorities were held, but the result was that the suburban local governing bodies would not agree to the proposals of the City Council. The City Council, however, introduced the Bill to Parliament, and it was referred to the Standing Orders Committee of the Legislative Council, which ruled it out of order.

Mr. Bingham subsequently released the Corporation from their agreement in August, 1900.



FIRST TROLLEY ELECTRIC CAR, NORTH TERRACE, ADELAIDE, NOVEMBER 30, 1908.

—Construction Work in the City.—

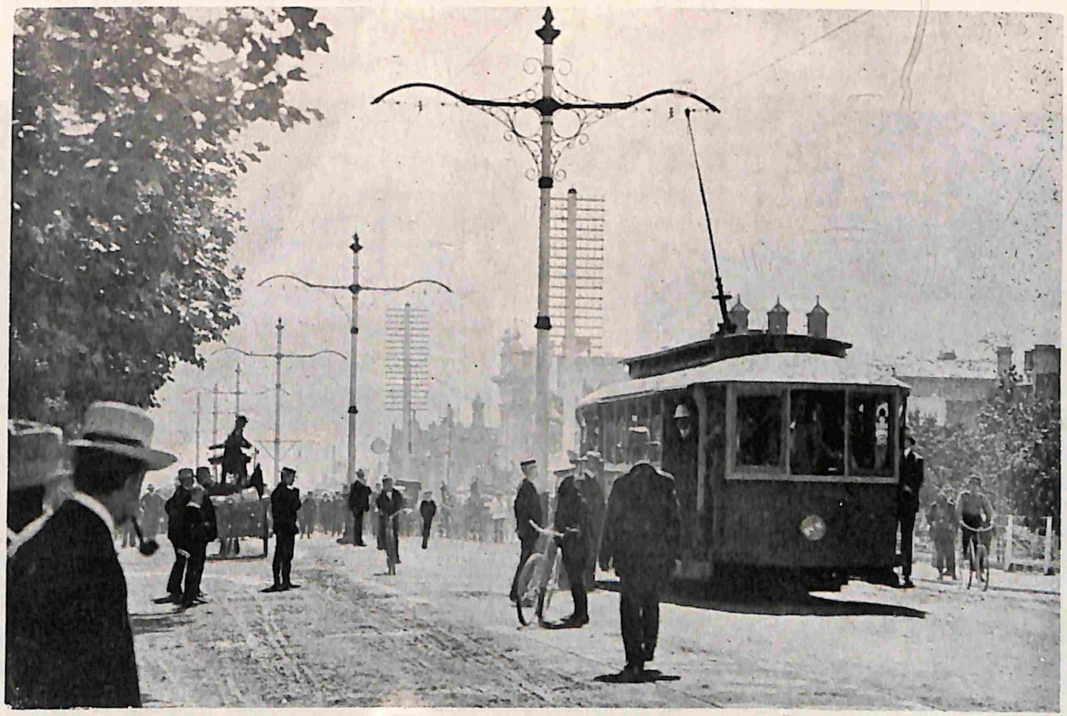
The commencement of construction work in the city has cast a very large amount of extra work on the city officials, the brunt of which has been borne by the Town Clerk (Mr. T. Geo. Ellery) and the City Engineer (Mr. J. Vicars, M.C.E.). New levels had to be supplied to the Trust engineers for all the tramway routes; roads have had to be raised in some instances and lowered in others; kerbs, footpaths, underground drains in many localities have had to undergo extensive alterations on account of the new system of traction; the parks and squares have had to be cut through in places to make short cuts for the new trams; electric lights and gas lights in "the line of fire" have had to be removed and temporary lighting provided. Altogether the public have no reason to complain of the way their interests have been attended to by Mr. Ellery and Mr. Vicars on the one hand and Mr. Goodman and his assistants (Messrs. Moulden and Bowman) on the other.

—Woodblocking King William-street.—

No history of the tramways movement in the City of Adelaide would be complete without a reference to the woodpaving controversy. Although this question has been discussed apart from and prior to the conversion of the trams, no definite action was taken until arrangements were being made by the Trust for laying the tram tracks in King William-street, because the City Council did not desire to dislocate traffic more than was absolutely necessary.

The first determined action taken was in 1907 when the Government was asked to support a Bill authorising the City Council to borrow £80,000 for works, including improved pavement, not only for King William-street, but for Rundle and Hindley streets also. The Bill was introduced to Parliament, but the Government desired to alter the existing property qualification of voters, and in order to preserve the rights of ratepayers the Council had to drop the measure and with it the progressive policy it contained. The Council then determined to make an appeal to the ratepayers, under existing legislation, to sanction a loan of £33,000, covering amongst other works the paving abovementioned, such loan involving a special rate of one penny in the pound to pay interest and sinking fund. The appeal to the ratepayers involving additional taxation had the usual result, viz., the defeat of the scheme by those who are always "agin the rate," and realising that the restrictions of legislation in regard to loan proposals stood in the way of progress, the Council decided then to proceed with the woodblocking in King William-street only, and a contract was let to Mr. W. Sim, of Melbourne, for carrying out the work under a system of deferred payments extending over 14 years. In this, however, the Council was once more baulked. The legality of the contract was tested in the Supreme Court, and the decision was that the contract was "ultra vires," the Chief Justice ruling that the Corporation have no power to mortgage the revenues of future years to pay for work done today.

Beaten at every turn and impeded by antiquated legislation, the Council as a last resource fell back on its ordinary revenue and resolved to squeeze from its current expenses as much as it could, and let a contract for a small section of the work, comprising 12 feet on each side of the new tram tracks in King William-street between North-terrace and the General Post Office. The work was carried out contemporaneously with similar work which the Trust was required to undertake by the Council between its lines, and thus the City Council for an expenditure of about £5,000 secured the blocking of the centre of the street, and for the full length between the terminal points previously mentioned. More than that, to avoid a hybrid pavement, the Trust extended its operations to Victoria-square, so that the course pursued by the City Council with the limited money available, although adversely criticised in some quarters at the time, proved the wisest, not only in securing a maximum of pavement at a minimum cost, but it allowed the required alteration of levels from end to end which could never have been attempted had the full width been blocked in only one or two sections of the street.



THE "CITY FATHERS" HAVING THEIR FIRST RIDE ON THE ELECTRIC CAR.

