NEW ZEALAND AND REFRIGERATION.

(*Specially written for* Progress.)

Now that twenty five years have sped since the installation of refrigerating machinery in New Zealand we are in a position not only to form some judgment of the extent to which as a colony we are indebted to the discovery of the process, but also with fair accuracy to create a mental picture of what our colony would now be had the process never been discovered. And in the attempt to accomplish this we find ourselves confronted with these inquiries :—What were the facts about this country a generation ago relatively to those of to-day ? What progress has been made in the meantime ? What proportion of the progress has been due directly or indirectly to the refrigerating process ?

Firstly, we are to note that for some years prior to the formation of the first freezing companies in the colony in 1882 the country had been in anything but a state of prosperity. Following hard upon the heels of a period of State borrowing and extravagance, there had set in a prolonged period of borrowing and retrenchment. A heavy fall in the prices of our staple products had produced commercial depression. Heavy taxation was imposed on all property. Every week men were leaving the country for more congenial shores. In 1880 the population of New Zealand was less than half a million and the public debt twenty eight millions. The total exports for 1882 amounted to six and a quarter millions.

Secondly, we find that to-day New Zealand has vastly progressed in twenty-five years. With a population of close on nine hundred thousand, a public debt of approximately sixty millions and a total export trade of over seventeen millions, she already claims the attention of the nations.

Thus we find that during the twenty-five years New Zealand has almost doubled her population, more than doubled her public debt, and increased her export trade by ten and a half millions. The following tables show other forms of increase :—

	1881	1891	1906
Total cattle in N.Z.	698,637	831,831	1,810 936
Total sheep in N.Z.	12,985,085	18,128,186	19,130,875
Railways open for traffic	1333 miles		2407 miles
Telegraph lines	3824 miles		8355 miles

	1890	1905
Savings bank deposits	£2,441,876	£9,773,954
Unimproved value of land	75,497,379	137,168,548
Value of Improvements	35,640,335	81,254,004
Total private wealth	142,631,461	258,710,000
Wealth per head	288	293

In 1882 a trial shipment of frozen meat left the colony, and the venture proving an unqualified success, immediately five factories were established in different centres, a number that has since increased four-fold Not till some years later did the public recognise the tremendous importance of the process as affecting the dairy industry ; but a glance at the figures above reveals the fact that during the last fourteen years the total number of cattle in the colony has increased by a million head—a fact that speaks for itself. The export figures for the year ending March 1906 are :—

Frozen meat and tallow	£3,034,934
Butter and cheese	1,613,728
Total	£4,648,662

This total considerably exceeds the value of our average annual wool export for the last thirteen years, during which period the latter has considerably fluctuated but shows no steady or permanent increase. And though last year the wool export reached an unprecedented figure, yet it may reasonably be expected that in a few years wool will be ousted from the position it has heretofore held as our leading product, and its place taken by frozen-meat, tallow, butter cheese—all the direct products of the refrigerating process.

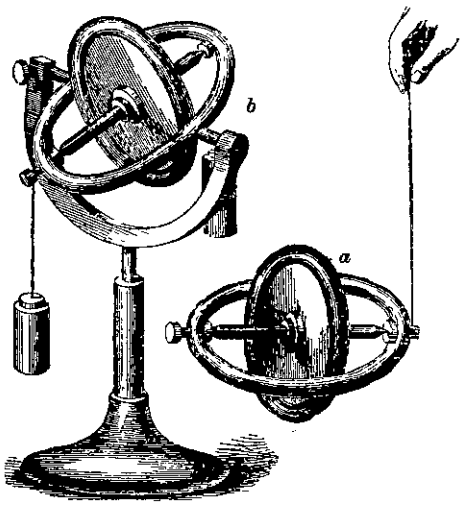
It is clear that without refrigeration New Zealand would be practically an immense sheep-walk, little known to the rest of the world except for its scenery and shooting and fishing—insignificant islands where the settlers vegetate thirteen thousand miles from civilisation. Under the régime of refrigeration we can fairly claim that New Zealand is not surpassed by any British possession in the world as a country for settlers with small means, or as a country for the toiler who lives by the sweat of his brow. The country must be prosperous where work is so plentiful and labourers so few that one thousand navvies have to be requisitioned from England to complete its railways.

