

# New Cars for the Melbourne, Brunswick, and Coburg Tramways.

By Struan Robertson, M.A., B.Sc.\*

Modern engineers and managers of electric street tramways are every day more clearly recognising that where traffic is not exceptionally heavy the most satisfactory method of encouraging people to ride in tramcars and of providing ample accommodation is to run more cars with a reduced headway between cars. If the intending passenger has just missed a car, he will not walk if the next car is in sight. In order to attain this object without unduly loading the power plant, and increasing the power bill, light cars to

When recently ordering new cars to cope with increased traffic requirements, the writer decided to get over this difficulty by adopting radial trucks of the newest type with a 12 feet wheel base which, as compared with double truck cars, would allow the double advantage of lightness, and uniformity of car-body construction with existing cars. The new car is not as heavy as the first type, while the overall dimensions are the same. The decrease of weight has been obtained by cutting out "atrophied" parts, which are an inherit-

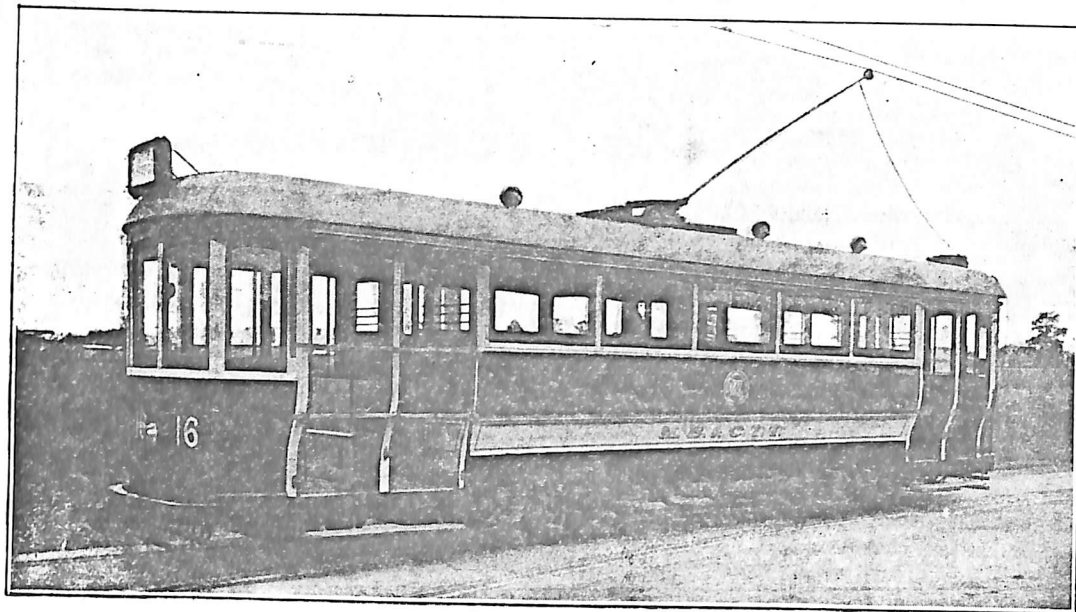


Fig. 1—Showing Features of Body Construction.

give reasonable seating accommodation must be provided. In designing cars for the Melbourne, Brunswick, and Coburg tramways trust, with which undertaking the writer is connected, he worked along the lines indicated above. The first twelve cars put into operation by the trust were of the single truck rigid wheel base type, having a wheel base of seven feet and an overall length of 35 feet, a weight of 23,600 lbs., and seating 44 passengers. Although the cars ride very smoothly on a well surfaced track, their great length compared to the wheel base is inclined to increase the amount of "pitching" that may occur owing to unevenness in the permanent way.

ance from former days, and designing weight-carrying parts on scientific principles.

The main dimensions and particulars of the new cars are given hereunder:—

**Car-Body.**

Length over headstock in centre ..	33 ft. 10 in.
" over bumpers .. .. .	35 ft. 0 in.
" over roof .. .. .	34 ft. 7 in.
" of saloon over pillars .. .	19 ft. 10 in.
Width over waist rail .. .. .	7 ft. 1 in.
" over belt rails .. .. .	7 ft. 1 in.
" over weather rails .. .. .	8 ft. 0½ in.
" over sill plates .. .. .	6 ft. 4½ in.
" over footboards .. .. .	7 ft. 8 in.
" of doorways .. .. .	2 ft. 2 in.

\*Engineer and manager.

Height of doorway .. .. .	6 ft. 3 in.
" from outside floor to saloon floor .. .. .	10 in.
" from step to outside floor ..	11½ in.
" from road to step .. .. .	13½ in.
" to trolley board .. .. .	10 ft. 5 in.
Side Sills .. .. . steel plate	7 in. x ½ in.
Weight complete .. .. .	8500 lb.

