

SECTION V.

NEW ZEALAND GOVERNMENT DEPARTMENTAL COURTS.

THE AGRICULTURAL COURT.

PRODUCTS OF THE SOIL.

It may be, as is often predicted, that New Zealand will eventually become the great manufacturing country of the southern world, but for the present and for many years to come she will depend for her solid prosperity on her agricultural and pastoral industries. It is the farmer that keeps the nation, the man who wins his way with the plough and the axe and the sheep-shears, the man of the dairy-farm and the cattle-run. Of close on £20,000,000 worth of exports sent from New Zealand during the Exhibition year, 1906-7, very nearly £16,000,000 represented the products of the soil, in the form of wool, frozen meat, butter and cheese, hemp, and grain. The history of the agricultural and grazing businesses, particularly during the last decade, is one of wonderful expansion, and the quantity of farm-produce of first-class quality shipped away from our shores to the world's great market-ports is annually largely increasing. In a very appreciable degree this satisfactory condition of the produce-export trade is to be credited to the efforts made by the Government of the colony, through the Agricultural Department, to disseminate principles of scientific farming amongst country producers, to improve the quality of all classes of farm-products, and by raising the grades to secure a high reputation and good prices for the colony's produce in the outside world.

The Department of Agriculture occupied, as was fitting, the premier place amongst the Government departmental courts at the Exhibition. Upon it devolved the duty of displaying the choicest samples of the wealth of New Zealand's cornfields, and sheep-runs, and cattle-farms, and orchards, of organizing a complete farmers' museum embracing a variety of educative exhibits, from orchard-pests to agricultural seeds and grasses and fodder-plants; and of giving ocular demonstrations of the most modern methods in such important branches of country life as poultry-raising, fruit-preserving and canning, and bee-keeping. In sound educative utility, it was the most serviceable of any section of the Exhibition. Farmers have come to regard the Agricultural Department as a real help to them in their battle with the soil—as, in fact, a great college of experts to which they can turn when in difficulties of a scientific and technical character. It was natural therefore to thousands of those who visited the Exhibition that the Department's court should have been the section of most particular interest, affecting so closely and usefully as it did the development of the great primary industries which bring New-Zealanders more than three-fourths of their income.

The Department of Agriculture's Court occupied an annex of the main building on the western side, fronting on the long western corridor and adjoining the rear of the Machinery Hall. The space enclosed was 150 ft. long by 80 ft. wide, giving 12,000 square feet of floor-room. This was devoted to an exposition of the Department's methods, to an agricultural museum, and to displays of various kinds of New Zealand produce, such as flax in sundry stages of manufacture. Outside, in the rear of the Exhibition buildings, there were the Department's gardens of various grasses and fodder-plants, and a model apiary. It was intended, in addition, to have a model dairy working in the grounds, but this idea was abandoned, unfortunately, on account of the expense.

Seventeen years ago the Department of Agriculture had no separate existence

It was a division of the Department of Lands and Survey. Since then it has developed into a very large and responsible Department of the State with a staff of about three hundred officers. In 1891 the Department's work was concerned chiefly with the inspection of stock and the destruction of rabbits; it had a dairy expert and a fruit expert. Now it has ten important divisions covering every branch of agricultural and pastoral industry in the colony. The most important section of the Department's work is probably the Dairy Division. This includes the work of inspecting and grading all dairy-produce prior to its shipment abroad; all sales of New Zealand butter and cheese are based upon the Government grade, which has an excellent effect in raising the standard of the colony's produce. In addition to the grading staff, experts are constantly employed in making visits of instruction to those engaged in the manufacture of butter and cheese, both in the co-operative factories, now so numerous throughout the colony, and at the private dairy farms. The inspection of dairies supplying milk for human consumption also devolves on the Department.

In the Veterinary Division much good work is done in the way of preventing the spread of contagious diseases amongst stock and in the inspection of all meat for export and meat killed at the public abattoirs for local consumption. Every animal killed at the abattoirs and every carcase and every tin of meat prepared for export is subject to a careful inspection. The Chief Veterinarian at the head of this division has a staff of about sixty qualified veterinary surgeons and other officers.

The Divisions of Horticulture and Biology are particularly concerned with the fostering of the fruit industry. Orchards throughout the colony are inspected by qualified instructors, and fruit-growers have the practical assistance of the division in dealing with orchard and garden pests. Settlers are given useful information concerning grasses, weeds, insects, &c., and the best methods necessary for combating diseases affecting crops. The fruit-canning industry is assisted by the services of a fruit-preserving expert, and there are bee-keeping experts for the instruction of all those interested in the production of honey. The staff engaged in these two divisions is under the charge of Mr. Kirk, Biologist, who also from the initiation of the Department till recently edited and superintended the distribution of literature dealing with matters that particularly interest the farmer and the fruit-grower.

The wine-making industry has the attention of the Government Viticulturist, who superintends the Government vineries in the Auckland and Hawke's Bay Districts and makes visits of inspection to the vineyards throughout the colony. Large quantities of phylloxera-resistant vines are supplied to growers.

The Poultry Division is now becoming an important branch of the Department. There are poultry-breeding stations at Ruakura, North Auckland, Moumahaki in the Wanganui district, Burnham near Christchurch, and Milton in Otago; and at the four chief ports of the colony there are depots for the dressing and grading of poultry for export. Many thousands of birds are now sent away annually from these stores in the freezing-chambers of the large ocean steamers.

The hemp-milling industry engages the attention of a special division consisting of a Chief Fibre Expert and a number of Graders and Instructors and other officers. Since the passing of "The Flax Grading and Export Act, 1901," all *Phormium tenax* fibre for export has been graded at the principal ports, and as a result there has been a great improvement in the quality of the fibre.

The Chemical Division, under the charge of an agricultural chemist and botanist, attends to the analysis of soils, farm-products, &c., for farmers, free of charge, and advises generally on matters of agricultural chemistry.

In the Stock-inspection Division a great deal of useful work is done in inspecting all cattle in the colony and in preventing the spread of stock-diseases, in dealing with the rabbit pest, in inspecting dairies, and in eradicating noxious weeds.

The broad aim of the Department, as set out by its head, Mr. Ritchie, the Secretary for Agriculture, is to secure the adoption of the most approved methods of farming, to improve generally the conditions under which crops are produced and stock reared, and to safeguard the reputation of the colony's produce by raising the grade of the articles exported.

These, then, were some of the uses of this most useful of public Departments, which were sought to be illustrated and elucidated in the Exhibition court.

Utility was the main effect aimed at in planning the court, but at the same time there was much to attract the general visitor. As the court was approached, the eye was caught by the boldly lettered facts painted on the roof-beams in terse advertisement of the nation's agricultural riches. The beams bore statements of the colony's total exports and the proportion furnished by products of the farm, and details were given of the several values of the great staple articles on which the country depends. Entering the court one of the first things that took the eye was a splendid exhibit of dressed hemp; then came the interesting little museum arranged by the biological section of the Department. There were many other features of high value to the farmer and the orchardist. These will be referred to in some detail in their several sections. The attendance at the court throughout the season of the Exhibition was large; often there were crowds of visitors, particularly when the demonstrations and addresses were being given by the Government experts. Outside the building practical demonstrations connected with the model apiary were given, and large numbers of visitors sought information in bee-culture and honey-making. The grass and forage-plants plots were a never-failing source of interest to visitors not only from country districts, but also from the cities.

The staff of the Department associated with the Exhibition court were the following:—

Officer in Charge	..	..	Mr. T. W. Kirk, F.L.S., Chief of Divisions of Biology, Horticulture, and Publications.
Deputy Officer in Charge	..	..	Mr. George Bisset, Editor of Publications.
Fruit-canning Expert	..	..	Mr. W. Jacques.
Apiarian	..	..	Mr. I. Hopkins; and assistant, Miss Livesay.
Officer in charge of Grass-garden			Mr. A. Macpherson.
Poultry Expert	..	..	Mr. D. D. Hyde; and assistant, Mr. F. C. Brown.
Fibre Expert	..	..	Mr. C. J. Fulton.
Wine Expert	..	..	Mr. R. Bragato.

The divisions of the Department under Mr. Kirk's control exhibited collections in the court illustrating diseases of crops, orchards, and gardens, and how to treat them; insects attacking crops and fruit; grain both in sheaf and threshed; commodities made from each kind of grain; grasses, forage-plants, and weeds; farm seeds; canned, preserved, and fresh fruit; working machinery for fruit-canning; wattle-barks for tanning; apiary appliances; packages for produce; fruit-models; useful and injurious birds; spraying machinery and pumps; and publications and illustrations dealing with agricultural matters.

Of these, a particularly valuable object-lesson to the farmer and the fruit-grower was the large collection of specimens of grain, seeds, weeds, and diseases and pests of vegetation, the result of years of work, which had been housed in the Agricultural Museum in the Customs Buildings, Wellington. The specimens, including many from

Mr. Kirk's private collection, numbered four thousand. Each was plainly labelled with the name and all necessary particulars. There were some seven hundred specimens in bottles, from all parts of the world, illustrating the various diseases of crops and fruits in blight and insect form; there were six hundred specimens of grasses and weeds, and there were over two hundred varieties of potatoes preserved in a solution of formalin. The collection of insect pests was one of particular interest to the agriculturist and horticulturist, and information as to the best means of coping with these enemies of the man on the land was continually being sought by visitors

**The
Farmers'
Museum.**



THE AGRICULTURAL DEPARTMENT'S COURT.

to the court. Amongst the specimens of orchard-pests shown were phylloxera, so much dreaded by the vine-grower. There was a collection of woods showing the damage done by timber-boring insects, including pieces of kauri-pine eaten through by the termite ant, and American axe-handles and various articles of white-pine attacked by boring-beetles. A number of destructive fruit-flies were exhibited, including one which in the Hawaiian Islands seems to make a speciality of attacking fruits like the water-melon. Amongst the destructive scale insects shown were those which affect the various citrus fruits, and also the blue-gum scale, from Australia, which since its accidental introduction into New Zealand has wrought considerable damage amongst the eucalyptus plantations in South Canterbury. This pest is preyed

upon by the ladybirds, specimens of which were on exhibition. There was a very complete collection of farm seeds: this exhibit included samples of seeds of the principal grasses and fodder-crops sent by Messrs. Williams and Kettle, of Napier, and Waters, Ritchie, and Co., Dunedin. There were good specimens of the cereals grown on the Government experimental farms. In grain, samples were shown in the ear, on the walls, and below there were bags containing samples of threshed grain of practically every kind grown in New Zealand. The sheaves and grain-samples shown were in many cases discoloured by the very wet harvest season of 1906, but the display as a whole was, despite this, of excellent quality. The collection was arranged to show the relative growth of each variety under varying conditions of soil and climate. The grain-exhibit proved to be one of particular interest to farmers, and there were many requests—which were as far as possible complied with—from settlers, schools, and technical classes for small quantities of seeds for experimental purposes. Enlarged photos of prize stock, large orchards, and farm scenes illustrated the varying nature of the work that falls to the farmer's lot. For the fruit-grower there were some particularly interesting exhibits in the form of coloured models of good specimens of fruit. There was also a collection of birds useful and injurious to the orchardist. The stages of dentition of farm animals at various ages was illustrated by a collection of skulls specially prepared for the Exhibition by Mr. W. C. Quinnell, M.R.C.V.S.