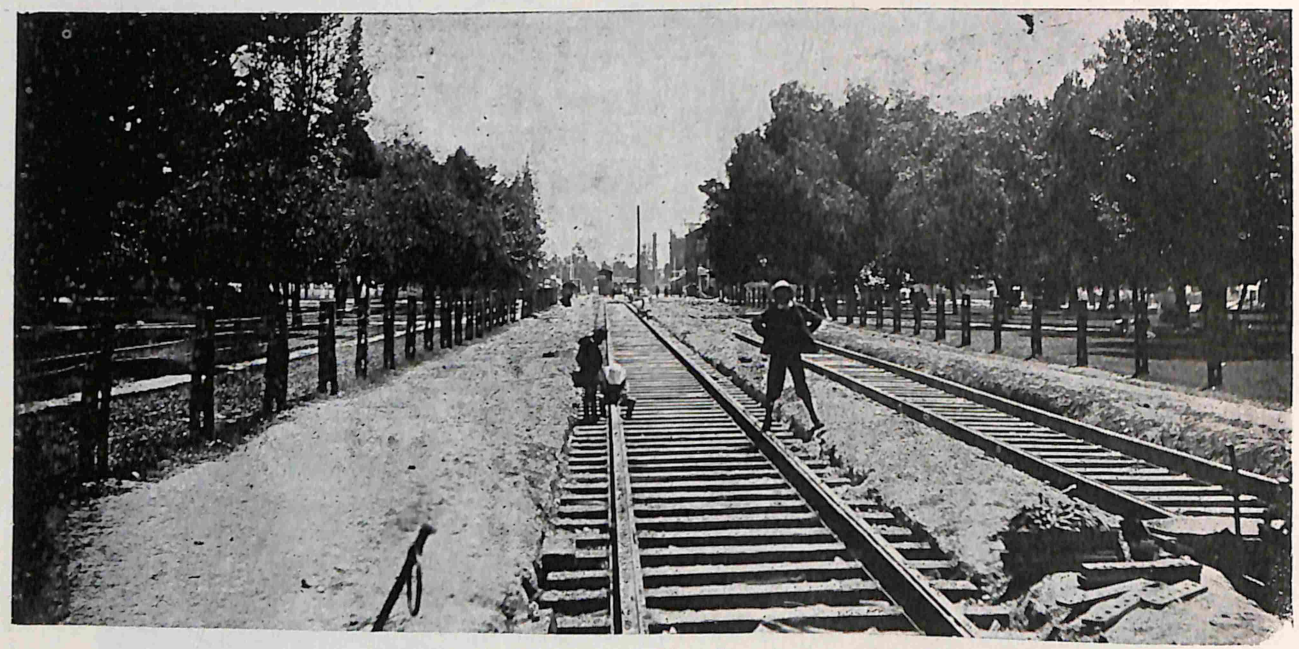
—The Cars.—

The electrical mechanism for the cars has been furnished by Messrs. Noyes Brothers, and manufactured by the British Westinghouse Company, England. It represents their latest designs in this class of work, and in most respects is identical with that adopted by the London County Council for 800 of its cars. Brakes and motor equipment have been partly delivered for 40 cars, and there are on the water magnetic brakes for 80 more. The cars are to be fitted with two motors, each of 30 h.p., and operating the car at up to 22 miles an hour. On each end platform, which is screened off for the exclusive use of the motorman, is placed the controller. The controller is worked by two handles. One is the reversing lever, and is used simply to reverse the direction of the car; the other —the driving handle—enables the motorman, by a series of gradual steps, to apply the current to the motors easily, thus increasing the speed smoothly and quickly from rest to the maximum pace. The controllers are provided with special safety devices to prevent the motorman from making a mistake; and the driving and reversing handles are so interlocked that he cannot by any foolish oversight cause damage to the motors. The same controller by the same set of handles operates the magnetic brake. The brake effect is produced by four special magnets, suspended close to the wheels. When it is desired to stop the car the motors are turned into dynamos and energise the four magnets comprising the brake outfit. These grip the rails, and by means of a system of levers retard the four wheels of the car and the truck. The brake outfit is extremely effective. The car was run at full speed, and the brake applied for what are known as service and emergency stops. The ordinary service stops were remarkably smooth and rapid, and the emergency stops, which would be necessary in order to avoid accidents, were highly satisfactory, and it was found possible to pull

the car up within half its own length. Another noticeable feature of the brake outfit was that going down a long incline it was impossible for the car to run away, as in no circumstances when the brake was applied could the car exceed a speed of three miles an hour with the automatic application of the brake.

One feature which will contribute materially to comfort is the long wheel base. In days past it was considered inadvisable to make the distance between the two axles exceed about 7 ft. Mr. Goodman has departed from precedent and increased the wheel base to 9 ft. This, combined with the easy curves of the tramway track, will produce excellent

of light in a car. In addition to the magnetic power brakes each car is fitted with hand brakes (used for holding the car on grades or controlling it in case of the failure of the motorman's foot), foot gongs, and other modern details. Besides the type of car tried on November 30 the Trust is having built an entirely open



VIEW OF TRACKS FROM HINDMARSH SQUARE.

—Seating and Lighting.—

The seating capacity is 40. There is room in that type of car for 20 on the open platforms, and a similar number in the saloon. The car is fitted with a number of patent devices supplied by Messrs. J. G. Brill & Co., including compensating door hangers and rattan-covered change-over seats. A large portion of the fittings were provided by Adelaide firms, and the car will be found easy of access and comfortable in riding.

results from the passengers' standpoint, and free the car from pitching or oscillation. The cars are illuminated by incandescent electric lamps, arranged in five clusters of three each. One section comprises the head lights of 32 c.p. lamps. Another includes the illuminated destination boards on the front of the cars, and the light inside the car is afforded by five groups of two 16 c.p. lamps each giving a flood of radiance sufficient for all purposes. The sectional system of lamps precludes the complete extinction

type of car, the seating of which will be transverse.

