PROGRESS

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N.Z. INTERNATIONAL EXHIBITION.

THE greatest exhibition ever held in the southern hemisphere was opened by His Excellency the Governor, Lord Plunket, at Christchurch, on the 1st ulto.

The importance of the event to the colony has yet to materialise in the form of increased trade, and it is within reason to predict that New Zealand will benefit by her splendid strenuousness to an extent which passes the present comprehension of her people.

As an Advertisement for the colony the New Zealand International Exhibition forms an immediately-paying medium that is only possible at intervals of generations. As an Educational Factor the event overshadows the dissemination of mere theories that sharpen the brain without satisfying; while for the nonce New Zealand enters the lists as the young and virile champion of a great people amongst the nations of the world.

It is now seventeen years since the last international exhibition was held under southern skies, and it is only fitting that the New Zealand International Exhibition of 1906 should eclipse all former colonial efforts. That it does there can be no question, for it is the largest British Exhibition held since the first international affair of 1851. The Glasgow Exhibition of 1901 excelled ours in one respect only, viz., the machinery section, and to the everlasting credit of Scotchmen be it recorded that their exhibition was the only one since 1851 to make a substantial profit, viz., £73,000. It is admitted by authorities that the New Zealand International Exhibition has exceptional attractions insofar as the variety of its exhibits is concerned; and yet it is no mere bazaar, no haunt of idle gossips, or butterfly pleasure seekers. It is, in fact, an event of the utmost significance to New Zealanders, whether they be in the political arena or in the artisan and mechanical world; and to prove of the fullest service to the colony it should be visited by at least seventy-five per cent. of the population. Everywhere heavily laden stalls pay eloquent tribute to the wealth and progress of our own manufactures, and everywhere the eye is constantly arrested by exhibits interesting, costly and unique. In the great Machinery Hall a thousand wheels are whirling, a thousand cranks revolving. It is a fascinating picture, and in the throbbing, pulsing engines we read the story of the mechanical triumphs of the 20th century.

The New Zealand International Exhibition comes at a time when the world is still young in scientific knowledge, and when the torch of science is being carried in direct paths by courageous pioneers. It comes to mark the wonderful prosperity that has fallen to the lot of our island colony, and there is every indication that this prosperity will continue.

We hope to hear that the fullest encouragement, in the form of travelling facilities, has been given to the people of our own colony, the Commonwealth, and further away still, in order that they may be enabled to attend and profit by the great event.

The Question of the Gas Turbine.

IN the *Engineering Magazine* Prof. S. A. Reeve, writing on this subject, points out that the gas turbine must work on the Brayton or Joule cycle rather than the Otto; that there is no thermodynamic reason why the gas turbine should not be a success; but that the obstacles in the way of the gas turbine lie in two directions, viz., in the necessity of starting from very high initial temperature for expensive working, and in the difficulty of compressing the gas to the high pressure needed to get high temperature. A temperature of over 4,000° is needed for good efficiency in order to get high velocity of the gas molecules on account of their small mass.

Prof. Reeve suggests that this high initial energy of the working fluid may be secured by injecting into the hot gas a quantity of water which will give molecules of steam and gas combined having considerable mass, and therefore not needing so great velocity (in other words, not requiring so high temperature) in order to have a high initial energy.

Prof. Reeve believes that the gas turbine is a machine immediately practicable both thermodynamically and mechanically, the great difficulty being the question of compression, and he believes that the difficulty in this direction will be solved.

Constitution of the Earth.

THIS interesting question recently formed the subject of a paper by Mr. R. D. Oldham, at a meeting of the Geological Society, London. He points out that just as the spectroscope opened up a new astronomy by enabling the astronomer to determine some of the constituents of which distant stars are composed, so the seismograph, recording the unfelt motion of distant earthquakes, enables us to see into the earth and determine its nature with as great a certainty, up to a certain point, as if we could drive a tunnel through it and take samples of the matter passed through. After an exhaustive treatment of the question of wave motions through the earth, in the course of which many figures and calculations are cited, the author of the paper deduces that wave motion originating at any point in the earth will be propagated in all directions from it, and whatever the nature of these waves, their paths will be straight lines so long as the velocity of propagation remains constant; but if this varies the course of the wave paths will be altered according to the laws of refraction. These laws hold good, whatever be the nature of the wave motion, although in the case of elastic waves the rate of propagation is dependent on two factors—the elasticity and density of the medium through which they are propagated. From this it will be seen that any information which can be obtained regarding the form of the wave paths will indicate the changes, if any, in the rate of propagation, and thence in the physical condition, of different parts of the earth traversed by the wave paths which emerge at different parts of the surface. He comes to the conclusion that the interior of the earth, after the outermost crust of heterogeneous rock is passed, consists of a uniform material, capable of transmitting wave motion of two different types at different rates of propagation; that this material undergoes no material change in physical character to a depth of about six-tenths of the radius, such change as takes place being gradual, and probably accounted for sufficiently by the increase of pressure; and that the central four-tenths of the radius are occupied by matter possessing radically different physical properties, inasmuch as the rate of propagation of the first phase is but slightly reduced; while the second-phase waves are either not transmitted at all, or, more probably, are transmitted at about half the rate which prevails in the outer shell.