In the fruit section, good displays of apples, pears, and quinces were made by the horticultural section of the Moumahaki Experimental Station (Mr. W. J. Palmer, horticulturist). These comprised about two hundred varieties. From South Island orchards about ninety varieties were sent, collected by Mr. J. C. Blackmore, Pomologist. All these were splendid specimens of the products of New Zealand orchards, well grown and of excellent quality in every respect. An exceedingly interesting

**Fruit
and
Fruit-
preserving.**

and informative feature of the court was the series of practical demonstrations of fruit canning and preserving and vegetable-canning given by Mr. W. Jaques, Canning Expert. A complete plant for this purpose was fitted up, and at frequent intervals practical lessons in the art of putting up fruit in glass and in tins were given. These demonstrations were always well attended, and on several occasions parties of schoolgirls were taken to gain some practical hints in this useful art. The articles preserved in this way were peaches, pears, apples, plums, apricots, quinces, gooseberries, tomatoes, and green-peas. The can-making plant, an excellent one of the latest class, was lent to the Department by Messrs. Bradley and Burch, London. A collection was shown of the products of fruit-preserving works in various parts of the colony, most of them very attractively prepared for sale, and of the best quality. These tinned fruits, &c., were sent from the factories of the following companies and firms: The Frimley Canning Factory, Hastings (Hawke's Bay); S. Kirkpatrick and Co., Nelson; Clark Bros., Whangarei; Teviot Fruit-preserving Company (Limited), Roxburgh; Hokianga Co-operative Preserving, Canning, and Packing Company; Peter Becroft, Port Albert, Auckland; J. H. Hinton and Co., Dunedin; F. G. Parsonson and Sons, Christchurch; and J. and A. W. Munnings, Christchurch.

Amongst the various horticultural and other appliances in the court were a number of machines and pumps for spraying orchard-trees, and potatoes, and other crops. A practical trial of these machines, which were lent by various makers and agents for exhibition and testing, was conducted by Mr. G. Quinn, Horticulturist of the South Australian Department of Agriculture, and Mr. Kirk. The trial was not competitive. There were fourteen or fifteen pumps of various classes, varying from the useful small garden bucket-pumps to the knapsack-pump and a horse-power pump for spraying large orchards. The exhibiting firms were Messrs. E. Reece and Son, Christchurch; A. Billens, Christchurch; A. Yates and Co., Auckland; and E. W. Mills and Co., Wellington.

In the centre of the court there was a large stand of New Zealand wines, the produce of the Government vineries, which produce grapes that make excellent light wines. The wines were made under the supervision of Mr. R. Bragato, Government Viticulturist. Several private vigneronns in various parts of the colony also contributed to the exhibit of wines. During the latter part of the Exhibition season, two large consignments of Auckland-grown grapes, which arrived at the Exhibition, demonstrated the exceeding suitability of some parts of the North for the culture of the best kinds of grapes in the open air. About two tons of grapes were sent down by private growers; other consignments were sent from the Government vineyards at Waerenga on the Lower Waikato. Samples of the grapes were displayed in the Agricultural Department's Court, and the rest were quickly sold in the Exhibition at 6d. per pound. The Government consignment included the following varieties, all of excellent quality: Table-grapes—Muscat Hamburg, Temporano, Black Alicante, Trebiano Bianca, Vantage or Flame Tokay, Royal Ascot, Doradilla, and Ulliade; wine-grapes—Pedro Ximenes, Hermitage, La Folle, Cabernet, Sauvignon, Riesling, Marsanne, Mataro, and Malbec. The Viticultural section of the Department of Agriculture grows about 120 varieties of grapes at its stations—Waerenga in South Auckland, and Arataki in Hawke's Bay. The Department has been for some years experimenting in the direction of ascertaining which are the most suitable kinds of wine-making and table grapes for cultivation in New Zealand. It was explained to inquirers at the Agricultural Department's Court that for white wine La Folle, Pedro Ximenes, Riesling, and Marsanne are preferred, and for red wine Cabernet Sauvignon, Hermitage, Pineau Meunier, and Malbec.

Wool, which last year brought New Zealand in seven and a half millions sterling—the cash return for the 426,582 bales exported—was represented in the court by a splendid collection of samples, the most attractive and comprehensive yet made in the colony.

Wool. There were nearly two hundred samples, covering almost every breed and cross in the two Islands. There were a number of fine fleeces from stud sheep; and general-flock wools were also represented. Each sample was given its respective Bradford spinning quality by Mr. B. J. Marquet, Instructor in Wool-classing at the Seddon Technical College, Christchurch; this provided wool-growers with a most useful object-lesson in the several values of the respective breeds and crosses. At the close of the Exhibition a number of the samples were given by the growers and the Department to the museum of the Seddon Technical College as the nucleus of a collection of New Zealand wools.

A few years ago the Government Agricultural Department began an experiment in the direction of breeding Angora goats by importing several from Victoria and South Australia. The Government's chief breeding-place for Angoras is Motuara Island, near the entrance to Queen Charlotte Sound, Marlborough. The flock at this place now numbers over a hundred pure-bred and half-bred Angoras. Flocks of cross-bred Angoras are now being reared in Nelson, Marlborough, and Westland. The flocks are useful in the first place for keeping down weeds, and eventually their production of mohair will be of commercial quality. The Government's lead is being followed by private individuals in several parts of the Dominion. About a hundred Angora goats were imported during 1905-6 by farmers in the Marlborough and other districts. Experts have given very favourable opinions of mohair from Angoras in New Zealand. These small flocks, which are probably the beginning of a big industry, were illustrated in the Department's court by a painting by Miss Flora Scales of a flock of Angora goats, and a number of photographs. In glass cases were shown samples of Angora fleeces and the mohair used in manufactures. Alongside the New Zealand samples were shown some from Turkey and Cape Colony. An exhibit from an English manufacturing firm comprised specimens of the combed hair in various stages up to the

finished fabrics, amongst which were figured plushes suitable for upholstery. An example shown in the Exhibition of one of the uses to which the article may be put was a pair of socks, hand-spun and knitted by a Scandinavian woman in Hawke's Bay, from mohair grown in that district.

The remarkably beautiful quality of the strong fibre produced from New Zealand's own peculiar plant, the *Phormium tenax*—the Maori *harakeke*, called by the white settler "flax"—was exceedingly well exemplified by a fine exhibit of the colony's hemp-manufactures. Common everywhere throughout the colony, swishing its long handsome sword-leaves in every swamp and by many thousands of streams, the native flax now ranks as one of our most valued staples of manufacture and export. Yielding a strong elastic fibre

**New Zealand
Hemp.**

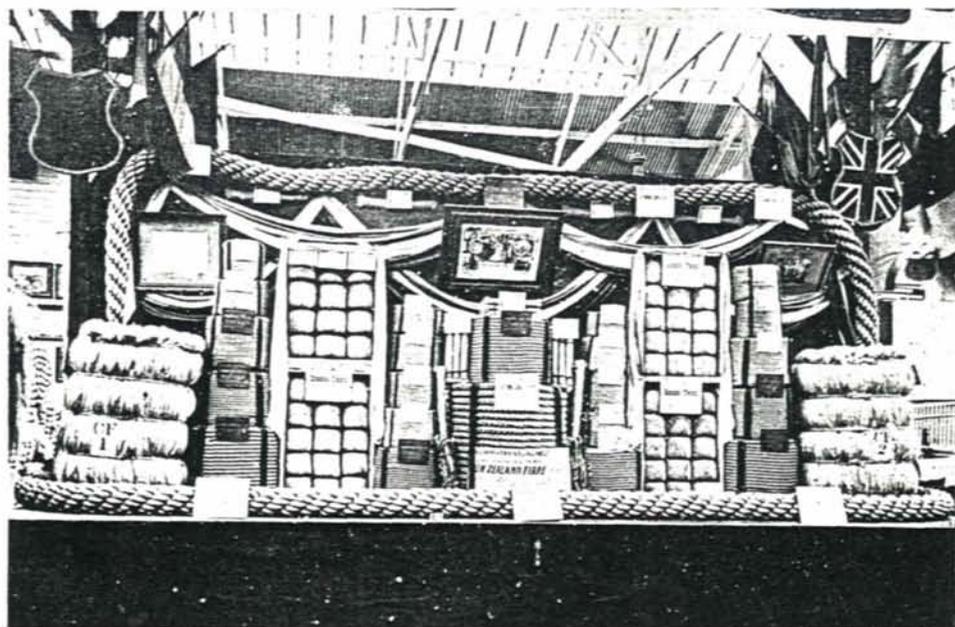


BALES OF DRESSED FLAX, AGRICULTURAL DEPARTMENT'S COURT.

quite equal to the best Manila hemp, it makes cordage of the highest strength and durability; it is largely used in America for making binder-twine; it has been converted by the Japanese into imitation silk; it has been made into paper; and it is now beginning to be used for canvas. In fact, its possible uses are multitudinous, and very wisely the Government and the millers of New Zealand are entering in earnest into the systematic cultivation of flax. Heretofore millers have confined themselves to cutting out the natural growth of the plant in the swamps, and on the plain, and alongside the lowland waterways; in future it will be cultivated on a large scale. The Maoris, indeed, set the pakehas a lesson in this respect, for in many a Native village, such as those along the banks of the Wanganui River, large clumps of the best kinds of flax may be seen, planted there for use in the making of kits and the soft woven mats which the women manufacture. And, with all his modern

appliances, the white hemp-miller has never yet been able to dress the fibre so beautifully as the old *wahine Maori* did with her little pipi-shell.