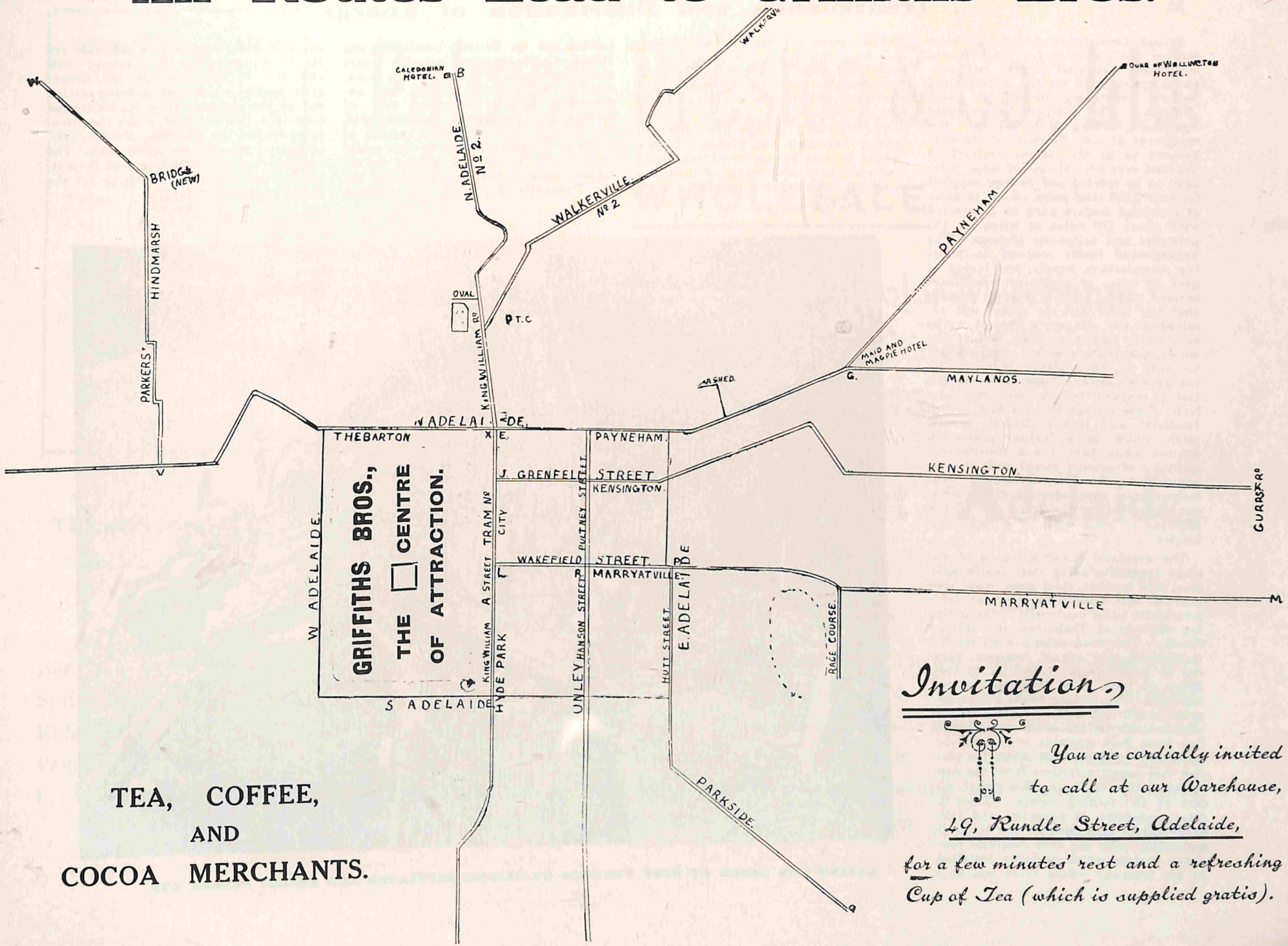
—The Car Builders.—

The trolley-cars have been built by Messrs. Duncan & Fraser, the well-known carriage builders of Adelaide. This firm constructed bodies for the Brighton (Melb.) electric service, and for years built cars for the old Adelaide and Suburban Co. These facts indicate an experience which should guarantee public satisfaction with the firm's work.

THE UNIFORMS.

The contract for the uniforms, to be worn by inspectors, motor men, and conductors, is (with the exception of the supply of caps) being carried out by Mr. G. J. Plenty, tailor and mercer, of Gibson-street, Bowden. and Port-road, Hindmarsh, who is also contractor for the supply of uniforms for the post and telegraph department, prison warders, and warders at the Adelaide Hospital. The uniform for the tramways service is smartly cut and attractive. The material is a Lobethal serge, which resembles Vicuna. The tunic is amply supplied with serviceable pockets, and a white celluloid collar is attached to the coat collar. The sleeves are protected with black chrome leather cuffs about 4½ inches deep, and the pockets are faced with similar material. The trousers show a narrow red bead or cord at the sides. The contract is for 250 suits, and the price runs into several hundred pounds. Mr. Plenty carries on a manufacturing order business on an extensive scale in large and fully equipped premises in Gibson-street, and has a retail establishment in Port-road, Hindmarsh.

All Routes Lead to Griffiths Bros.



TEA, COFFEE,
AND
COCOA MERCHANTS.

Invitation.