**Electric Equipment.**

Motors .. .. .	2—55 h.p.
Gearing .. .. .	60/17
Weight of electric equipment .. .	6840 lb.
<b>Air Brakes.</b>	
Air pressure .. .. .	50 lb. to 60 lb.
Weight of air brake equipment .. .	1147 lb.
Total weight of car .. .. .	22,837 lb.

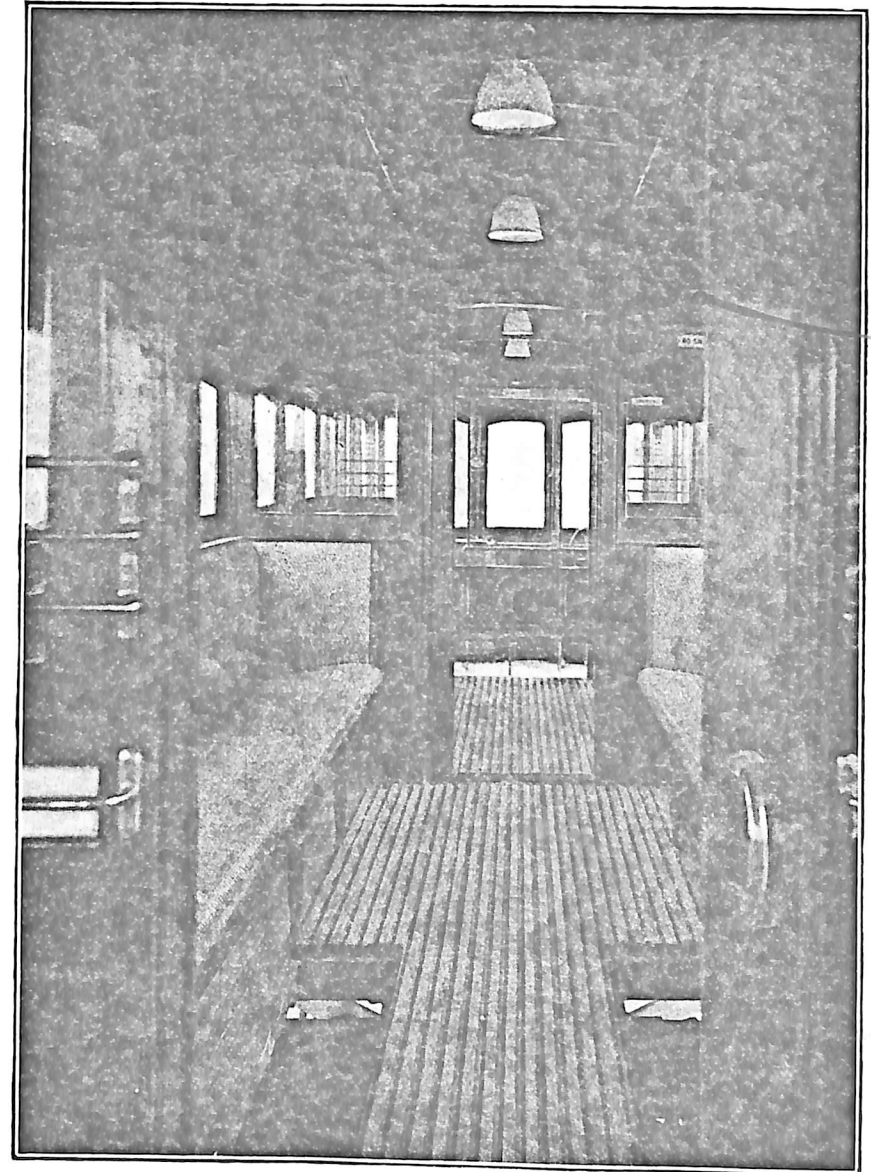


Fig. 2—Interior View of the Car.

**Truck and Wheels and Axles.**

Length of top plate .. .. .	19 ft. 0 in.
Wheel base .. .. .	12 ft. 0 in.
Gauge .. .. .	4 ft. 8½ in.
Wheel diameter .. .. .	33 in.
Axle diameter .. .. .	4½ in.
Journals .. .. .	7 in. x 3¼ in.
Weight of truck .. .. .	3550 lb.
Weight of four wheels and two axles	2800 lb.