The exhibit of this valuable native product of ours—the Maori called it *muka* when dressed ready for the market; we call it commercially “hemp,” though it is commonly spoken of as “flax”—consisted of fifty-four bales of dressed fibre and tow built up in a large trophy in the court, two collections of the manufactured article, a number of native woven mats made from the best varieties of flax, and some growing *Phormium tenax* plants. The hemp came from milling establishments in the Auckland, Manawatu, Nelson, Marlborough, Canterbury, and Southland Districts, and represented the several grades from “superior” to “common.” Each bale was graded by the Government Chief Fibre Expert, and bore the necessary “tag” indicating the grade. The tow comprised samples of the various qualities packed for export. The high quality and the



ROPE AND DRESSED FIBRE FROM NEW ZEALAND FLAX, AGRICULTURAL DEPARTMENT'S COURT.

immense possibilities of this fine fibre were emphasized by the exhibit of cable, rope, and cordage and twine of various sorts and sizes, manufactured at the request of the Agricultural Department by Messrs. Donaghy and Co. (Limited), of Dunedin, and lent for exhibition by this firm. The material was all the best grade of flax, and the large ropes and other cordage made from it were remarkably good specimens of factory-work, and excited the admiration of many visitors with expert knowledge, including some business men from the United States. Nothing could have been better devised to advertise the excellent quality of the once-despised common flax-plant as a material for the best of cordage-work. Another good collection of hemp-manufactures, smaller in size but of excellent quality, was sent by Messrs. James Maddren and Sons, of Christchurch. In addition there were long hanks of soft silky fibre and specimens of Native dyed mat and cloak work in the Maori-dressed material. To complete this fine section—the best exhibit of the products of the flax-mill yet made in the colony—there was a

collection of the various machines and appliances used in flax-works, sent by Messrs. Booth, Macdonald, and Co., and Anderson's (Limited), of Christchurch; A. and T. Burt, of Dunedin; W. Fairweather, of Blenheim; and J. Barry, of Renwicktown, Marlborough. In a glass case containing Mr. Kirk's private collection of works dealing with New Zealand flax, there was a rare little book, printed seventy years ago on paper made from New Zealand *muka*. Its title-page bore the following words: "An Account of the *Phormium tenax* or New Zealand Flax, printed on Paper made from the Leaves; with a Postscript on Paper. By John Murray, F.S.A., F.L.S. London: Henry Renshaw, 356 Strand, 1836."

The absence of a working flax-mill was commented on by some visitors. Had a model State flax-mill been set up in the grounds and kept working at intervals throughout the Exhibition, not only would it have been a great source of interest to visitors—despite the screeching of the stripper—but millers themselves, especially beginners, would have benefited considerably from the practical instruction that could thus have been afforded, particularly as to the proper choice of leaves used and the finishing-off of the fibre.

The wattle grown in large quantities on the Government experimental station at Waerenga, South Auckland, is of considerable marketable value on account of the suitability of its bark for leather-tanning purposes. Specimens of this wattle-bark, whole and ground, together with the timber, in the form of poles and posts, were on exhibition.

Outside, at the rear of the Department's court, was a space of a little over an acre, enclosed for the purpose of cultivation as a garden of grasses and forage-plants. There

Grasses
and
Forage-plants. were 120 plots each 12 ft. by 8 ft., some of them planted with the agricultural and forage plants generally cultivated in New Zealand, together with a number of those regarded as useful in other countries including various kinds of sorghum and saltbush. By midsummer all the plants had made excellent growth, and some of the sorghums and millets eventually attained a height of 10 ft. These Exhibition plots were of intense interest to farmers; many of the plants were quite new to the agriculturists of New Zealand, and in consequence many applications were received for plants for experimental purposes. Mr. Kirk delivered several addresses to farmers during the season, dealing with some of the more interesting plots in the agricultural garden. It was explained that the plots were not exactly experimental, but had been prepared in order to show visitors as many kinds as possible of grasses and forage-plants grown in New Zealand, Australia, and elsewhere, so that their characteristics might be popularly known. Many of those hitherto little known in this country seemed well fitted from their luxuriant growth for cultivation here, but for some others the soil did not seem suitable. Amongst the grasses grown in the plots were the following:

Fiorin (*Agrostis stolonifera*), fodder-grass for reclaimed swamp lands and wet meadows, but of little or no use on lands where other grasses will flourish; meadow foxtail, an excellent permanent pasture-grass; crested dogstail, cocksfoot, timothy, perennial rye-grass, Italian rye-grass, New Zealand rice-grass, Golden Crown grass (*Paspalum dilatatum*), and other well-known grasses; various Australian grasses, such as native paddock-grass (not hitherto tested in New Zealand); the New South Wales bay-grass; New South Wales native love-grass (a good coarse-growing tussocky grass excellent for forage); Guinea-grass; two South African grasses—the Natal red-top and Rhodes grass; Red canary-seed from North America; and seven different kinds of fescues, valuable constituents of sheep-pasturage, including the well-known Cheving's fescue, so useful as a sheep-food in high-lying and poor country (this grass is peculiar to New Zealand), and described as a sport from one of the forms of our native fescue (*Duriuscula*, Hook.); several different kinds of oat-grass, including New

Zealand oat-grass, prairie-grass, largely grown in the southern parts of the United States, and buffalo-grass from America—a grass which, in the opinion of the Agricultural Department, should command more attention from New Zealand farmers than it does, especially in the warmer districts, as a succulent and highly nutritious stock-food; Canadian blue-grass; Texas blue-grass, and several other kinds of poas. The useless and even noxious sweet vernal (*Anthoxanthum odoratum*) was included as a specimen of a grass that should be discouraged by farmers as much as possible, as it is immensely damaging to pastures in New Zealand by crowding out useful grasses. Two useful sand-binding grasses, the sea lyme-grass and the sea-tussock, were also amongst the collection. Of leguminous forage-plants there was a highly useful red clover, a white clover, and a number of other trefoils, including two hitherto unknown in New Zealand, such as the Egyptian clover (*Trifolium alexandrinum*), the principal green forage and hay crop grown in Egypt. A good plot of lucerne of excellent growth was shown. Amongst the legumes an interesting plant was the Florida velvet bean, a trailing plant with long vines, a native of India and of great value as a forage; and serratella (*Orifopus sativus*), an annual from 12 in. to 18 in. high, cultivated in many parts of Europe on high sandy ground. Of sorghums eleven kinds were shown. Sorghums, it was explained, are divided into two groups—those which contain little or no sugar and those which have from 10 to 20 per cent. of saccharine material. To the former belong dura, Kaffir-corn, and chicken-corn, and of the latter the best-known variety is the Early Amber sugar-cane. None of these sorghums are much cultivated in New Zealand, as maize, which closely resembles sorghum, is much preferred by agriculturists. The sorghum shown included the sweet sorghum, growing 8 ft. high; the Early Amber cane of equally luxuriant growth; Egyptian corn, an abundant fodder-plant 2 ft. to 3 ft. high; the Hungarian, African, and Japanese millet, and evergreen broom-corn and golden broom-corn millet. Amongst the various other plants shown as useful for stock-foods were rape, thousand-headed kale, Jersey kale, kohl-rabi, drumhead cabbage, turnips, and white mustard. Several kinds of saltbush, valuable only on poor arid land, were shown in the plots. One of these, the creeping saltbush, has been the one most grown in various parts of the world, particularly in the United States, where it grows well on lands containing large percentages of salt; all the most useful kinds are natives of Australia. Of miscellaneous plants included in the garden there were specimens of Cape barley, rye-corn, chicory, linseed, buckwheat—regarded as a very useful plant to grow on poor lands—and esparto grass, grown chiefly for paper-making.

Another interesting and educative feature of the Agricultural Department's exposition was the working apiary, occupying a site of a quarter of an acre adjoining the grass-garden. This model bee-garden was designed, laid out, and equipped by Mr. I. Hopkins, Government Apiarian, and stocked with twenty colonies of bees presented by Mr. E. Richards, of Waiheo Downs, South Canterbury. In the garden was a neat building containing an up-to-date extracting-room and a tinning and storing workshop, with fumigating-chamber attached. To beekeepers, this model apiary, and the practical exhibitions given of bee-hiving and honey-making were of exceeding utility. The honey business is of great value to the colony, more valuable than most New-Zealanders are perhaps aware. It is estimated that during the Exhibition year 1906-7 over 2,000,000 lb. of honey were produced in New Zealand. The output was approximately 850 tons of honey and 25 tons of wax, which, at 4d. and 1s. 3d. per pound respectively, would be of a total value of something over £35,000. Mr. Hopkins, in his report to the Department for 1907, says that at the present rate of progress he expects to see the output trebled in three or four seasons. The largest New Zealand bee-farm is one at Masterton, which last season yielded 32 tons of honey from 750 colonies of bees. The bees in the Department's garden were housed

**Among
the
Bees.**

in hives of an up-to-date type, one with glass to show the bees at work, and by way of contrast some of the old-fashioned straw hives were exhibited close by. During the Exhibition season practical demonstrations covering all operations of beekeeping were given by Mr. Hopkins or by his assistant, Miss Livesay. These were watched with great interest by beekeepers, some of whom took a systematic course of instruction; four ladies passed the prescribed examination entitling them to a certificate of proficiency.

In the Department's court in the Exhibition there was a comprehensive exhibit connected with the beekeeping industry. It included honey from all parts of the world, all kinds of beekeeping appliances, literature relating to bees, and a set of charts of the anatomy of the honey-bee. The principal feature of this exhibit was a stand of honey and wax produced at the Exhibition apiary, both of good quality. Some of the honey was put up in 2 lb. tins labelled with a view of the apiary. The sign "State Apiary," surmounting the stand, was worked in honeycomb by the bees in the apiary.

The efforts which the Government Agricultural Department is making to further the poultry industry in the colony were illustrated by a very complete display of requisites in connection with the breeding of birds. The exhibit was under the charge of Mr. F. Brown, Assistant Poultry Expert, and the great number of inquiries he received from poultry-raisers concerning the scientific methods of breeding was a proof of the educational value of the Department's show.

The Poultry Industry.

The Poultry Division of the Agricultural Department does a great deal in the way of lectures and demonstrations by experts and the circulation of pamphlets and handbooks to assist growers in specialising and in raising the most profitable strains of poultry. The Government has model poultry-farms at Ruakura, Moumahaki, Burnham, and Milton. The Poultry Division display at the Exhibition included hot-air and hot-water brooders shown in full work, and hot-air and hot-water incubators, models of standard poultry-houses and brooders, trap-nests, force-feeding machines, bone and grit mills, drinking-fountains, &c. The majority of these appliances, representing the most up-to-date requisites in connection with this industry, were lent by local agents for the manufacturers. An exhibit of frozen poultry packed for export was shown in a glass-framed refrigerated chamber during the course of the Exhibition. In the Exhibition grounds there was a model poultry-yard, with incubators, breeders, and all kinds of poultry appliances and foods. In a hall inside the main building patent egg-carriers were shown. The private exhibitors in the poultry section were Messrs. Wickes (Limited), Greymouth, and the Dawson Patent Egg-carrier Company.

