

# TRAMWAY CARS AND EQUIPMENT

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## CONSTRUCTION OF CARS

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### CAR BODIES

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#### SINGLE-DECK CARS

Types of Cars.—The cars used for conveying passengers on tramways may be single-deck or double-deck cars, according to whether seating accommodation is required on one floor, immediately accessible from the ground level, or on two floors or decks, the upper one of which is reached by means of stairs. Single-deck cars are not used very much in the British Isles or in France, but otherwise they are the standard nearly all over the world. Where single-deck cars are used exclusively, the heavy traffic of the morning and evening and of holiday times is carried by using *trailer cars*, which are drawn behind the ordinary *motor cars*, as they have no means of independent propulsion. Motor cars are independently driven units, each being complete with motors, controlling devices, and means of collecting current from the trolley wire or working conductor. In the British Isles the Board of Trade regulations forbid the use of trailer cars, so that the cars must be built for the maximum number of passengers that are to be carried at the busiest hours, at the expense of propelling a certain amount of unnecessary weight at the times of lightest traffic. Cars mounted on two trucks are known as double-truck,

or bogie, cars ; those mounted on a single truck and running on four wheels are known as single-truck cars. The motors which drive the cars are invariably mounted on the trucks between the car wheels.

**Arrangement of Single-Deck Cars.**—The use of single-deck cars in the British Isles is mainly confined to special purposes. When of the *open type*, that is, without enclosing panels and windows at the sides, they are used for summer excursion traffic at seaside resorts. The *semi-convertible car*, which has side panels, and windows which can be opened or closed as desired, is also used. Passengers can enter or leave the open-type car by stepping on or off at any point on either side, but the semi-convertible car has doors only at the ends. Single-deck cars are also used on certain routes where railway or other bridges are too low to allow the use of double-deck cars, and also in shallow subways immediately below the street level, as in the case of the London County Council subway underneath Aldwych and Kingsway.

**Single-Deck Steel Car.**—The ordinary tramway car for use on the surface usually has a wooden body, or superstructure, built on a steel *underframe*, which is supported on the truck or trucks. The shallow subway cars of the London County Council are built entirely of steel, in order to prevent danger from fire. One of the cars, built by the United Electric Car Company, is shown in Fig. 1 (*a*), (*b*), and (*c*), which gives side and end elevations and plan of the car body, respectively. The underframe consists of longitudinal sole bars *a*, formed of rolled-steel angles, which support cross-joists *b* and terminate in channel bars *c* at the end of the car body. The double-channel pillars *d* form the framework of the car body, which is stiffened by the diagonals *e*. The underframe is stiffened by a truss composed of the vertical struts *f* and tie-rods *g*. The sides of the car are completely closed by panelling and glass, the passengers entering and leaving by doors at the ends.

The driver's and conductor's platforms *h* are carried on extensions from the sole bars *a*, and access to the platforms is gained by the steps *i*. The curved dash *j* has a glazed opening *k*