**Car-Body Details.**—The principal parts that have been cut out of the car-body are, the monitor roof, ceiling linings, and bulkhead behind the motorman's platform, while all parts have been cut down to the minimum section consistent with stiffness and safety. Owing to the length of the truck top plate, the total length of the saloon body was

made 19 feet, and advantage of this was taken to provide an inside smoking compartment. This compensates for the loss of outside seating accommodation for ten passengers entailed by the construction of the car-body.

The whole of the inside of the car is finished in Queensland maple. The roof boards are also made of this timber, and three coats of covering material were applied, viz., one coat of raw oil, one coat of French polish, and one coat of flatting varnish. This flat finish brings out the grain of the wood and lends itself to renovation with a polishing cloth. All seats are shaped to fit the body when seated; the seats in the smoking compartment are of wood slats, and the seats in the saloon have been fitted with helical springs and upholstered with rattan.

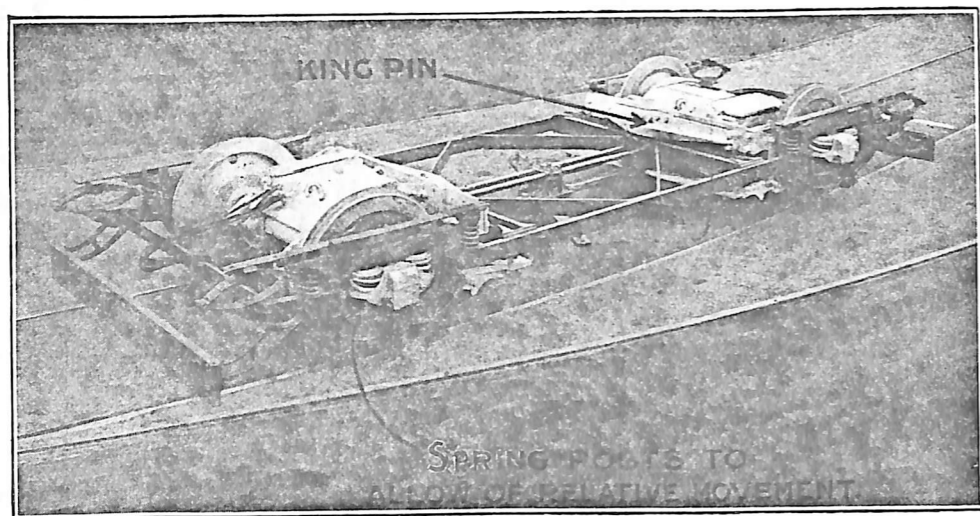


Fig. 3—Under-carriage of Car. Gear painted white pivots on King pin.

Ventilation has been provided by means of eight automatic extractors, which do not break the continuity of roof lines. The illustrations (Figs. 1 and 2) show the various features of the body construction.

**Truck.**—The radiating feature of this is the most interesting point. As will be seen from the view shown in Fig. 3, a cross-beam is pivoted by means of a large king-pin and bearing midway of the cross member of the truck. The motor is secured to the ends of the beam and serves as the connecting member between the wheels and axle and the truck, through the king-pin. The weight of the car and truck proper is taken by eight spring posts which are supported from the axle boxes by means of helical springs. These latter carry a hemispherical pivot bearing seated in the

top of the spring. The spring posts hang through the spring and the truck is secured to the bottom end of each post by means of two pins. It will be seen that the relative movement of the axle boxes—which radiate about the king-pin—and the truck is permitted by this support. In swinging round a curve, the weight of the car is taken by the pin which is furthest horizontally from the vertical line through the centre of the pivot bearing, and which passes through the post. There is, therefore, a positive tendency for the wheels to come back into their normal position and remain there when the car gets into the straight track and after the centrifugal effect of the weight of the body ceases.

**Electrical Equipment.**—The motors are of the box frame self ventilating type, each of 55 h.p.

on hourly rating at 600 volts. A novel feature has been added which does away with all interruption of current in the controller. The main circuit is made in a relay operated contactor located under the car. In cutting off, the initial movement of the controller backwards at any point opens the contactor relay circuit, and the main current is interrupted in the contactor. It is hoped that this innovation will cut down controller maintenance to a minimum and prevent any danger of fire on the motorman's platform. The contactor replaces the automatic feature of the canopy switches, so that there is only one of these, which acts simply as a main switch and not as a circuit breaker. In addition, there are two small relay switches, one at each end of the car. The wiring is shown in Fig. 4.

**Air Brakes.**—The cars are equipped with the trust's standard straight air brakes. Compressed air is supplied by a motor-driven air compressor supplying 10 cubic feet of air per minute at 60 lbs. pressure. The brake cylinders are 8 in. diameter, and the working length of stroke is 6 in. At this point a slack adjuster—air operated—moves the fulcrum of the cylinder lever and takes up the

making stops. The automatic pressure governor cuts in the compressor at 50 lbs. and cuts out at 60 lbs. pressure. Air sanding gear is fitted so that sand is supplied under the wheels.