During the Exhibition season the Agricultural Department distributed many thousands of pamphlets, leaflets, and handbooks on various agricultural subjects; and there was a great demand on the part of the visiting public for information on the scientific methods of fruit-growing and poultry-keeping, beekeeping, flax-cultivation, and grape-growing. An illustrated pamphlet entitled "Agriculture in New Zealand" was specially prepared by Mr. Bisset for distribution at the Exhibition.

In connection with agriculture, the Canterbury Agricultural and Pastoral Association conducted interesting shows and experiments during the currency of the Exhibition. There were monthly shows of fat sheep and fat lambs, prizes for which were given respectively by the Christchurch Meat Company and the Canterbury Frozen Meat Company. The prize lambs were exhibited in the frozen state in a glass-walled refrigerator, which formed part of the display made by the latter company. A series of interesting experiments in potato-growing with various kinds of fertilisers were held in a portion of the grounds at the rear of the Exhibition Buildings. These experiments were of considerable value to agriculturists.

THE MINES COURT.
NEW ZEALAND'S MINERAL WEALTH.

New Zealand possesses nearly every mineral known to science. It is particularly rich in such valuable minerals as gold and coal, and the fact that only a small portion of the known auriferous areas and other mineralised belts have yet been developed justifies the belief that the mining industry is capable of enormous expansion. Already, however, it possesses the most productive gold-mine and the third most productive colliery in Australasia. The gross value of all minerals produced in the colony during the year 1906 amounted to £3,871,811, which was very nearly a quarter of a million in excess of the output of 1905. Of this total the gold-mines contributed £2,270,904 in gold, and £169,484 in silver.



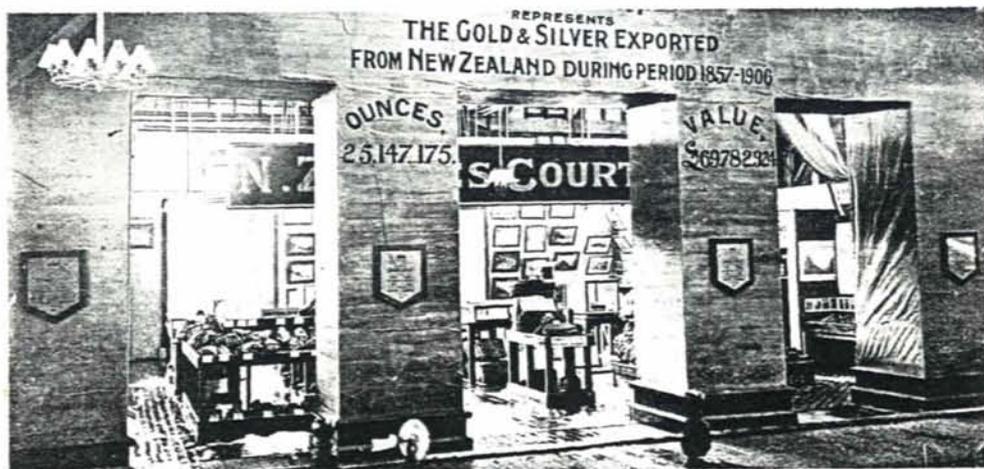
THE MINES COURT.

The immense variety of the metals and minerals that lie beneath the surface of these Islands was exemplified in the large court of the New Zealand Mines Department, which was located at the northern end of the Exhibition Buildings, and directly opposite the New Zealand Railways exhibit. Though not quite a complete collection of the known minerals of the country, it was an attractive display of the treasures of the rocks, and the excellent methods adopted in its arrangement added greatly to its educative value. The collection of minerals in the court would have been more than doubled had the various provincial specimens been concentrated here, but each province showed its mineral productions in its own section; Westland in particular provided a splendid museum of its mineral riches that almost equalled that of the Mines Department. Accordingly, the description of the Mines Court which follows should

be read with those of Westland and other courts in order to gather a really comprehensive idea of the present economic importance and future possibilities of the New Zealand mineral belts.

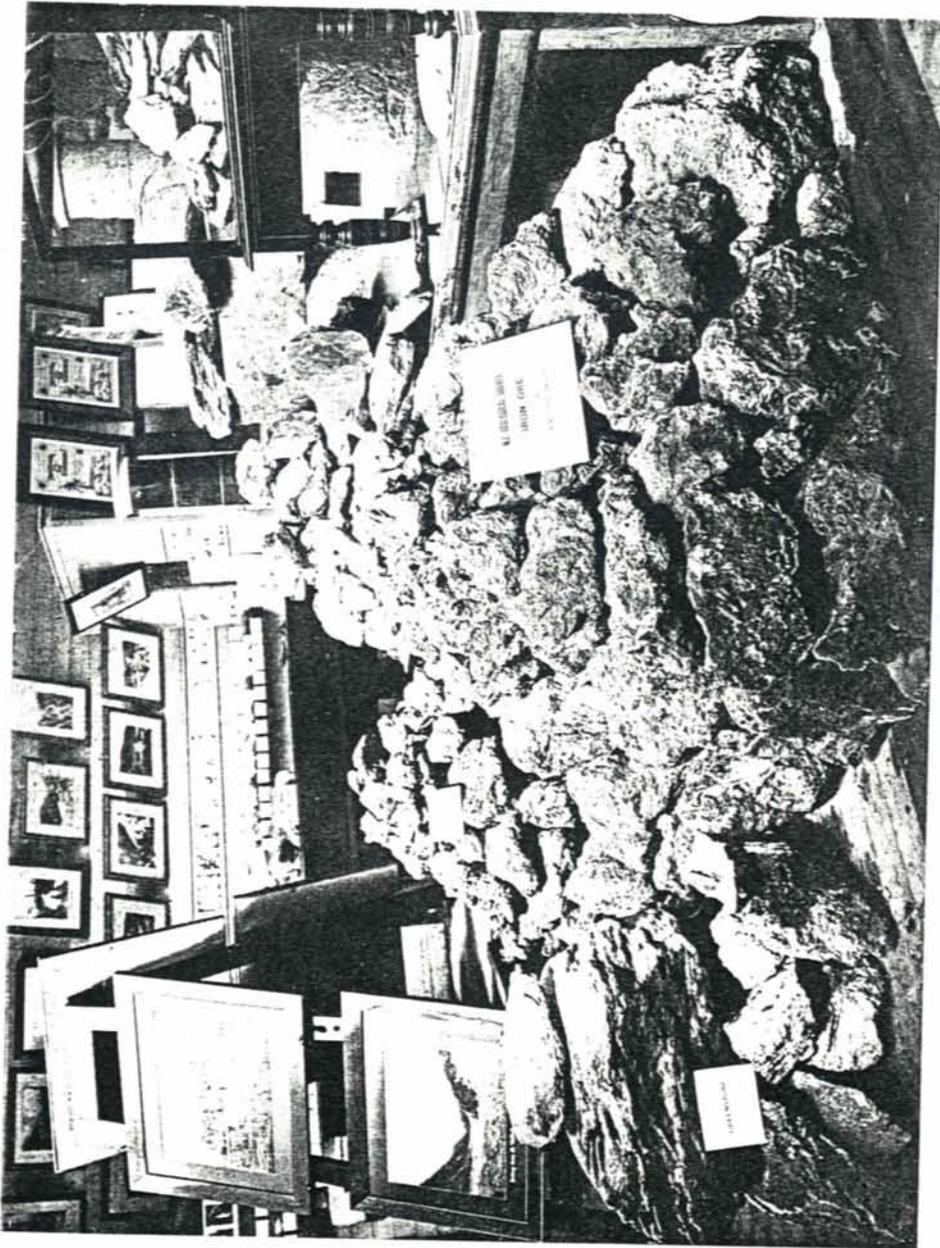
Very fittingly the enormous wealth won from the goldfields of New Zealand was the first thing emphasized in the arrangement of the Court. The visitor, turning to enter the court, saw before him a great gilt monolithic structure covering

Gold. ing the frontage of the court, pierced by three doorways, and bearing the inscription in bold lettering: "This trophy represents the gold and silver exported from New Zealand during period 1857-1906. Ounces, 25,147,175. Value, £69,782,924." Within the court there were cases and stands full of all kinds of mineral specimens, and geological maps and mining photographs adorned the walls. Gold-quartz specimens bulked very largely, and very completely epitomized the great auriferous fields of the colony. Naturally, prominence was given to a large collection of gold-bearing ores from the famous Waihi Mine, Ohinemuri, the premier gold-mine in Australasia, which has (up to the time of writing) produced nearly £6,000,000, and is



ENTRANCE TO THE MINES COURT: THE GOLD TROPHY.

winning gold at the rate of over £60,000 per month. The low-grade ores, which the Waihi Company has treated with such great success, were exhibited in considerable bulk. An exhibit of particular interest from this mine was one showing the peculiarities that are distinctive of thermal siliceous deposits, and demonstrating the method by which the Martha Reef and other master lodes in the Waihi Company's ground had been formed. Other quartz masses that exhibited the characteristics of thermal quartz were several auriferous and argentiferous specimens from the Komata Reefs—a mine that has produced over a quarter of a million's worth of gold. There were good collections from various other important quartz-mines on the Hauraki goldfields, including rich displays of ore from those great mines in the Karangahake Gorge, the New Zealand Crown Mines and the Talisman. The stone from the Talisman Reefs gave 50 oz. of gold and 63 oz. of silver to the ton. The Waihi Grand Junction, which promises to be a rich gold-producer, was represented by a fine display of specimen ores. Amongst the other samples from various parts of the Auckland Province were specimens of the rich but refractory ores from Waiomo Creek, on the Coromandel Peninsula, and Te Aroha.



SPECIMENS OF IRON-ORE, FROM PARAPARA, NELSON : MINES COURT.

In a recess on the right were a number of very rich specimens of quartz from the Waio-tahi Mine, at the Thames, which has produced over £600,000 worth of gold. In the recess on the left were specimens from two other Thames mines, the Omahu and Occidental.