You are cordially invited to call at our Warehouse,

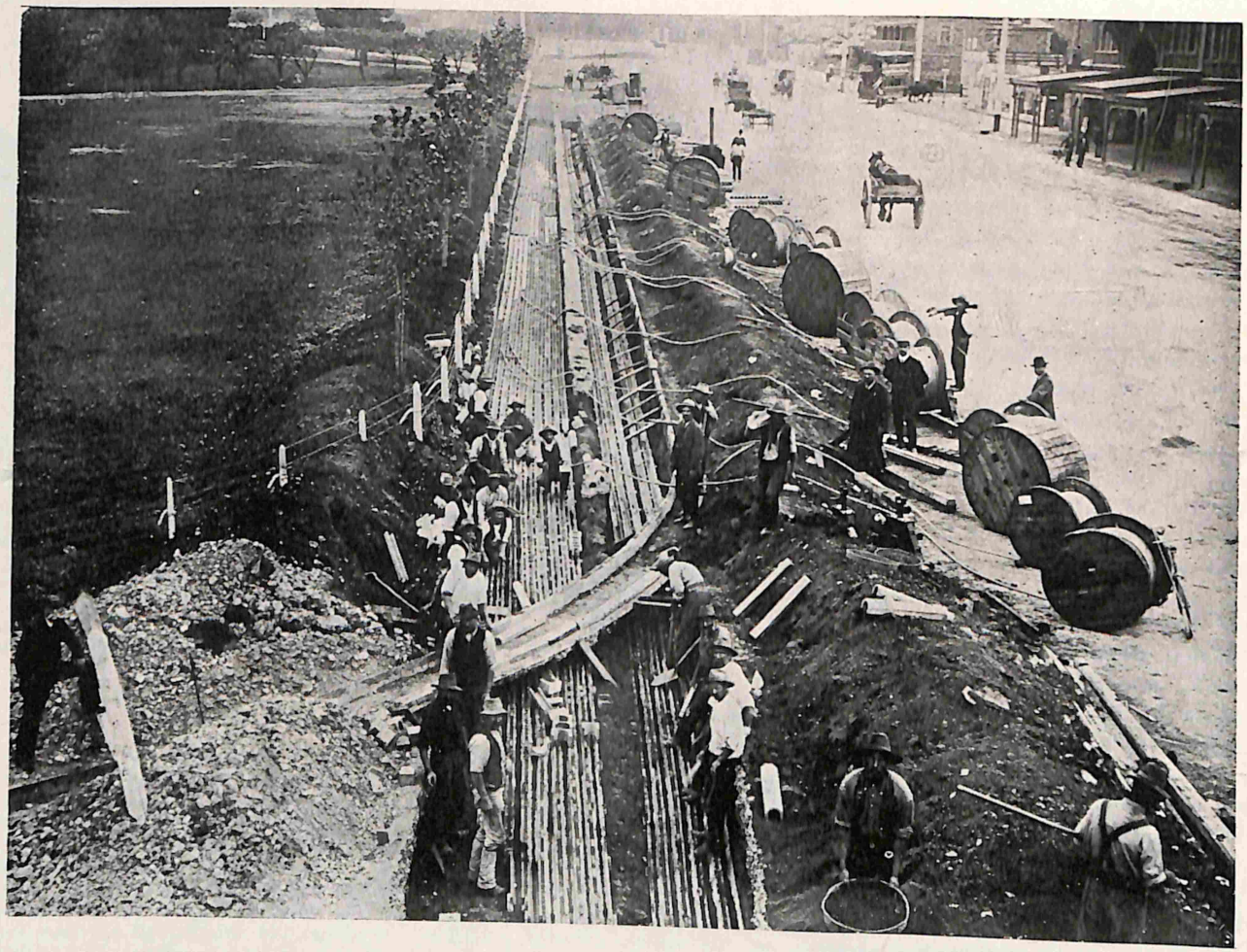
49, Rundle Street, Adelaide,

for a few minutes' rest and a refreshing Cup of Tea (which is supplied gratis).

British Insulated and Helsby Cables secured the contracts for the overhead equipment, overhead feeders and telephone system, and for the underground feeders, amounting in all to about £45,000. The contract for overhead equipment, calling as it did for the equipment of some 54 miles of track, is believed to be the largest contract of the kind ever let. About 700 wood poles have to be erected and fittings supplied for over 1,800 steel poles. Some 15 miles of overhead feeders have to be erected with about 120 miles of wires for the potential and telephone systems. The underground feeder contract comprises the manufacture, supply, and laying of over 20 miles of paper-insulated lead-covered cables. It is of interest to note that the order for the cables was received at the company's Prescot works on July 2, and more than half of the whole quantities required was shipped on July 23, the balance following by the next steamer. These cables are all laid in cement troughs made in Adelaide. They are run in solid with British Insulated and Helsby Cables' special pitch, which, as a further protection against white ants, has a considerable quantity of arsenic mixed with it. In addition to the cement troughs, local makers have supplied most of the ironwork required for the poles, and all the painting is being done by a local contractor.

The overhead construction is of various types, including steel centre pole, steel side bracket, steel span, wood side bracket, and wood span, the two last-mentioned being used only in the outlying districts of Thebarton and Henley Beach. The wood poles are all erected in concrete, and are of ironbark, varying in length from 31 feet to 40 feet. Many of these poles weigh about one ton each. The underground cables comprise 11,000-volt 3-phase cable for the city section of the main transmission line from Port Adelaide to the converter station, and 600-volt cables for positive and negative feeders from the converter station to the various switch pillars at the feeding points. There is also a quantity of potential and telephone cables underground, the latter in connection with the very complete telephone system which is being installed. At the tramway offices there will be a 50-line common battery switchboard, and from this point communication is made with over 40 telephones in pole boxes on the routes, at the termini, the converter station, and the Chief Engineer's residence.

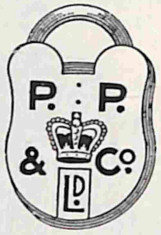
The overhead fittings are either of British Insulated and Helsby Cables' Special Prescot Bronze or of galvanised malleable iron, and many of them are of special design. The Australasian work carried out by British Insulated and Helsby Cables in the last few years comprises overhead equipment for tramways at Ballarat and Bendigo and underground feeders for every city of consequence throughout Australasia. The company has supplied hundreds of miles of telephone cables to the postal departments, and is now making the extensive common battery switchboard for the Fremantle Exchange. Its resident superintending engineers in Adelaide are Mr. T. Wilkinson for the overhead work and Mr. F. Williams for the underground. The whole work is being carried out by the company from its Melbourne office, 493, Collins-street, under the direction of Mr. H. Clement Newton, the company's manager for Australasia. The company has extensive works at Prescot, Helsby, and Liverpool, and is by far the largest concern of its kind.



LAYING THE CABLE AT EAST TERRACE BY BRITISH INSULATED AND HELSBY CABLES, LTD.

POSTAL ADDRESS: P O. BOX 58.

TELEGRAPHIC ADDRESS:
"PALMPREST," PORT ADELAIDE.

TRADE  MARK.

LONDON OFFICE:
Hopetoun House, Lloyd's Avenue, Fenchurch-st.

BROKEN HILL, N.S.W.:
Argent-street.

PORT PIRIE:
Alexander-street.

TEL. 55 and 259.

Palmer, Preston & Co., Ltd.

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Hardware, Metal, Oil and Color Merchants,
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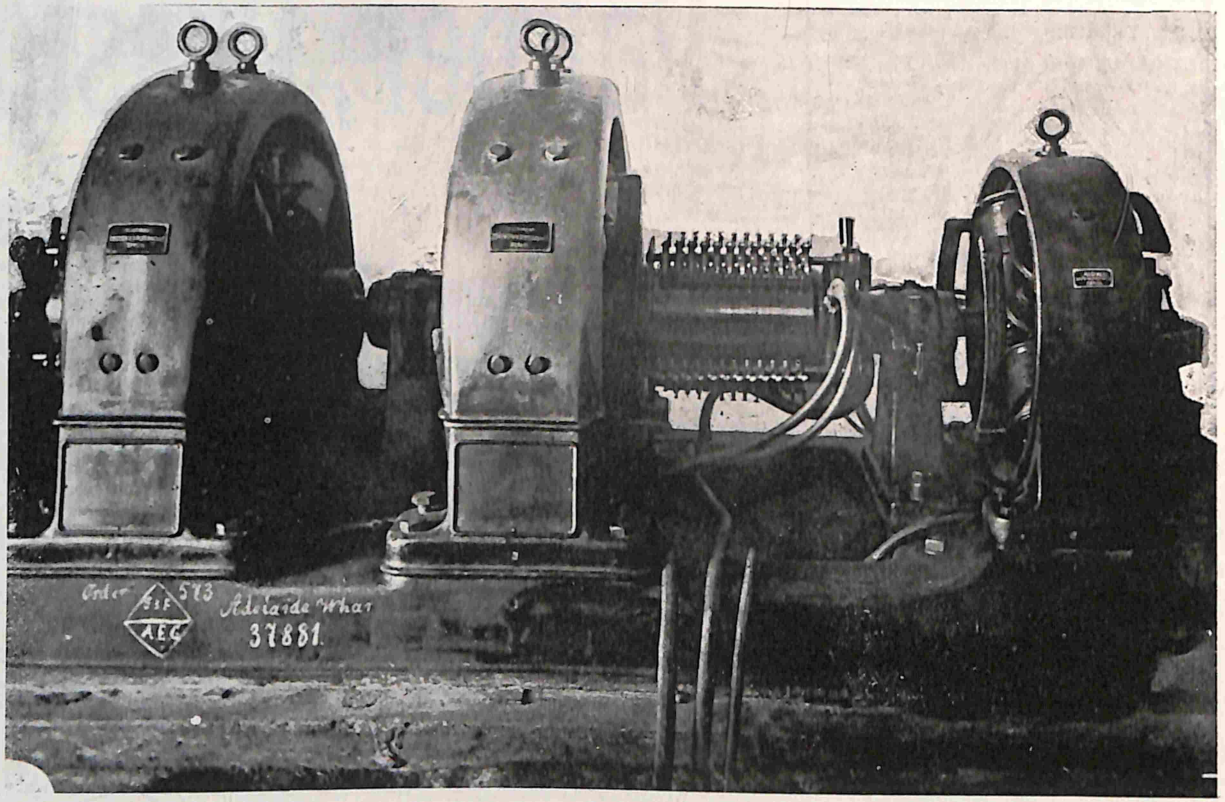
IMPORTERS OF

