

external repairs and continual painting. They would be fireproof, and thus the cost of insurance would be reduced. They would be damp-proof and vermin-proof, and hence would make for the better health of the occupiers. As a result, rents could be materially reduced on account of the great saving in depreciation, repairs, renovation, and insurance. The whole concrete house is the only way to reduce rents. Warehouses could also be built of concrete, and under the system I propose the cost would be the same as wood. No one would hesitate about using concrete. The benefit would be a saving of life, as in the case of fires, and less insurance. There is an opening for great business in concrete fencing—posts, rails, palings, pickets—at the same cost as wood. Having, I trust, shown the advantages to the people if concrete for homes can be provided for them the question arises, In what way can the Government assist to this end? I will state how the Government may assist:—

(1.) By State enterprise in the manufacture and sale of parts.

(2.) By guaranteeing to any private company who will manufacture for the purpose the purchase by the Government of a minimum quantity per annum for a number of years at a fixed price.

(3.) By utilizing factory-manufactured concrete and reinforced concrete in all Government buildings in lieu of wood or of wood and corrugated iron, and by the use of concrete material in workers' dwellings.

(4.) By making it law that every new building (or addition) in every town or borough shall be completely fireproof.

(5.) By making it law that every building in the Dominion used as an hotel, boardinghouse, hospital, or nursing home, if not a fireproof structure, shall be made a fireproof structure within seven years from the passing of the Act.

If effect were given to Nos. 2, 3, and 4, then Nos. 1 and 5 might be eliminated. In this event I think sufficient encouragement would be offered to private enterprise.

Coming to roads and footpaths, all the existing roads in the Dominion require remaking. Of main arterial highways it may be taken that there are eight thousand to ten thousand miles which must in the near future be reconstructed, and the earlier this is commenced the better and more economical it will be to the people. Concrete in some form, whether laid *en masse* or made in parts in factories, is the material *par excellence* for this class of work. I am of opinion that the factory-made road is the better for several reasons. Notwithstanding the excellence that can be provided by properly made concrete roads made *en masse*, the piece-made road affords these advantages:—

(1.) Mass roads require the use of perhaps double the quantity of aggregate than those piece-made, and although there are localities where stone and shingle are plentiful, yet there are many districts where there is none of this material. Great economy is gained where the stone and shingle obtain, and if concrete is going to be largely used it would be well to consider the natural supplies.

(2.) Mass roads present a hard unrelaxing surface, whereas the piece roads provide resiliency and afford more comfortable travel.

(3.) In the matter of wash-outs the mass road would fall in and the cost of repairs would be considerable, while the piece-made road would be replaced with its own material at slight cost.

(4.) Concrete tracks, piece-made, are infinitely better and stronger than those laid *in situ*.

(5.) Factory-built roads can be manufactured all the year round, laid when required, and utilized for traffic at once, whereas *en masse* roads must be constructed in suitable weather, and all traffic must be kept off them for a month, which means serious inconvenience to the users.

(6.) These remarks apply equally to footpaths. Single-traffic roads could be laid down for about £1,800 per mile, and double-traffic roads at £3,500 per mile. Vehicle-tracks could be laid down for £1,000 per mile (single track).

I have not touched on the shipbuilding industry, but I believe the concrete ocean liner is a possible industry, and would pay.

If my proposals are given effect to the industries which will be greatly benefited are—(1) Cement-manufacture, (2) stone quarrying and crushing, (3) freighters of sea-borne shingle, and (4) steel-merchants and workers in the carrying trade. Of necessity an enormous impetus must be given to these trades, while a new trade will arise for concrete workers. The workers involved in the trades I have mentioned are largely unskilled workers or general labourers, and if my suggestions as to roads were carried out, such a thing as unemployment could not occur in the Dominion for many years. I claim to be the pioneer in New Zealand for the use of reinforced concrete for homes and for general buildings. I designed and had carried out the first whole concrete house in the Dominion, and I designed and built the largest complete fireproof hotel in the Dominion—I refer to "Cargen," in Auckland. Before the war the Prime Minister promised that he would try the reinforced-concrete road, for which I had taken out a patent, but when the war broke out he said he would have to go back on his word, and that nothing could be done till after the war.

1. *To Mr. Luke.*] I think that the building of the blocks away from the site, and making them in a factory with proper machinery, would be the cheapest method. The parts could then be assembled on the site. Concrete blocks could be used for different designs and details on a sliding scale.

2. *To Mr. Hornsby.*] In a piece road the size of the blocks would be regulated according to the weight. A block of 7 ft. by 3 ft. could be used, but bigger blocks could be made, provided the lifting machinery was available. That would be reinforced concrete. Such a road could be taken to the backblocks or elsewhere and laid down. It would cost £1,700 or £1,800 per mile for a road made with blocks 7 ft. by 3 ft. and 3 in. thick. I propose to tar it on top for the wearing-surface.