On the north side of the court there were table-cases filled with hand-specimens of the rocks of the gold-bearing Moehau (Cape Colville) Peninsula and the Hauraki Mining District. These were representative of nearly all the various kinds of rock on the Peninsula, of different ages from Devonian to Pliocene. The oldest rocks in this collection were those of the Tokatea Range, Coromandel, on which are situated the Royal Oak and Tokatea Mines. The rocks shown were duplicates of those described by Professor Sollas, of Oxford University, in the work "Rocks of Cape Colville Peninsula." The remainder of the collection was exhibited in cases on the southern wall of the court, and on a shelf were also shown samples of the different forms of ordinary auriferous quartz, siliceous sinter, &c., in the Hauraki goldfields. These it was at first thought would have been shown in contrast with the different samples of quartz from the Westland mines and other parts of the South Island, but the materials not being available the idea was not carried out. However, the visitor interested in gold-mining was able to study the West Coast ores in the excellent mineral section of the Westland Court in the Exhibition. On the walls of the court there were shown a series of photo-micrographs illustrative of the rocks of Cape Colville Peninsula and the Hauraki goldfields that were displayed in the glass cases. These photo-micrographs, which were originally taken by Mr. Alexander McKay, Government Geologist, to illustrate the work on the rocks of Cape Colville Peninsula by Professor Sollas, were directly from the rock-slice without after-enlargement. Amongst other goldfields exhibits there were shown under glass valuable samples of alluvial and reef gold from all parts of New Zealand. A special exhibit of this nature represented the product of the Golden Point Gold and Tungsten Mine at Macrae's Flat, Otago, which had up to the date of the Exhibition yielded gold and scheelite to the value of £44,000.

Amongst the New Zealand gold-mining companies which contributed exhibits of quartz, &c., there are some wealthy dividend-payers, led by the great Waihi, which had up to the end of 1906 paid dividends of very nearly two millions and a quarter sterling, and which spends about £1,000 a day in the Dominion in wages and other ways. In 1905 the Waio-tahi Mine, Thames, struck a patch of very rich stone, and paid about £51,000 in dividends. In the same year four companies in the Hauraki Mining District paid over £400,000 in dividends. In the Inangahua District, adjoining Westland, the dividends paid by quartz-reefing companies between 1881 and 1905 inclusive totalled £734,200, as against £486,220 paid-up capital. The group of Reefton mines worked under the management of the Consolidated Goldfields of New Zealand had up to the beginning of 1906 distributed £125,487 in dividends, and its offshoot, the Progress Mines, had paid £226,875 in dividends. Another dividend-payer is the Keep-it-Dark Mine, Reefton, which had paid up to the end of 1905 £145,666. Some of the numerous dredging companies working the golden-sanded rivers of Otago have also returned their investors a rich harvest. In 1905 those listed on the Dunedin Stock Exchange paid £102,446 to their holders. The Electric Dredging Company, for the period it had been working, returned up to the end of 1905 £116,350 on a paid-up capital of £26,000; the Hartley and Riley, over £79,625, as against £6,300 capital; the Manuherika, £26,700, as against £6,000; the Golden Gate, £23,250, as against £2,500; the Moa, £22,700, as against £6,000; the Pactolus, £20,937, as against £8,125; the Matau, £15,225, as against £6,200; the Perseverance, £13,500, as against £1,500, and the Otago, £11,875, as against £2,000. These, however, are cited as exceptional examples of successful dredges.

Next to gold in importance came the coalfields. During the year 1906 New Zealand's collieries had an aggregate output of over a million and a half tons of coal. There were exhibits of excellent coal from the State mines on the west coast of the

South Island—Seddonville, near Westport, and Point Elizabeth, near Greymouth. In the exhibit from Seddonville the nuts and slack, the results of screening, were

**Coal
and
other
Minerals.**

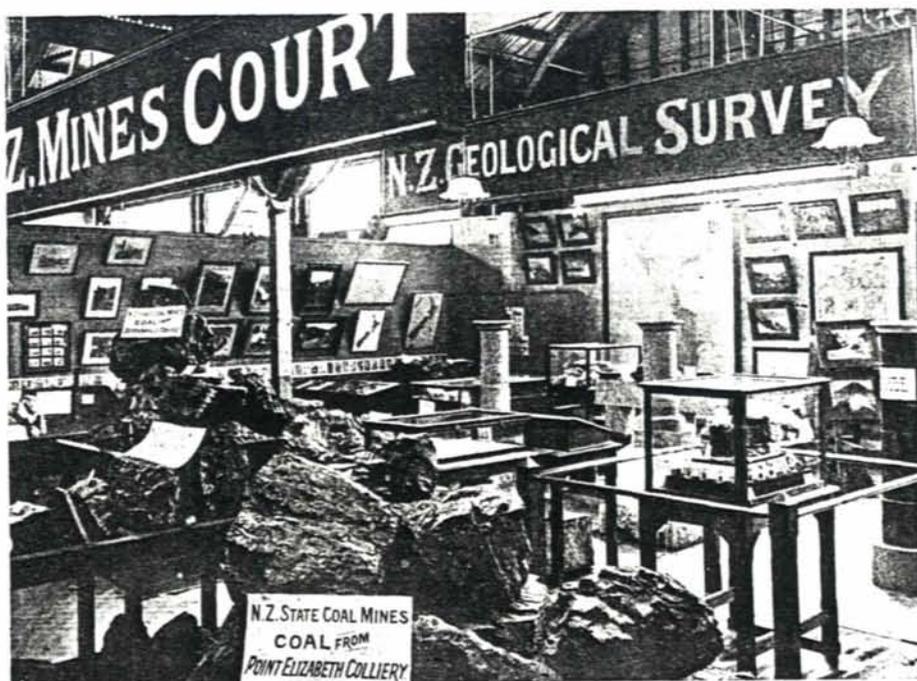
also shown. Between the two main exhibits were several samples of coal from the Point Elizabeth field, from recently discovered seams of a highly bituminous nature. Near the east wall of the court there was a collection of coal from the Pakawau Mines, Collingwood, in the Nelson Provincial District. Near the entrance was shown on a table an exhibit of magnetic ironsand from the Taranaki beaches. Iron is one of the colony's most valuable mineral possessions, and it is probable that great foundries will be at work in the near future converting into steel the immense quantities of ore at Parapara, in Nelson, and the heavy black sand that covers the west coast beaches for scores of miles. Copper, in which New Zealand abounds, was represented on benches on the southern side of the court by samples of copper-ores and native copper from the Champion and United Mines, Nelson; from Moke Creek, near Lake Wakatipu, Otago; from Maharahara, Hawke's Bay; and from Whangaroa, North Auckland. Other valuable minerals of which specimens were shown were antimony-ore (stibnite) from the Golden Treasure Mine at Reefton and elsewhere; chromate of iron from Nelson; oil-bearing shales from Orepuki in Southland and Cambrians in Central Otago; galena from Te Aroha; a slab of jasper from Ohinemuri County, South Auckland; a block of chalk from the Eyre River, Oxford, Canterbury; lithographic stone of good quality from the Chatham Islands and from Mangonui, North Auckland. An exhibit characteristic of the volcanic districts of the North was some obsidian or volcanic glass from Mayor Island, in the Bay of Plenty. This island contains huge masses of obsidian, called by the Natives *tuhua* or *mata-tuhua*, and so celebrated was it on this account amongst the Maoris, who used volcanic glass for a variety of cutting purposes, that it was given the name Tuhua. There was an exhibit under glass of diatomaceous earth from Banks Peninsula, Canterbury. This earth is found in many parts of both Islands of New Zealand, and will no doubt be largely used in the future for the manufacture of dynamite, polishing-powders, &c. The sea-beaches of some parts of North New Zealand are very rich in glass-making sands of the finest quality. There was an exhibit of these sands from Parengarenga, near the North Cape. These sands are obtained from decomposition of quartz diorites, which are abundant over a great part of the Mangonui and Hokianga Counties.

In building-stones, the Department showed a fine block of the hard and very beautiful stone known as Coromandel granite, which occurs in massive dykes on the Moehau Range, Cape Colville Peninsula. A fine example of this building-stone was also to be seen in the Auckland Court. A somewhat similar stone came from Ruapuke Island, in Foveaux Strait. The various kinds of building-stone which are to be found in the neighbourhood of Pencarrow Heads and round the coast of Palliser Bay were illustrated by a sample collection. There were several large pieces of rough unhewn granite from the Hokitika district. A remarkable exhibit, reminding one of the remote days when the whole of the Auckland isthmus was in a state of volcanic activity and when scores of fire-cones threw out their streams of lava on the Tamaki Plain, was a volcanic bomb found near Mount Eden, the crater-topped green hill that rises immediately in the rear of Auckland City.

On the walls of the court there were maps and photographs illustrative of the progress of mining in the colony. Enlarged photographs showed various phases of mining, coal-mines and coal-hewing, gold-mines and gold-winning machinery, &c. The geological map of the colony on two sheets, one for the North Island and the other for the South Island and Stewart Island, by Sir James Hector, late Government Geologist, showed the distribution of the various rock-formations and also the location of the known minerals, each indicated on the map by an appropriate symbol. Various geological

sedimentary formations were distinguished by colour, as cenozoic, mesozoic, palæozoic, azoic, and the igneous rocks, as volcanic and plutonic, acidic, and basic. The sheet of sections accompanying the map showed the position of the different formations in vertical relationship. On the northern wall of the court there was a large scale plan of the Waihi and adjacent gold-mines.

The New Zealand Geological Survey, of which Dr. J. Mackintosh Bell is Director, had an exhibit in this court, but distinctive from that of the Mines Department generally and from the Geological Survey prior to 1904. This exhibit was an epitome of Dr. Bell's geological explorations in the new Dominion since his arrival here from Canada; most of these explorations have been carried on in the Westland District. Most of the rock-specimens and minerals shown came from the West Coast. In front of the exhibit, to the right and left, there were columns of polished granite



IN THE MINES COURT.

from the country which Dr. Bell includes in the Hokitika Sheet of his Westland survey. On a table-stand were shown quartz from the Taipo River and a polished lintel of granite on two short rough-hewn columns of the same material; surmounting this lintel were slabs of polished serpentine, a mass of nephrite (greenstone), and two slabs of polished limestone from Koiterangi, between Hokitika and the Southern Alps. In two show-cases under glass there were samples of the rocks of the Westland District, including schist, talc, serpentine, garnet schist, serpentine schist, actinolite rock, serpentine-quartz schist, and greenstone. The valuable iron-ore of Parapara, Nelson, was shown in bulk in the form of two pyramids piled on the floor, and a pile of the crystalline limestone suitable for fluxing this iron-ore was also shown.