Bar Iron, Mild Steel Bars, Plates and Hoops, Mining Steel, Plough Steel, Tool Steel, Spring Steel, Fencing Wire, Barb Wire, Wire Netting, Fencing Standards and Droppers, Guttering, Ridge Cap, Down Pipe, Shearing Supplies, Builders', Blacksmiths', Wheelwrights', Coachbuilders', and Painters' requisites, Malthoid, for Roofing, Floor Covering, P. & B. Paints, Samson Mineral Paints, F. & G. Metallic Mixed Paints, Solarine Metal Polish, Hall's Blasting and Sporting Powders, Haggies' Wire Ropes, Guns, Rifles and Ammunition.

CONVERTER STATION EQUIPMENT.

THE contract for the complete equipment of two Converter Stations was given to Messrs. Staerker and Fischer, of Melbourne, Victoria, as agents for the Allgemeine Electric Company, of London and Berlin, whose enormous electrical undertakings are well known.

The No. 1 Station at East Terrace will have an ultimate capacity of 2,500 K.W. The alternating current, at a pressure of 10,500 volts, will be received through the underground cables by the 15 oil-cooled reducing transformers, which step the voltage down to 430 volts and deliver the current to the Rotary Converters. All high pressure apparatus is so designed and arranged as to afford most perfect protection from lightning discharge and other surges, and to the various station attendants on duty. All main switches are immersed in oil, and are electrically operated from the main switchboard many yards distant. The rotary converters, five in number, will have an output of 500 K.W. each. Receiving alternating current at a pressure of 430 volts, they will deliver continuous current for the working of the tramway system at a pressure of 600 volts. They will be of the six phase type, and embodying the latest designs, will be of very high efficiency. The current will be delivered through a system of underground conductors to the main switchboard, arranged in a gallery overlooking the rotary converters, where all the necessary synchronising, starting and controlling arrangements will be fixed together with the elaborate and delicate measuring, recording and testing instruments which will indicate and graphically record every change of load or pressure.



Critic photo.

Highfield Reversible Booster.

Erected by Staerker & Fischer, representing the Allgemeine Elektricitäts, Gesellschaft, of London and Berlin

These apparatus will occupy 42 panels of polished black slate, and will have a total length of 75 feet. One positive and two negative booster sets will be arranged beneath the gallery, the former being for maintaining the load on the rotaries constant, by bringing a large storage battery into use when required, the latter to assist the current on its return through the tram rails, and so prevent its straying and damaging water or gas pipes. This Station will be one of the largest of its kind in Australasia, and will represent the most up-to-date practice in converter station design.

The No. 2 Station, at New Thebarton, will be very similar in its arrangement and operation. It will have an ultimate capacity of 900 K.W., and will contain two 300 K.W. and two 150 K.W. rotary converters. The main switchboard will consist of 22 panels and will have a total length of 52 feet.

From these Stations will pass the feeder cables which will deliver the electrical energy to all parts of the tramway system, the extra high pressure cables delivering current from the Generating Station at Port Adelaide, and the negative return cables bringing the current from the tram rails.

As an example of the splendid design of this machinery, it is interesting to notice that the A.E.G. Reversible Battery Booster, which has been in use for some time, and which is shown in the accompanying block, has withstood most satisfactorily very severe overload conditions with no sparking or undue heating, and is in every way far above the terms of the specification. To comply with the demand for urgent delivery, it is further interesting to note that this set, which weighs upwards of 17 tons, was designed, made, delivered and erected in Adelaide four months after the order was cabled.

Mr. Jolly, the Australasian Manager for Staerker & Fischer, who was Engineer for the erection of the Fremantle tramway system, is returning in the course of a few weeks from the A.E.G. Works where he has been carefully going into the manufacture and testing of this particular plant. On his arrival here Mr. Jolly will personally supervise the erection of the whole of the work to be carried out by the A.E.G.

Car Equipment and Battery.

Amongst the numerous contracts which have been let in order to effect the completion of the Adelaide electric power system, are those which have been carried out by the well-known Melbourne firm of electrical engineers, Messrs. Noyes Bros. (Melbourne) Proprietary, Ltd. The firm has been responsible for the supply and erection of the trucks on which the cars are mounted, a large proportion of the fittings of the cars supplied to Messrs. Duncan & Fraser in connection with their contract, the provision of the highly efficient magnetic brakes, specially designed to suit the Adelaide cars, the motors, controllers and complete electrical equipment together with installation and the provision of the very large set of accumulators or storage battery at the converter station on East-terrace.

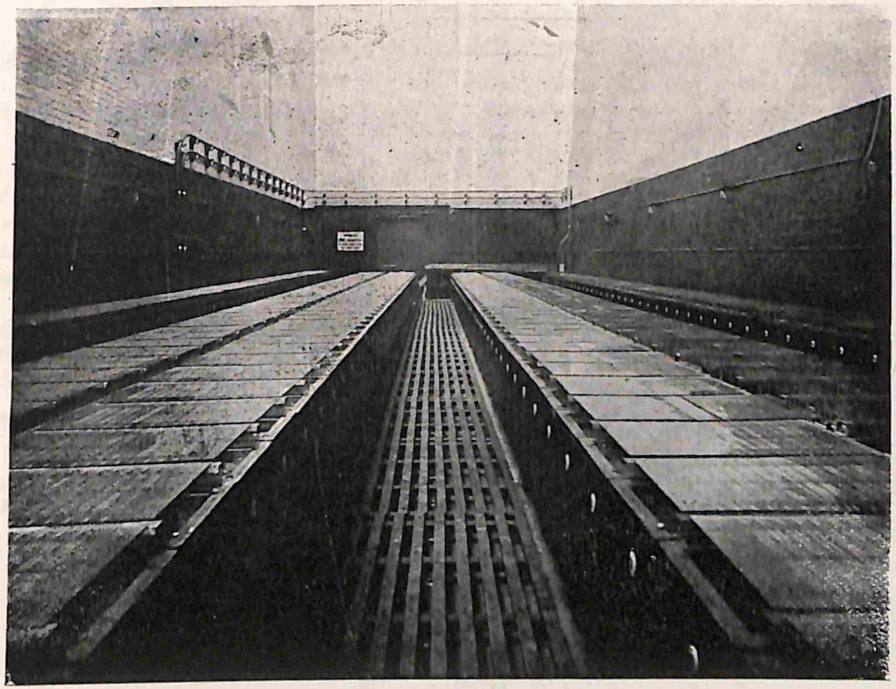
The trucks supporting the cars are of the very latest type, and specially long between the axles in order to promote steadier running of the cars. This was a feature adopted by Mr. Goodman, and the trucks have been manufactured in accordance with his specification by the world-famous firm of Messrs. J. G. Brill and Co., Philadelphia, U.S.A., who are recognised throughout the world as the pioneers in the design and manufacture of trucks for electric tramways, and whose designs have remained the standard for all manufacturers.

