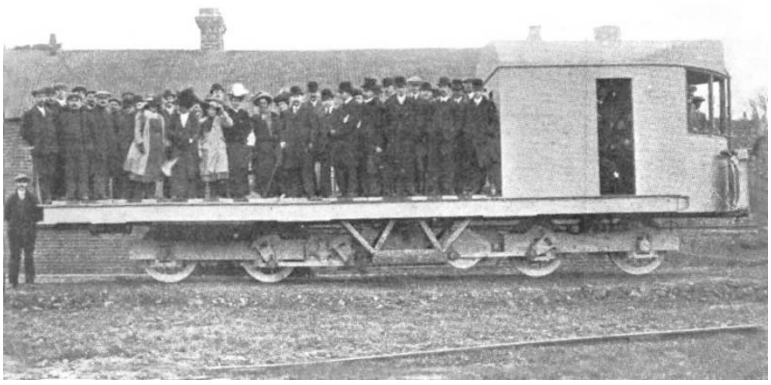
THE BRENNAN MONO-RAIL SYSTEM.

IT will be remembered that Mr. Louis Brennan exhibited a model mono-rail vehicle at the Royal Society soirée in May, 1907. Aided by grants from the War Office, the India Office, and the Cashmir Government, Mr. Brennan has developed the system, and we have now to record public trials of a full-sized vehicle which were made at the Brennan Torpedo Works, near Chatham, on Wednesday, November 10. A full account of the gyroscopic principles involved was given in NATURE of March 12, 1908.

The track consists of a single-rail circular portion of 105 feet radius, a straight portion 440 yards in length, and sidings. The rails are of the Vignoles section, $5\frac{3}{4}$ inches high, 70 lb. to the yard, and have the heads rounded to a radius of 5 inches. These are laid on sleepers 3 feet 6 inches long at about 3-foot centres on soft made ground, the rails being spiked to the sleepers. The points consist of two short lengths of rails fixed together and capable of sliding sideways so as to bring whichever is required into line with the fixed rails. The car is a platform 40 feet in length and 10 feet in width, having the machinery cab at one end, and is supported on two bogies, the centres



Four-wheel self-propelling mono-rail car.

of which are 20 feet apart. Each bogie has two double-flanged wheels 3 feet in diameter, of wheel base 5 feet 4 inches. To obtain flexibility in rounding curves, the bogies have their centre pins connected to the body by means of ball bearings. The empty car weighs 22 tons, and is designed to carry a load of from 10 to 15 tons.

The power required is derived from two petrol-electric sets of 80 and 20 horse-power respectively, the petrol engines being direct-coupled to dynamos. It is, of course, possible to collect current from an overhead wire, or to use steam or other motive power. Current is supplied from the generating sets to two 40 to 50 horse-power motors on the bogies for propulsion, the motors being geared to an intermediate shaft, from which the wheels are driven by balanced cranks and coupling rods. Current is also supplied to the gyroscopic motors, to a compressor for operating the Westinghouse brake and the gyroscopic control gear, and to a small motor driving an oil pump.

Each of the two gyroscopic wheels is 3 feet 6 inches in diameter, and weighs three-quarters of a ton; the axes are normally horizontal, and perpendicular to the direction of the rail. Each is driven at 3000 revolutions per minute by a direct-current shunt motor, having the field magnets on the frame and the armature on the gyrostat shaft. The whole is cased in, and a vacuum is maintained of $\frac{1}{8}$-inch to $\frac{5}{8}$-inch of mercury for the purpose of minimising the air resistance. Although the vacuum will last several hours, a pump is kept running in order to keep it as low as possible. Mr. Brennan has noticed that, while the motors run cool under a good vacuum, they become hot directly air is admitted to the casing. The shafts have steel journals running in white-metal bearings under forced lubrication, the oil being cooled before being returned to the bearings.

During the trials on November 10 the smaller generating set alone was in operation, giving a speed of seven miles per hour. At this speed there was no difficulty in carrying forty persons round the circular track, on to the straight, and over reverse curves of 35 feet radius without material disturbance of the level of the car floor. Loaded on one side, the car-level first rises on that side and then gradually recovers; the steadiness is admirably shown by one of the photographs taken, showing thirty-six persons standing as close as possible to one edge of the platform with the car at rest. Mr. Brennan states that a load of two tons can be placed on the edge of the platform and then removed without danger of non-recovery of the level. The car at present can negotiate grades of 1 in 13, and, with an additional generating set, grades of 1 in $6\frac{1}{2}$ could be surmounted. Finality in design cannot be said to be reached as yet, and Mr. Brennan thinks that development will proceed in the direction of high-speed passenger trains having speeds up to 150 miles per hour.

THE RISE OF SCIENTIFIC STUDY IN SCOTLAND.[1]

AS the Royal Society is now about to open a fresh page in its history, it may not be regarded as an inopportune moment to sketch the rise of scientific study in Scotland, the means and opportunities afforded for that purpose, the formation of societies and institutions for the encouragement and diffusion of science in Edinburgh; also to put in the form of a continuous narrative the chief incidents in the growth of the society during the century and a quarter that has elapsed since its foundation.

Prior to the eighteenth century, and indeed during a considerable part of its course, Latin was the language in use for the interchange of thought and information amongst educated people at home and abroad. Treatises were composed in this language, lectures were delivered in the universities in Latin, and the theses presented for graduation were written and defended in the same tongue. Readiness to speak and understand Latin was a common bond of union amongst the learned, and distinguished them from the unlettered classes, whether of higher or lower social degree. Scotland participated in the revival of letters during the sixteenth century, and the names of George Buchanan, the representative Scottish humanist and historian of his time, of Andrew Melville, humanist and theologian, of James Crichton, surnamed the Admirable, were familiar to scholars throughout Europe. Contemporaneous with Andrew Melville was John Napier, the laird of Merchiston, the inventor of logarithms, a man of a different order of mind from the famous divine, one who by the publication of his great treatises, which were written in Latin, created a fresh era in the science of numbers, and provided mathematicians with a new and powerful instrument. To be conversant with Latin was a necessity for all who aspired to take rank in their respective professions. Those whose means enabled them to travel and to study in foreign universities could avail themselves of the instruction imparted therein, without requiring to have, as a preliminary, a good acquaintance

[1] Abridged from an address delivered before the Royal Society of Edinburgh on the occasion of the opening of the new home of the society, November 8, by Sir William Turner, K.C.B., F.R.S., president of the society.