On the back wall of the court were two large scale-maps showing the various quadrangles into which Dr. Bell has divided the country for the purposes of his geological survey; between these was the Hokitika Sheet of the North Westland Quadrangle, on which the work already done was indicated by a dark tint. Dr. Bell also showed a large number of enlarged photographs of Westland's mountain, forest, and lake scenery, showing the kind of country encountered in the course of his geological work.

The Mines Department exhibit had been displayed by Mr. C. H. Pierard, draftsman, Mines Department, and was in charge of Mr. Alexander McKay, F.G.S., Government Geologist.

At the back of the Main Exhibition Building the Analyst of the Mines Department, Dr. Maclaurin, had a small detached building in which he conducted during the course of the Exhibition a number of the ordinary mining assays and analyses necessary in gold-mining and other branches of the mining industry. There were three rooms in the building—a furnace-room for the ordinary assays of gold and silver, a coal-assaying room, and a balance-room for the weighing of samples. Amongst other apparatus provided was that used in testing the calorific value of the different kinds of coal.

Outside and in rear of the Main Building the State Coal-mines Department had a large replica of a subterranean coal-working, in which every detail as closely

A
Model
Coal-mine.

as possible resembled the actual appearance and actual working-conditions of a coal-mine. This structure covered an area of nearly an acre; the drive was 130 ft. long. In the drive rails were laid down with trucks thereon, and all the details, even to the coaldust and the dimly lighted drive and face of the workings, were such as to give the visitor a thoroughly good idea of the kind of place in the underworld that his steam-fuel and his household coal come from. All the roadways in the model coal-mine were over 6 ft. in height, and could therefore be readily traversed. As the system of work known as the "bord-and-pillar" is general in New Zealand collieries, this method was chosen for illustration in the model mine. On the right-hand side of the main haulage-road, which the visitor entered from the road immediately in rear of the Exhibition Buildings, there was a parallel road known as the "return airway," from which working-places or "bords" were shown as driven in the solid coal. The first "bord" showed the method of "holing" or undercutting at the working-face, with the overhanging coal supported by sprags for the miners' safety. Another "bord" showed preparations for blasting in the form of a side-cut. An illustration of the manner in which the coal forming the "pillars" supporting the roof of a coal strata is worked out was given on the opposite side of the main haulage-road. The safety of the miners as the coal "pillars" are extracted is provided for by the use of rows of props, sometimes by "chocks" or "crib-logs," and also by "pack-walls," built with the *débris* from the roof of the workings in conjunction with the use of "props" or "chocks," or "props" alone. Another interesting feature of the model colliery showed how ventilation was provided for in mines. The air-current, coming through the main haulage-road to the inner branch roadways, was then divided, a portion flowing in each direction. The current which ventilated the right-hand-side workings was directed by means of brattice-work, and travelled out by the first door to the ventilating-fans. The current through the left-hand section had to cross the main air-current at right angles on its way to the fan. This was effected by an air-bridge, known as an "air-crossing" or "overcast." The fan used for ventilating was of a type specially designed to suit the requirements of New Zealand mines. Haulage arrangements were shown by a representation of an endless rope, to which the trucks were attached by means of lashing-chains. Outside the mine there was a working-model, one-fourth actual size, of an up-to-date coal-screening plant, which separated the coal into four distinct classes—lumps, nuts, peas, and dust slack—at one operation.

MACHINERY HALL.

(WITH PUBLIC WORKS AND RAILWAY COURTS.)

The great Machinery Hall at the north end of the building was a complete museum of modern means of locomotion, of mechanical appliances, and general machinery of an up-to-date character, all triumphs of scientific engineering, and of the methods of dealing with some of New Zealand's staple products. The largest exhibit was that of the Railways Department, whose locomotives and trains and other exhibits filled nearly the whole of the two northernmost bays. Then there were the Courts of the Mines, Defence, and Prisons Departments on the east side; the model viaducts and other exhibits of the Public Works Department, and a very large display of machinery of a most varied character.

A space of 75 ft. by 20 ft. was occupied by the Government frozen-produce room and refrigerating machinery. This interesting exhibit included four refrigerating-machines and a gas-engine, an ice-tank capable of making half a ton of ice per day, and a produce-room, in which samples of the frozen produce exported from New Zealand, such as butter, meat, poultry, &c., were shown in such a manner as to be readily inspected by passers-by.

In the south-west corner of the hall was the electric-lighting-plant installation of the Exhibition. The machinery consisted of two compound engines, one of 120 indicated horse-power and the other about 175 i.h.p., the larger one running a 110-kilowatt generator and the other a 75-kilowatt generator; a self-contained electrical generating set comprising a Bellis engine and a Thomson-Houston generator of 75 kilowatts; a 35-kilowatt balancing-set, and a switchboard 19 ft. long by 18 ft. high, with all necessary instruments. Then there was a maze of machinery all polished and glittering, wonderful to look upon. Near the Mines Department Court there was a good display of machinery and appliances used in the manufacture of butter and cheese. There were oil-engines, gas-engines, traction-engines, woodworking-machines, electrical exhibits of all kinds, wool-scouring apparatus, a display of printing machinery and lithographic work; incubators, bicycles and motor-cycles, and a splendid parade of motor-cars, a delight to the eye in their beauty of finish and their luxury of furnishings.

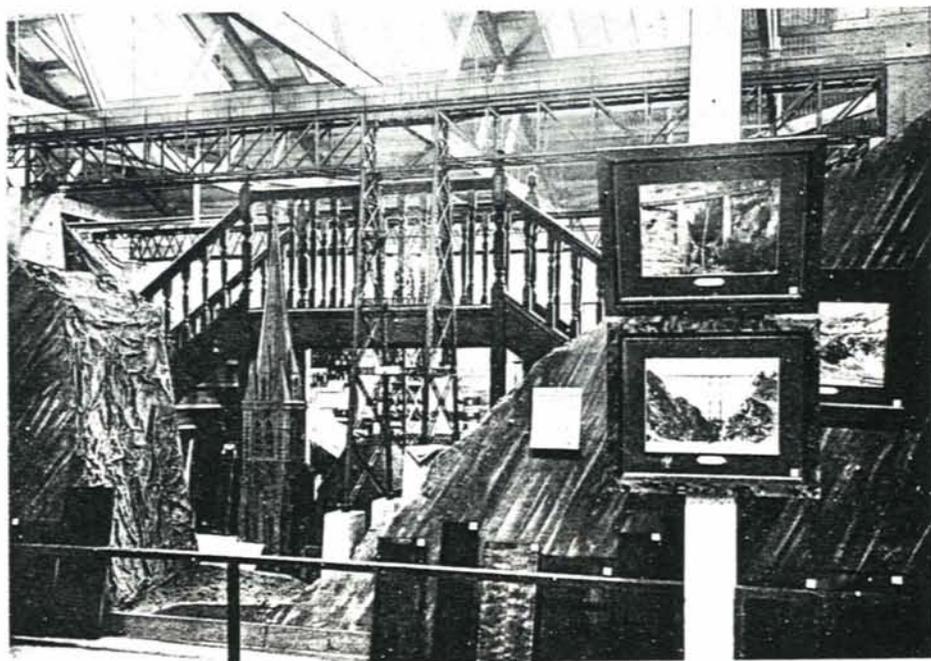
PUBLIC WORKS DEPARTMENT.

No section of the Exhibition told a more eloquent story of industrial and engineering progress and triumph over great natural difficulties than the fine exhibit of models shown by the Public Works Department. The Department's most important work is the building of the Dominion's railroads, and in its display in the Machinery Court a special feature was made of excellent models of the great engineering-works in the form of viaducts constructed either under its supervision or by its own workmen on some of the principal railway-lines in both Islands.

The principal engineering exhibits shown were the models of the great Makohine Viaduct on the North Island Main Trunk Railway, and the Staircase Gully Viaduct on the Canterbury - West Coast Railway. The models were exact to the smallest detail. The scale on which they were constructed was half an inch to the foot. The Makohine Viaduct, over which railway-trains run on the southern portion of the Main Trunk line, is 237 ft. above the bed of the Makohine Creek, occupying a very deep and narrow gorge, similar to the many other river-gorges on this line, which are mainly responsible for the delay in its completion. The viaduct consists of five spans; the outside spans are each 40 ft., the centre span 176 ft., and the other two 247 ft. each, making a total length of 750 ft. The Staircase Viaduct is 237 ft. above the water-level, and consists of four spans, two of 192 ft., one of 60 ft., and two of 36 ft. Alongside the model of the

Staircase Viaduct was a model of the Christchurch Cathedral, done on the same scale as the viaduct; this gave an excellent idea of the great dimensions of the railway engineering-work. The top of the cross on the Cathedral is 215 ft. above ground-level.

Another interesting railway exhibit, illustrating the engineering difficulties which are being so skilfully overcome on the North Island Main Trunk line, was an excellent relief map of the Raurimu Loop, 109 miles north of Marton. The configuration of this rugged country in the Waimarino forests necessitates the railway-line doubling right round, tunnelling under itself, and forming a complete circle in ascending from Raurimu to the plateau above. From Raurimu Station to Waimarino, seven miles, the height ascended is 714 ft. (Waimarino Station is 2,636 ft. above sea-level). At this ingenious railway spiral it takes four miles and a third of rail-line to advance in a straight line



THE PUBLIC WORKS DEPARTMENT'S EXHIBIT: MODELS OF VIADUCTS, &c.

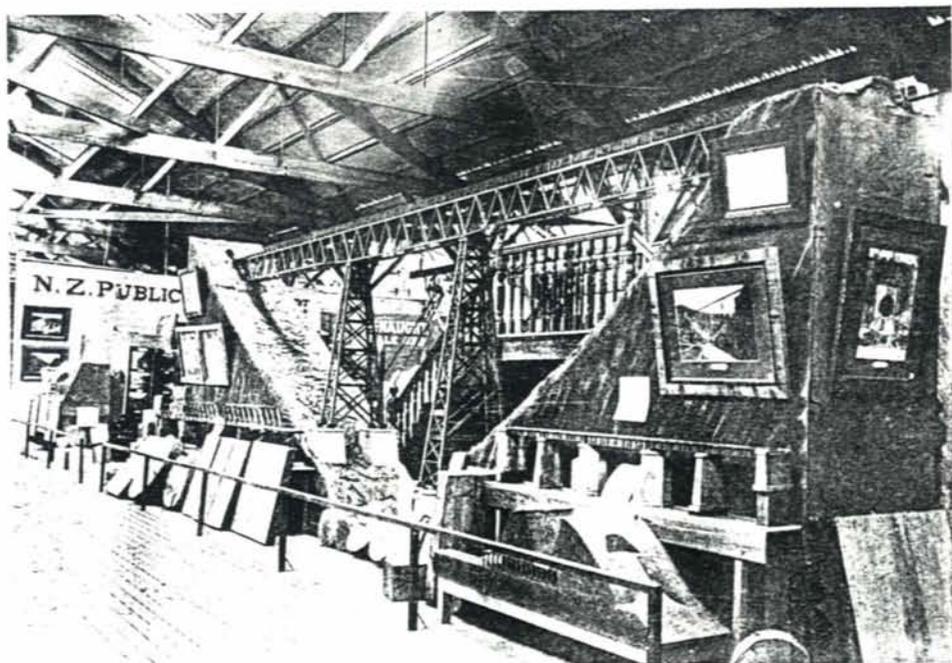
a mile and a quarter; the ruling grade of 1 in 50 is preserved. Another striking feature of this great engineering-work is the huge earthworks. One of the embankments on the spiral is 110 ft. high, another is 90 ft., and there are two tunnels.