The cars throughout will be equipped with the latest design of magnetic brake, manufactured by the British Westinghouse Company. This brake is operated off the car motors, entirely independently of the supply of current to the car, and can be adjusted so that the motor driver, by the operation of the controller handle, can smoothly and quickly stop the car when running at its highest speed within a remarkably short distance. The brake operates by four powerful magnets, which grip the surface of the steel rails, and simultaneously apply very heavy pressure to the revolving wheels of the car, thus bringing it quickly to rest. The magnetic brake outfits supplied have been specially designed to suit Adelaide cars, and have the great advantage that they are not only much cheaper in first cost to air or other forms of power brake, but the cost of keeping them in order is insignificant, and moreover their braking power is immensely powerful. Adelaide may, therefore, be congratulated in regard to the braking power of its cars, through being fitted with the very latest and most efficient apparatus.

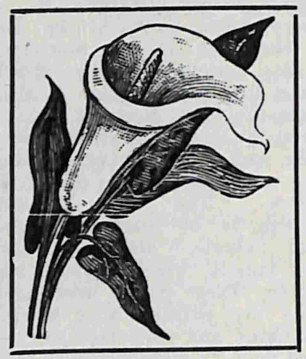
The motor equipments and other electrical fittings on the cars have also been manufactured by the British Westinghouse Company, who are represented throughout Australasia by the contractors (Messrs. Noyes Bros., Melbourne). Amongst the special features may be mentioned the self-oiling trolley wheels, of a design which enables the collecting wheels running along the trolley wire to run for the whole of its life until worn out with only one oiling. This great advantage does away entirely with the dripping of oil on to the car roofs, and instead of oiling the wheels at the end of every trip and before the cars leave the car shed every day, thus saving time, wages, and oil. The motors also are equipped with a patent automatic lubricator, so designed that the oil is only fed when the car is in motion, and thus a source of waste is entirely eliminated, and the cost for oil is immensely reduced. Moreover, by this system the life of the wearing parts, such as bearings, is very considerably increased, effecting in this way further savings.

The whole of the system of wiring under the cars is thoroughly water and dust proof, and also readily renewable, and easy for the location of faults, should such arise due to accident. The electrical equipment supplied by the British Westinghouse Company. The whole of their apparatus has been manufactured at their works in Manchester. In view of the high class material supplied, and as it has already undergone rigorous testing before shipment, it is safe to say that the Adelaide cars embody in their equipment the very latest and most up-to-date features, and provisions against breakdown, and in the interest of economical working, which are unique. The work under the above three contracts has been carried out by Messrs. Noyes Bros.' expert staff at the car shed.

At the converter station on East-terrace, in connection with the machinery to be installed there later, a very large storage battery, or set of accumulators has been installed in a fine battery room provided by the Trust at the back of the converter station. This battery has been manufactured and supplied by the English Tudor Company, the contract having been secured by Messrs. Steele & Baker, of Adelaide, and the work of erecting the battery was entrusted by them to Noyes Bros. The floor of the battery room is of cement covered with lead sheets, and on this are oregon stands, which support the battery boxes. These stands were made locally, and are painted with special acid proof paint and supported on the lead covered floor by glass blocks to prevent leaking of current. On the stands once more are placed the wooden boxes supported by porcelain insulators; they enclose the specially prepared lead plates and sulphuric acid comprising the working parts of the battery. These boxes are all lead lined, and are erected in six rows, there being in all 293 cells all connected up to form the complete battery. In order to estimate the immense amount of work, it is only necessary to mention that the erectors had to lead burn by means of oxygen-hydrogen blow pipes no less than 8,300 joints between the individual plates and lead connecting bars, to which they are attached. This work was necessary as the plates are all shipped out separately and connected up on site by skilled men. Great care has to be taken in erection to ensure all the lead boxes are perfectly in line, and are all level and do not leak, and the completed work is certainly a very great credit to all who were engaged on it. Between the lead plates mentioned above, however, are inserted very thin specially prepared boards made of pine. These are an entirely new feature in batteries, and reduce the cost of maintenance and improve the life of the battery. After the insertion of these plates the battery cells are filled with dilute sulphuric acid. Owing to the immense quantity of acid required, it was found necessary to build a huge tank capable of holding about 50 tons of acid. After the battery receives its first charge of current from the Adelaide Electric Supply Company's Power House, and when in proper working condition, it will be utilised by the Tramways Trust as a store of energy, and more particularly as a regulator so as to provide for the sudden demands for current which are characteristic of tramway systems.



Critic photo. **AT THE CONVERTER STATION.**
Showing Permanent Leads to Switchboard.



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We guarantee, as well, all our Goods are cheaper than any other Grocer's.

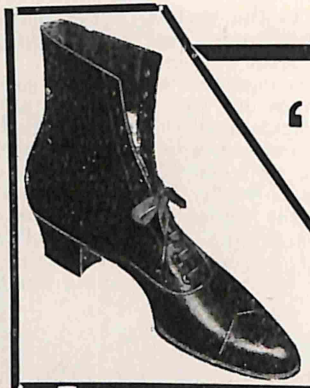
We post Price List free to any address. It will pay you to **compare our Price List** as well as quality of Goods.

TOWN & COUNTRY STORES,

112, RUNDLE STREET

(Opposite Arcade).

BRANCHES: PARADE, NORWOOD, CENTRAL MARKET, GOUGER STREET.



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"LYRIC" is the brand of "Bostock's" Highest of High-Grade Shoeware. This is a significant statement, for "Bostock's" rank among the foremost shoe manufacturers of the whole World. "LYRIC" Shoeware combines every essential which goes to make perfection—finest grade material, correct conformity to the human foot, comfort, style, nicety of finish, faultless fit, and permanent retention of original shape.