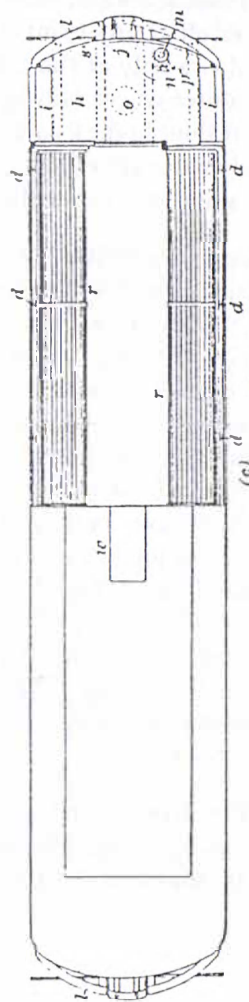
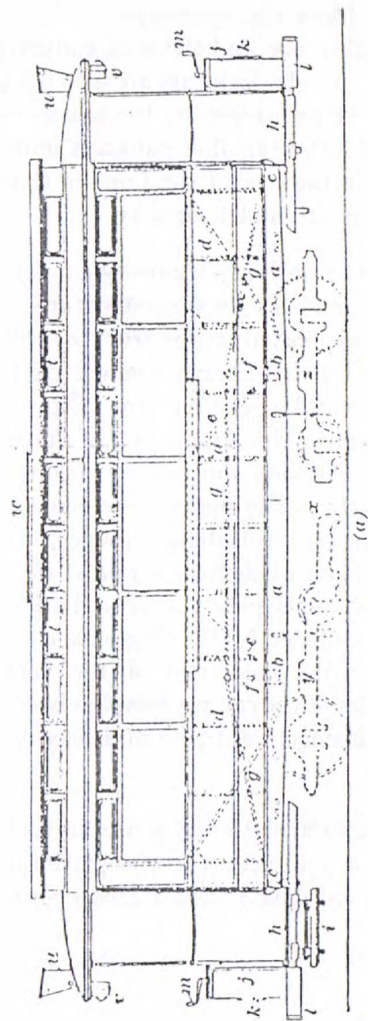
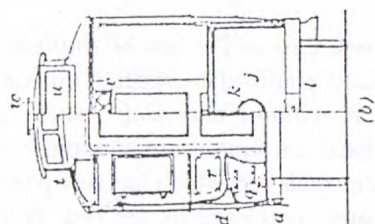


FIG. 1

for a head-light, while collision fenders *l* serve to minimize injury to the car in case of accident. On each platform are the brake handle *m*, pedal *n* for sounding the signal gong *o*, and pedal *p* for sanding the rails, the sand being stored in a box *q* under the car seat *r*. The electric controller by which the car is operated is placed on each platform at *s*. The roof of the car is of the clerestory type, with glazed clerestory *t*. Route indicators *u* and signal-lamp indicators *v* show the destination and route of the car. On the top of the clerestory is the trolley board or plate *w*, on which the trolley standard is mounted if current is derived

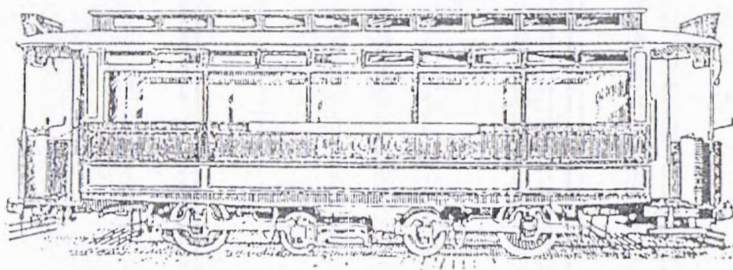


FIG. 2

from an overhead trolley wire. The car shown, however, is worked on the conduit system, and each car carries a plough on the extension *x* of one truck *y*; the other truck *z* is built without any extension. The total length of the car over collision fenders is 33 feet 6 inches, the width over the roof is 6 feet 10 inches, and the height from the rail head to the top of the trolley plate is 11 feet. The total *wheel base*, or distance between centres of outermost wheels, is 14 feet 6 inches. The seats of this car are longitudinal and accommodate 36 passengers. The appearance of the complete car is shown in Fig. 2.

#### DOUBLE-DECK CARS

**Construction of Double-Deck Car.**—A typical British double-deck car, built by the United Electric Car Company for the London United Electric Tramways, is shown in Fig. 3, which consists of a side elevation (*a*) and a plan (*b*). A vertical cross-section is given in Fig. 4, which is drawn to a larger scale than