The method of tunnelling adopted by the Public Works Department in building this railway-line was illustrated by a model tunnel under construction, showing timbering, bricking, and concreting in progress.

Some fine specimens of various New Zealand timbers were shown. These comprised about forty different woods, some in the rough and some sawn and polished. A great kauri-pine trunk was 7 ft. clear through the bole; a totara plank measured 3 ft. across. Some beautiful figured kauri, rimu, and puriri were used in a small staircase and platform, which had been constructed in order to enable visitors to easily view the models of the Railway Viaducts.

Specimens of all the good building-stones which the Dominion produces were also shown. These included such splendid granites as those of Tonga Bay, Nelson (the stone which is being largely used in the new building of the Public Trust Department in Wellington City), some hard shell marbles, the celebrated Oamaru building-stone, and the hard blue volcanic stone which is plentiful in and around Auckland. There were all colours in these stones, from cream and grey to red and green and a slaty blue.

A model septic tank was shown ready for use, fitted up by the Department according to the most modern designs of sanitary engineering.



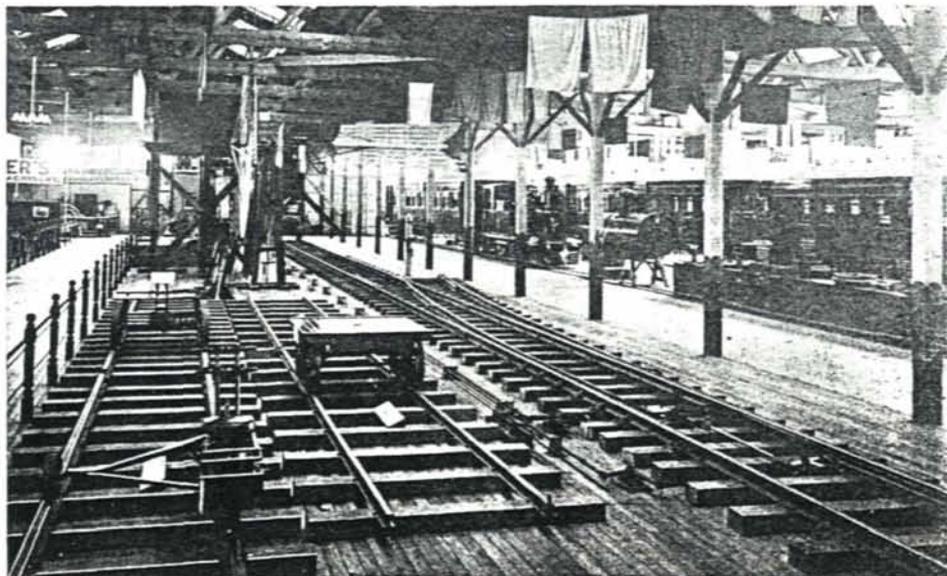
A RAILWAY VIADUCT MODEL, PUBLIC WORKS DEPARTMENT'S COURT.

THE RAILWAY DEPARTMENT.

The display of railway plant of all descriptions made by the New Zealand Government Railways was the dominant feature of the Machinery Hall. It was a magnificent demonstration of New Zealand's self-reliance and progressiveness in the world of mechanical engineering, a practical proof of the excellence of colonial work in locomotive-building and in every other branch of railroad-work. State control of the railways has been a sound success in New Zealand, and the policy of the Department is in the direction of doing as much of the mechanical work as possible in its own workshops in preference to importing. For many years past there have been large workshops at Newmarket (Auckland), Petone (Wellington), Addington (Christchurch), Hillside (Dunedin), and elsewhere, and here a great deal of excellent work in the form of not only railway-carriages but locomotives is annually turned out by the expert workmen of the Department. There are nearly 2,500 miles of State railways open in the Dominion, and over ten thousand men are employed by the Department on the various lines and

in the big workshops. While primarily serving the purpose of opening up the country and of providing indispensable means of intercommunication, and while affording the public moderate passenger and freight rates and making liberal concessions to the farming population, the railways bring a substantial sum into the Treasury every year. For the Exhibition year, 1906-7, the gross revenue of the Department amounted to £2,624,600, and the net revenue to £812,118—equal to 3·45 per cent. on the capital cost of the railways.

The exhibits of rolling-stock, permanent-way, and railway appliances occupied a fourth of the whole area of the Machinery Hall, and were situated in a block near the northern end of the hall, extending from the rear almost to the front wall. Almost



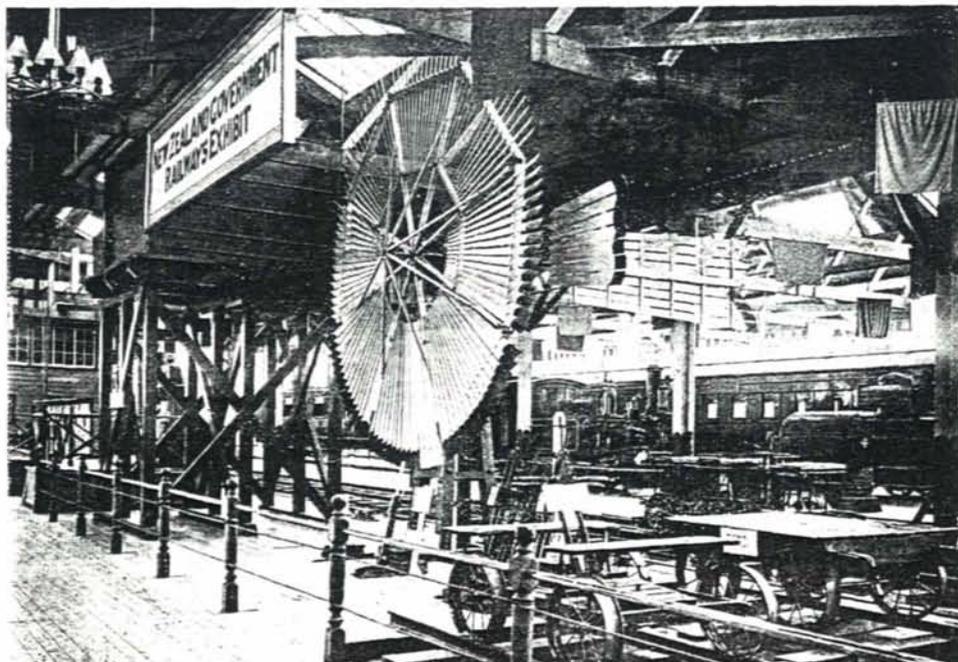
GOVERNMENT RAILWAYS SECTION : IN THE MACHINERY HALL.

every item and article shown, even to the huge locomotive and beautifully finished passenger-cars were manufactured in the railway workshops of the Dominion.

A fine locomotive turned out by the Addington Railway Workshops and shown at the eastern end of the section was the third of that class built in the Government railway workshops, and of that type the largest yet built south of the Line. This locomotive was a four-cylinder balanced-compound 4-6-2 type, adapted to New Zealand's narrow gauge. Its dimensions were as follows : Diameter of coupled wheels, 4 ft. 6 in. ; cylinders, diameter, high-pressure 12 in., low-pressure 19 in. ; stroke, 22 in. ; working steam-pressure, 225 lb. per square inch ; weight in working-trim, 72 tons ; tractive power, calculated at 80 per cent. of boiler-pressure, equalled 17,440 lb.

Near by this engine were displayed materials used by the Railway Department in various stages of conversion into finished parts ; and amongst them were a sample of riveted boiler-plate showing how the rivets bound these plates together ; a crank-axle for large engines—a forging weighing 12 cwt.—shown in a semi-finished state, also a forging for one of the coupled axles ; iron forgings and castings of various kinds in steel, iron, and brass from high-pressure cylinders down to window-fastenings for railway-cars.

The various stages of wheel-making were well illustrated by good examples from the railway workshops. A boiler for a Single-Fairlie locomotive, made in the railway workshops, was also shown, and close by stood a great block of faggoted scrap-iron partly welded up, showing what a forging looks like in its earlier stages. Types of each kind of rolling-stock used on the Government railways were shown. There were passenger-cars, first and second class, of the most careful make and finish. The first-class car was fitted with "walk-over" seats and panelled within with puriri timber. Each car was 50 ft. long over all. A bogie brake-van of the same length was shown with an area for luggage-storage of 225 square feet. A bogie horse-box, capable of carrying four horses, was shown; also a specimen of a frozen-meat bogie-van capable of carrying 350 carcasses



THE GOVERNMENT RAILWAYS EXHIBIT.

of frozen mutton. An opening in the wall of this wagon illustrated the method of insulation: the wall had three skins; between the inner pair of walls was an insulation composed of heat-resisting paper, felt, and slag wool, an air-space being provided between the outer and middle walls. Other types of rolling-stock shown were the large wagons used for carrying sheep, cattle, timber, coal, and merchandise. Everything gave evidence of good and careful workmanship, and every part was well and neatly finished.

A motor-train was exhibited; this consisted of a large 60 ft. bogie-car attached to a small type of locomotive. This one-carriage train, giving seating-accommodation for seventy-two passengers, was shown as a sample of those intended to be used on suburban lines where the traffic is too light to warrant the running of a full train. The car contained smoking and non-smoking compartments as well as a guard's compartment. A special feature of the car was that it is lighted with Stones's axle-driven electric light.

All the locomotives, cars, vans, and wagons exhibited were equipped with the Westinghouse automatic quick-acting air-brake.