**Lighting Circuits.**—Head lights are fitted with 46 watt 100 volt concentrated metal filament lamps, which are in series with two lines of 23 watt 100 volt car lighting lamps, each of five

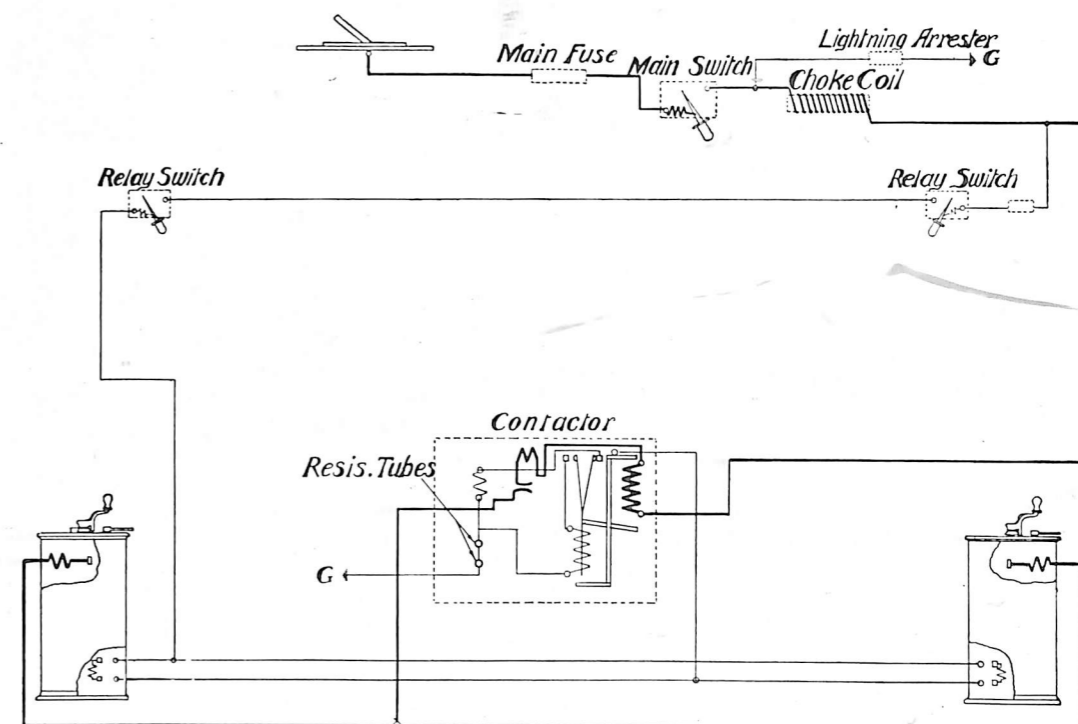


Fig. 4—Wiring Diagram of Contactor Connections.

brakes. Cars fitted in this way may be run 1000 miles without any adjustment of the brakes. The pressure gauges in the motorman's cabin are of two hand type, one hand indicating reservoir pressure and the other pressure in brake cylinder. This latter feature is a great aid to the motorman in

lamps, these two lines being in parallel. This arrangement provides four destination sign lamps—two to each—and six car lighting lamps. These latter are fitted with opalescent shades of Sudan pattern, and consequently provide ample lighting for all purposes.

**Tramway Working Conditions.**—An agreement has been arrived at between the Prahran and Malvern tramway trust, Vic., and its employees in regard to wages and working conditions, whereby the employees receive an increase of, roughly, 1/6 a day all round, and, with increased holidays and overtime, they represent an addition to the working expenses of the trust of approximately £10,400 a year. The new agreement provides for the following wages:—Motor-men and conductors: First year, 10/ a day; second year, 10/6; third year and thereafter, 11/-. Shedmen and pitmen, 11/6; battery-men, 11/-; blacksmiths, 12/4; blacksmiths'

strikers, 10/6; night watchmen, 10/-; car washers, 10/-; track laborers, 10/-; track repairers or fitters, 10/6; track gangers, 11/6; track cleaners and pointsmen, 10/-; block and pitcher setters, 11/-; pair horse drivers, £3 6/- for 50 hours per week; motor roller drivers, 11/- a day; lavatory men, 10/; general laborers, 10/-. Youths employed as car cleaners: First six months, 5/2 a day; second six months, 5/7; second year, 6/5; third year, 7/3. In order to meet the increased cost, fares on Sundays and holidays are to be increased.