THE MONO RAILWAY.

THE GYROSCOPE AT WORK

A NEW DEPARTURE.

The gyroscope has been a child's toy for generations, the favourite form being the top. In like manner the conic sections were mathematical toys which have amused the learned and after 25 centuries found a most important application to science ; *inter alia* revolutionising astronomy. It will be a curious and welcome coincidence if the gyroscope were to after all end by obtaining a useful career. The chances are at present much in favour of that consummation. The principle has now engaged in a marked degree the attention of inventors and practical men. The other day a German inventor conceived the idea of using it in ship building, and applied it to a small craft, which went through a heavy sea without rolling



THE GYROSCOPE.

Now Brennan of torpedo fame is said to be applying the prineiple to his scheme for a mono-railway. Some years ago this famous inventor was in the service of Mason and Firth the well known printers of Melbourne. Being a man of ingenious mind, and persistent withal, he turned his attention to engineering questions, attending to them in his spare time. In due course he evolved his method of steering torpedoes by wire, and though he was much ridiculed by the thoughtless of his city, he knocked so many targets to pieces that he attracted the attention of the British Government, which secured his invention by a cash payment of £100,000, and his services by a salary of £1,000 a year, a commission in the Royal Engineers, and permanent employment in a high post at Woolwich Arsenal. That was the origin of the Brennan torpedo. Since then, neither the good fortune, nor the work have been able to blunt the keenness of Captain Brennan's invention. Thus we now hear of him explaining the principle of his mono-railway to a gathering of engineers and other experts all of whom pronounce the same to be perfectly feasible.

" Gyroscope " is a name applied to various instruments designed to illustrate the phenomena of rotation. They all consist essentially of a disc revolving on pivots within a ring. In figure *a* the ring is supported at one end of its axis by a string. Take hold of the outer end of the axis of the disc, rotate the disc by means of a string, let go the outer end the disc will remain at the angle at which it is left. It will do more : it will spin round the supporting string maintaining equilibrium during the whole of the time of the spinning. If, as shown in *b*, a weight is attached to the framework at one end of the axis, the whole rotates about the vertical. The reason why the rotating body in *a* does not fall is that in such a body gravity is no longer allowed to act singly, but must in every instant enter into composition with another force. Hence the body in such case can not simply fall, but must move towards such new place in space as the combined actions shall determine : and hence again, the same force which ordinarily produces a vertical fall, here carries a body round a horizontal circle, or secondarily sometimes even causes it to ascend.

Now the whole downward action of gravity on the disc is very slight compared with that of the rotation first imparted, sometimes as small as the ratio of 1 to 40 or 60. Clearly the rotation is vastly the predominating force.

Now in a railway upon the mono-railway system the cars are suspended beneath a single rail, or supported upon a rail which runs through the body of the car. In either case, the car hangs like a pendant, and to a large extent, its stability depends upon the equal balance of the load. Obviously, this balancing is a difficult problem to face, when passengers are constantly entering and leaving the vehicle. To guard against accidents, which might take place through the swaying, side rails have been used with which idle pulleys carried by the car come in contact when the oscillation is greater than usual. We have no details of Brennan's adaptation of the gyroscope to the overcoming of this difficulty ; but it may be assumed that he employs a large flywheel which is caused to revolve at a high velocity. Probably the revolution is in a vertical plane. and its tendency is upon the explanation of the theory above given, to maintain the equilibrium of the car in spite of any inequality of the loading. We hope in a future issue to give full details of this very interesting invention.

M. Alfred Leblanc has just made a balloon voyage from Paris to the shores of the Baltic—a distance of 630 miles— in fourteen hours