"LYRIC" Brand Shoes are for both Men and Women, and are made to suit all requirements, whether for Street, Evening, Sporting, or Home Wear.

FOR MEN.

- **Shooting or Golf Boots, with extra heavy Waterproof Soles, as shown above.**
- **Patent Derby Shoes.**
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- **Glace Kid Derby Shoes.**
- **Dress Boots.**
- **Dress Shoes, lace or court.**

FOR WOMEN.

- **Lace and Button Boots and Shoes in Black and Tan.**
- **Dress Shoes in colored leathers—White, Black, Bronze, Red, Fawn. beaded & plain.**
- **Satin Shoes, all colors and Styles.**
- **Goloshes and Footholds to fit all our exclusive styles of Shoes.**

Obtainable only in South Australia from

The C. J. Young Shoe Compy,

57, Rundle Street, **Adelaide, South Australia.**

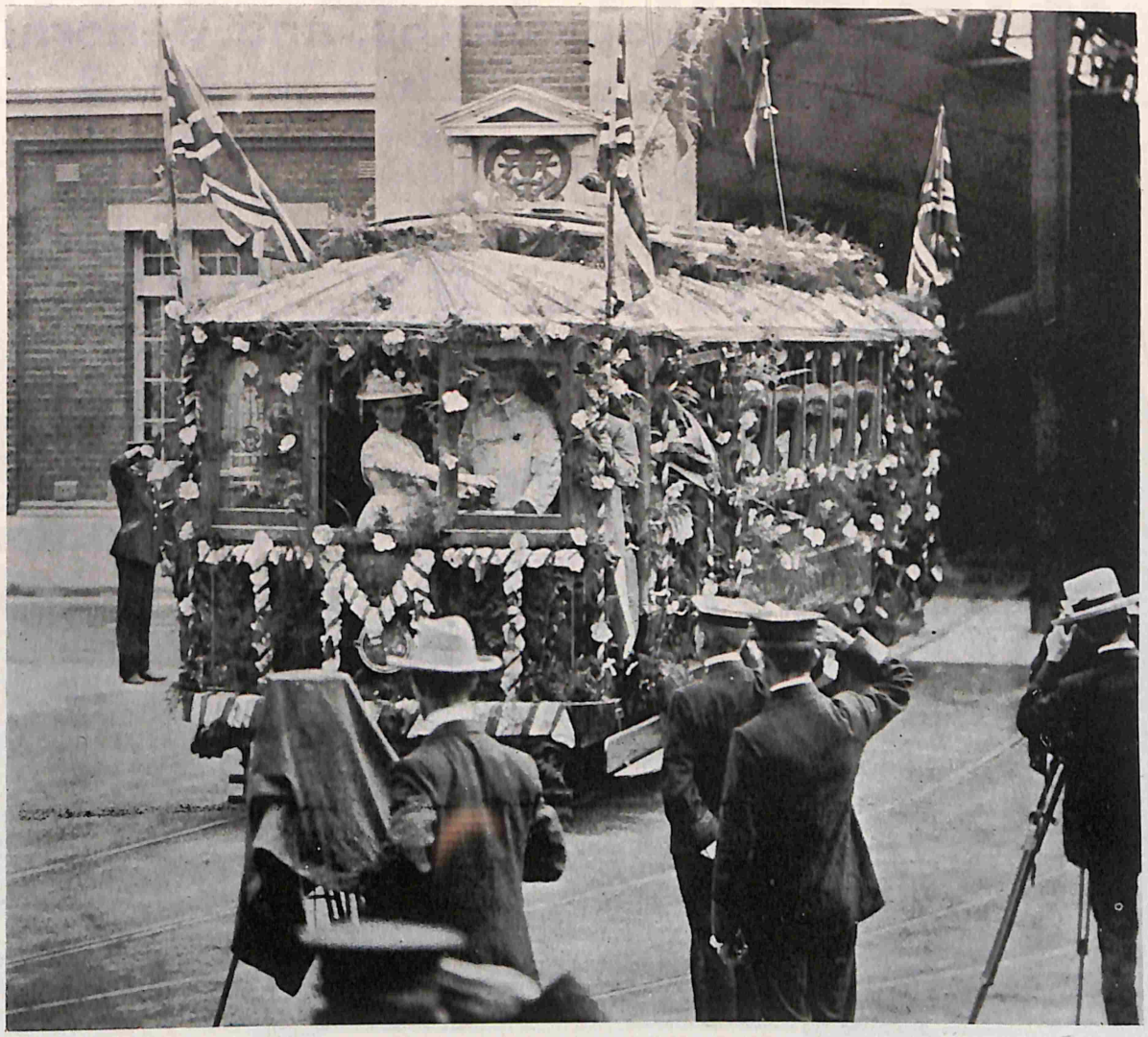
LYRIC BRAND

Opening Ceremony of the Electric Trams.

Anyone visiting Adelaide on Tuesday would have at once seen that some immense epoch in the history of South Australia was eventuating.

At 2.30 the seven hundred guests had gathered at the Car Depot, directed through the spacious courtyards where inspectors were drawn up in double line a la militaire in fetching looking uniforms of black cloth with black leather cuffs and facings and smart caps ornamented with silver. We passed into the sheds where everyone mounted their particular car according to invitation card, and the procession started. The first official car was artistically decorated in red, white, and blue, with a profusion of asparagus. On the front platform stood Mrs. Price, gowned in pale reseda costume and white hat with pink roses, and with her hand on Mr. Goodman's drove the car successfully through the suburbs—a run out to Kensington and back being the prescribed jaunt. The cars are beautifully comfortable, and run so easily. The entire population, with a few exceptions, turned out to witness the excitement. On returning to the Depot the guests were ushered through a large hall to the marquee, where a much appreciated afternoon tea was served to the multitude.

ADELAIDE'S ELECTRIC TRAMS OFFICIALLY OPENED BY MRS. PRICE, MARCH 9, 1909.