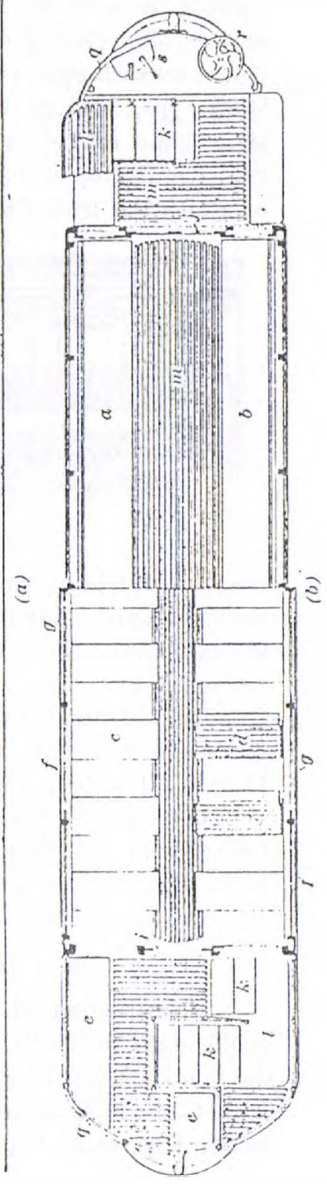
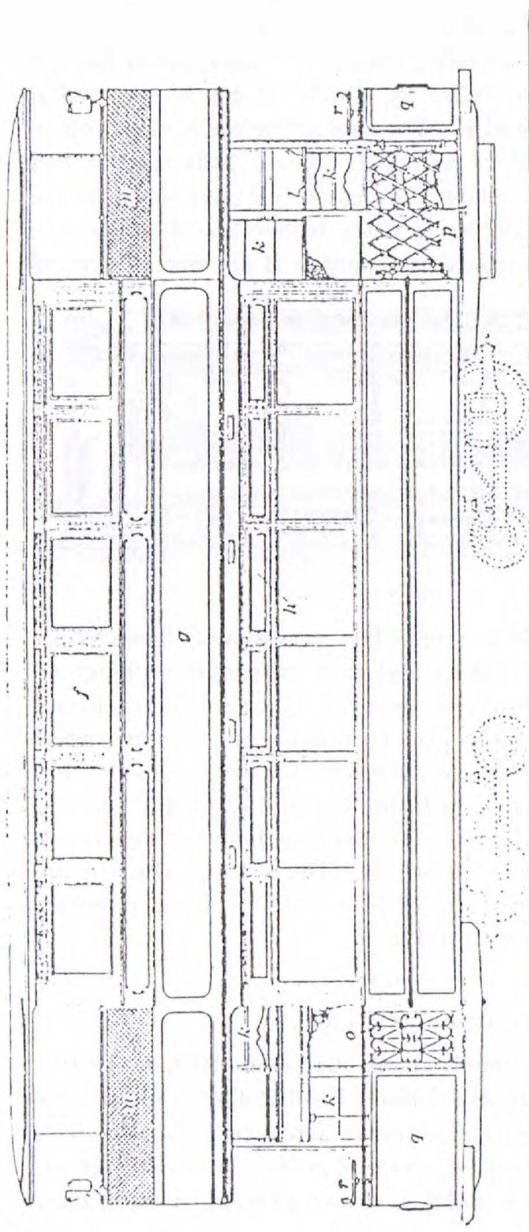


FIG. 3



Fig. 3 in order to show the constructional details ; the lettering is the same for both illustrations. In the type of car illustrated, seating accommodation is provided for 74 passengers, 30 on the lower and 44 on the upper floor, or deck. The seats *a, b* on the

