The total cost of the electrification of this sixty-seven miles was about £248,000. Of this, £100,000 was spent on the hydraulic-power works, which are capable of at least three times as much power-development as at present called on to provide; £52,000, electric rolling-stock; £68,000, electrification of line; £28,000, central-station machinery.

The two $\frac{5}{16}$ in. trolly-wires used for the 3,000-volt three-phase current cost £130 per mile, while for the same horse-power transmitted by 700-volt continuous current the cost of copper conductor would be £1,300 per mile.

Steel-rail conductivity would cost about £900 per mile.

The Ganz high-tension three-phase induction-motor system is being used for eighteen miles of railway in North Wales and in Canada.

Wannsee Electric Railways, Berlin.

Estimated capital cost of electrification of $11\frac{1}{2}$ miles of double track, with two miles of sidings (third-rail system):—

	£
Central station	65,000
Batteries, 3400 kilowatts	21,050
Transmission	40,000
Twenty-four locomotives of 300-horse power, at £2,250	54,000
Repair-shop	2,500
Sundries	2,450
Total	185,000

Current obtained from a Siemens and Halske outside armature dynamo, giving 400 amperes at 750 volts, which, however, is run at 900 volts when batteries are being charged. This is driven by a 500-horse-power condensing-engine.

Thunn and Burgdorf Three-phase Railway, Switzerland.

The normal line tension is 750 volts, two phases of the current being collected from two overhead copper wires, while the third phase travels by the rails. The high tension is at 16,000 volts.

Six turbines, each of 900-horse power.

There is one special point about the design of the rail third-phase return that is worth noting. Copper bonds are done away with, and the only bonds are the fish-plates.

Motor-coaches weigh 32 tons empty, and have four 60-horse-power three-phase motors.

Locomotives are driven by two motors of 150-horse power each, weight 30 tons.

Capital outlay on construction,—	£
High-tension line with branches to transformer substations	5,600
Fourteen transformer stations, each 450 kilowatts	6,400
Contact overhead duplex line and return-rail bonding	14,000
Station-lighting, and repair-shop	800
Six motor-coaches and two locomotives	9,400
Reserve fund	1,200
Total	37,400

Central London Electric Railway: Central-Third-rail System.

Current to motors, 500-volt, continuous.

Each train is made up of seven cars, the front and the last being motor-cars A motor drives each axle of the front bogie truck on the car, so that four motors drive each train, giving in all 500 nominal horse-power.

The central station contains six main three-phase generators, driven by horizontal cross compound Corliss valve jet condensing-engines.

Metropolitan Railway and Metropolitan District Railway: Third-rail System.

Total route-length of Metropolitan Railway is sixty-seven miles, of which twenty-six miles have been electrified.

The Metropolitan District route is about thirty-three miles. The line-current is supplied to cars at between 500 and 600 volts.

The normal weight of train is 150 tons.

Power is at present being provided for thirty-eight full-sized trains running simultaneously on the whole Metropolitan system.

The engineer's rough estimate of the total running-expenditure is £20 per train-ton year.

The rolling-stock of thirty-eight trains will cost about £346,000; power-station about £174,000.

The complete electrification of the line, including central and substations, feeders, rails, and rolling-stock, will cost over £1,250,000.

Power used for Metropolitan Railway electrification turbines, 5,000 brake horse-power, run at 1,000 revolutions per minute. Westinghouse generators, 3,500 kilowatts, each at a voltage of 11,000.

It has been decided that the electric trains for the Metropolitan District Railway should be worked on the Sprague-Thomson-Houston system of multiple-unit train-control. Motor-cars on this system have already been substituted for separate locomotives on the Central London Railway,