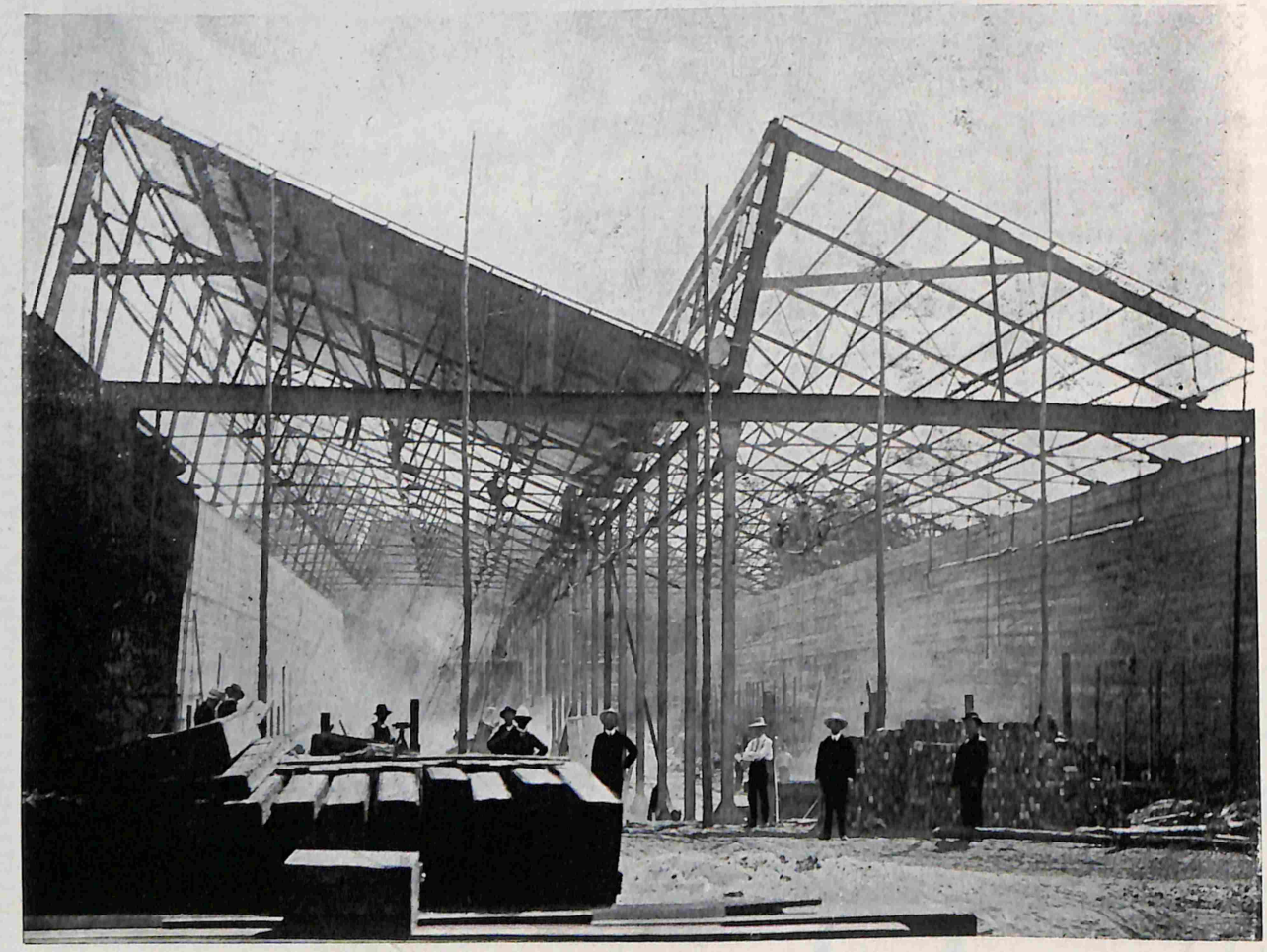


Critic photo.

Decorations carried out by Heyne, Potter, & Co., King William-street, Adelaide.

Messrs. FORWOOD, DOWN & Co., Limited,

Engineers, Blacksmiths, and General Founders,



Critic photo. BAY "B" CAR DEPOT.

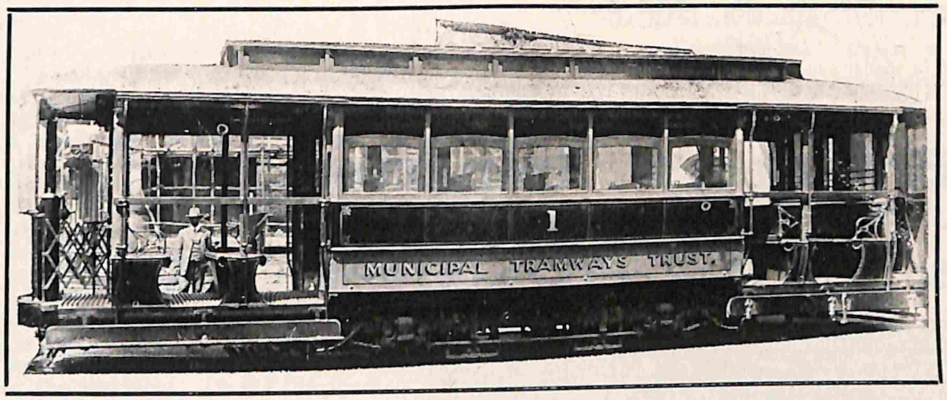
of Adelaide and Kilkenny, South Australia, and Kalgoorlie, Western Australia, are supplying the whole of the Steel Construction Work required for the Car Depot, Administrative Block, Workshops, and the other buildings at Hackney. This contract comprises 237 built principals with columns, girders, purlins, &c., making a total weight of about 600 tons.

Forwood, Down & Co., Ltd., are also supplying the whole of the cast iron bases and wheel guards required for the poles of the permanent way.

The above contracts are being carried out by Forwood, Down & Co., Ltd., as subcontractors to Messrs. Smith, Timms & Company.

DUNCAN & FRASER,

Carriage Builders, Car Manufacturers,

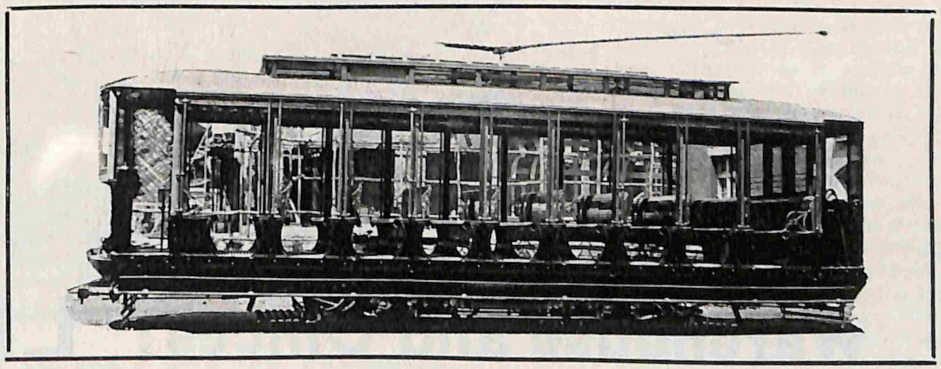


COMBINATION CAR.

MANUFACTURERS OF
ELECTRIC TRAMCARS FOR

Adelaide Municipal Tramways Trust.
Ballarat Tramway Company.
Bendigo Tramway Company.
North Melbourne Tramway Company.

Designs and Estimates
Submitted.



OPEN CAR.

46, Franklin St., Adelaide, South Australia.