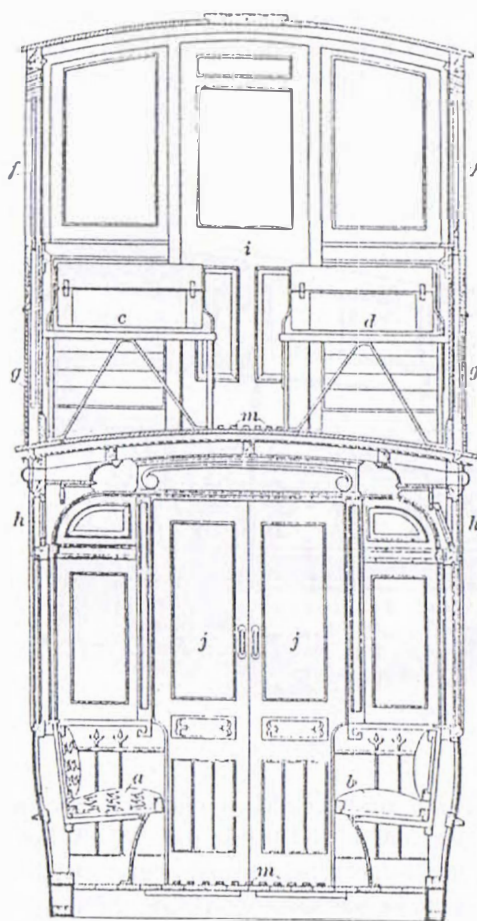


FIG. 4

lower floor are longitudinal, while those *c, d* on the upper are cross-seats with swing backs, so that passengers can face either the front or rear ; in addition, four passengers can be accommodated at each end on the outside fixed seats *e*. On the older types of double-deck cars, the top seats were open and no protection from the weather was afforded to the passengers travelling on the outside of the car. The modern tendency is to build a roof over the top seats, and, by carrying the sides up to the roof, to enclose the top deck as well as the lower deck by means of panelling and windows. The upper windows *f* are in this case arranged to open,

by lowering them into a space provided behind the top-deck panelling *g*. The small windows *h* of the lower deck can be opened for ventilation, but the main windows are fixed. Sometimes, however, all the side windows of a car are arranged

so that they can be thrown open in hot weather. Single sliding doors *i* are provided at the ends of the car on the upper deck, and double sliding doors *j* below. Stairways *k* are built to give access to the upper deck at both ends of the car. They are built as left- and right-handed spirals and, as in the present instance, in two straight portions, with a small intermediate platform *l* between them. The car floors and platforms are protected with wearing strips, or slats, *m*; by renewing the slats from time to time, the solid floor is kept sound. The upper platforms are

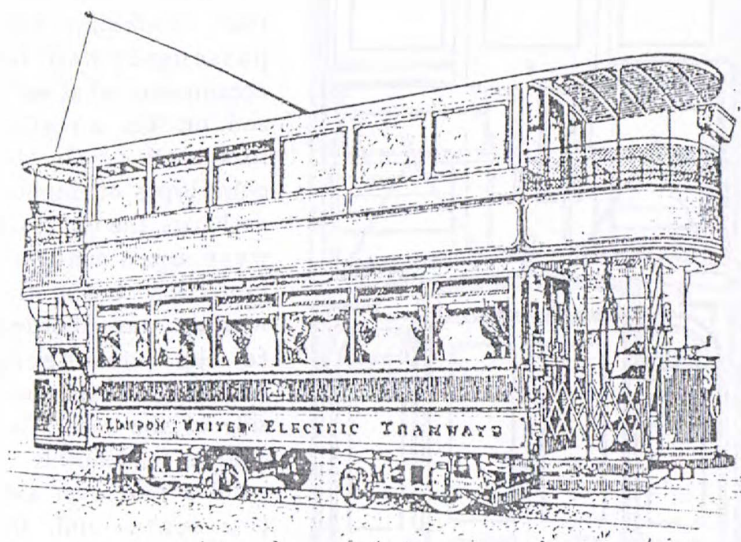


FIG. 5

surrounded by metal screens *n*, and each lower platform can be closed by a swinging gate *o* and a collapsible gate *p*. When driving the car, the driver, or motorman, stands between the stairway and the dash *q*, where he has room to operate the brake hand wheel *r* and controller *s*. The total length of the car over the collision fenders is 34 feet 7½ inches, the maximum width 7 feet 2 inches, and the height 15 feet 10 inches. The general appearance of a double-deck car of the type illustrated in Figs. 3 and 4 is shown in Fig. 5, from which the general arrangement of the car can easily be understood.