Various branches of the Maintenance Department of the Railways were illustrated by examples of working-apparatus and by models. In bridgework an excellent model of the new Ormondville Viaduct attracted attention and gave a good indication of the type of structures adopted when renewing older types of bridges. Other models showed different types of bridges in use on the New Zealand Railways. Photographs of some bridges were also shown. At the west end of the court stood a model of a typical wayside station, with the station-building and the general arrangement of the station-yard shown in detail. The principal railway stations and offices in New Zealand were illus-



GOVERNMENT RAILWAYS EXHIBITS.

trated by photographs. Among general appliances was an example of the windmills used for lifting water at wayside stations and of a 2,000-gallon tank on elevated stand. Other exhibits in this section were a motor inspection-trolley driven by a petrol motor, which was frequently run up and down a length of track in the hall, and various other trollies and velocipedes in use on the railways.

A very complete set of railway signalling apparatus, past and present, was shown. A completely equipped signal-box was a noticeable exhibit, with all its signal and switch levers and the interlocking devices as used at all the principal stations, the box operating a set of points just as on a railway-line, with the corresponding signals and standard semaphores on the main and loop lines. The rails on which this operated were part of the District Engineer's display of rails and track. It included rails of different weights

varying from 30 lb. to 70 lb. per yard and fastened to sleepers of various timbers, each of which was labelled with its name.

Other signalling appliances shown were the following: A set of Dr. Lemon's block instruments, the earliest system used on the New Zealand railways. A set of Winter block instruments, which succeeded the Lemon block. A set of ordinary visual signal tablet instruments, which succeeded the Winter block, and is now the standard block instrument for single-line working on the New Zealand Government railways. A set of special tablet instruments for branch lines, which can be operated by guard or engine-driver. A set of electrical lock and block instruments for double-line working, with model lines and signals for illustrating the working. A set of Wynne's automatic tablet-exchanging apparatus, for the exchanging of the tablets at stations by express trains while passing at full speed. A portable telephone, as used by guards for obtaining communication with a station in case of accident or breakdown of train.

POST AND TELEGRAPH DEPARTMENT.

In the Court of the New Zealand Post and Telegraph Department, just to the south of the Machinery Hall, visitors had an opportunity of seeing a comprehensive collection



EXHIBITS OF TELEGRAPHIC APPARATUS.

of the telegraphic and telephonic apparatus used in the colony, all clearly labelled. There were relics of the early days of telegraphy in New Zealand in the form of telegraphic apparatus invented by Varley and used by the old Provincial Government of Canterbury; old double-needle and single-needle telegraphic instruments; two old-fashioned magnetic alphabetical instruments, the predecessor of the telephone; and an early Edison-Bell telephone. The modern apparatus was most complete, and included every up-

to-date instrument in the science of electric telegraphy. Postage-stamps of all kinds were shown in frames on the walls, and there were photographs of New Zealand post-offices of various grades.

Some of the marvels of wireless telegraphy were made clear to the visitor by the small installation of Marconi plant which was included in the Court. This was erected by arrangement with Captain L. E. Walker, the Australasian representative of the Marconi Wireless Telegraphic Company, and was operated and explained by Mr. H. N. Dowsett, one of the company's engineers. The instruments were connected with a mast outside the building. A similar installation was erected at Islington, seven miles away, and messages were exchanged between the two during the Exhibition, and also with some of the British warships outside Port Lyttelton. Behind the apparatus in the court were hung photographs dealing with the Marconi system.

The Court was under the general supervision of Mr. J. W. Gannaway, Inspector of Electric Lines in Christchurch District.

DEPARTMENT OF TOURIST AND HEALTH RESORTS.

Suave and eye-resting hues, a pleasantly softened light, a delicately harmonious taste in furnishing and papering, beautiful pictures in oils and water-colours and in the



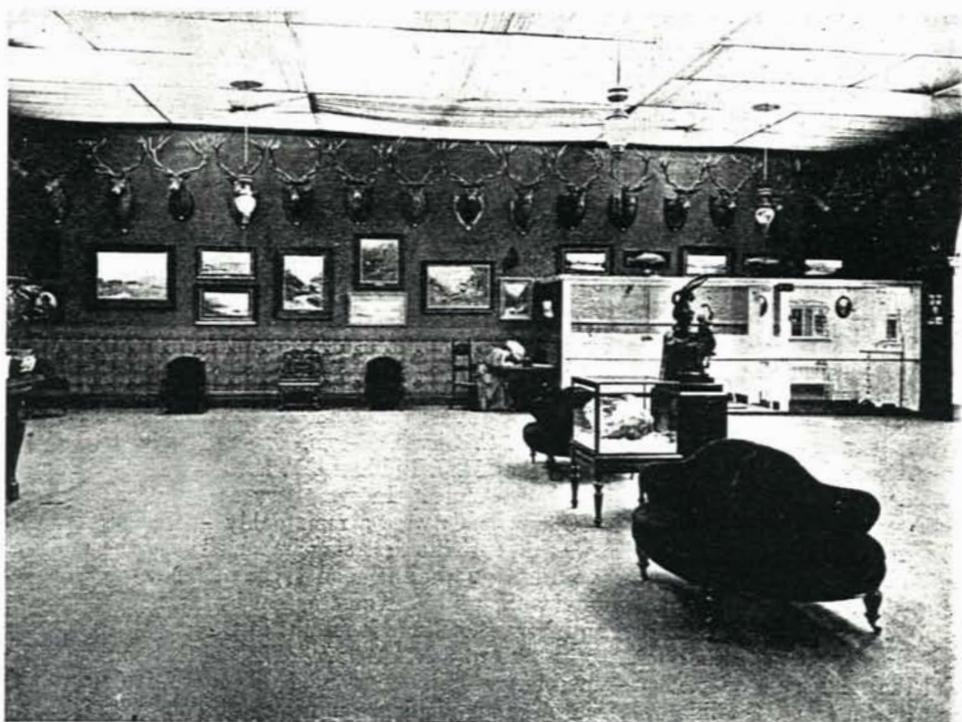
THE GOVERNMENT TOURIST DEPARTMENT'S ROOM.

black-and-white of artistic photography, and a lordly array of stags' heads were the characteristics of the fine Court of the New Zealand Government Department of Tourist and Health Resorts, situated alongside the Main Corridor, southern side. The court occupied a floor-space of 3,240 square feet, a roomy well-ordered apartment, where many a weary visitor sought the comfortable lounge-seats, glad to escape for a while

from the hot and crowded avenues into this cool reposeful corner with its soothing tints of green. The Tourist Department certainly effected its purpose of advertisement by the judicious location and arrangement of the court, for it was situated in the most conveniently reached part of the Exhibition, and its interior was attractive enough to compel thitherward the feet of probably every visitor that paraded the long main thoroughfare of the big building. Mr. T. E. Donne, the General Manager of the Department, brought his experience of foreign Exhibitions to bear on the designing of the Exhibition court with admirable results, and he succeeded in not only presenting to visitors' eyes in microcosm the singularly beautiful and wonderful scenery of these Islands and the excellent sport in the form of trout-fishing and deer-stalking, but in contriving a court that was in its general scheme a model of artistic taste. The floor-covering was dark green, the walls were in soft shades of green, and the ceiling was of squares and lengths of coloured muslin, agreeably tempering the strong light that streamed through the skylights. Invitingly soft chairs and settees, a long and decorative office counter of dark polished wood, Maori wood-carvings, and beautiful wall-panels of various kinds of New Zealand timbers handsomely completed the attractive impression created, even before one entered the court, by the pictures and the sport trophies.

The well-filled walls of the court were a picture-gallery of wild nature, and held several canvases that might with credit have been hung in the Exhibition Art Rooms. There were a number of fine oils and water-colours depicting some of the most famous scenes in this land of geyser, and lake, and alp, and fiord. There were some of Perrett's serenely smooth pastels of lake, and river, and sound scenery, and a beautiful painting of the great ice-peak of Aorangi, by Howarth; there were scenes of dainty beauty such as the woody shores of Lake Waikaremoana, and of boldly magnificent rock-architecture like the cliffs of Milford Sound; there were spouting geysers, glistening glaciers and ice-falls, and glimpses of some of the loveliest forest, and fern, and waterfall scenery that this land of greenwood and glancing waters has to show. The photographic enlargements, taken by the Department's own photographers, were illustrative not only of New Zealand scenery, but also of Maori life, of Maori villages and carved houses, of the strange life in the Geyserland districts, and of the spas and pleasure-resorts maintained by the Department. Three historical pictures took the memory back to the old fighting-days when Maori and pakeha met each other in fierce border warfare. These pictures were associated with the name of one of the most picturesque figures in our military story, Major Von Tempsky, of the Forest Rangers. Von Tempsky was a clever artist as well as a dashing soldier: two of the pictures—one a water-colour and the other a pen-and-ink sketch—were his work. The water-colour showed General Chute's column setting out in 1865 on its famous march through the Taranaki forest at the back of Mount Egmont; the black-and-white sketch depicted a lively bush-skirmish at Okotuku, in Taranaki, with the Hauhau rebels. The first picture was lent by Mr. A. Hamilton, of the Colonial Museum, Wellington; the other by Dr. Hocken, of Dunedin. Then there was a reproduction of an oil-painting, interesting because it represented that disastrous forest-battle in 1868 at Te Ngutu-o-te-Manu, in which Von Tempsky was killed. The pictures of scenery and life in New Zealand even overflowed the court: the outer rear and side walls were hung with some excellent works in oils and in photographic enlargements. There were a number of paintings by E. W. Christmas, forming a series of farming views, from the bush-clearing and "burning-off" stages to the comfortable day of the prosperous farmstead and the "cattle on a thousand hills." From Mr. Christmas's brush also came a good painting of Mount Egmont.

Then there were the trophies that illustrated the grand sport that New Zealand holds for the deer-stalker and the angler. Around the walls above the pictures many a good red deer "uplifted high his cabarfeidh"—magnificently antlered kings of hill and forest that brought a thrill of delight to the heart of many an old stalker. There



TWO VIEWS OF THE GOVERNMENT TOURIST DEPARTMENT'S ROOM.

were a full hundred of these stately heads, some from the Wairarapa forests, some from the mountain country of south Nelson, some from the Morven Hills and the wild highlands around Lake Hawea, in the South Island. One sportsman who inspected them said he doubted whether a similarly fine collection of stags' heads had ever been got together in the world. Certainly the heads were well worthy the rifle of any British stalker who cares to desert his Highland glens to explore the deer-country of New Zealand. It has long been agreed that the red deer introduced into this country have developed a massiveness and size of horn unapproached in either the Scottish or the European herds. The heads, collected from all parts of New Zealand, had all been carefully measured under Mr. Donne's supervision, and these measurements were given in an illustrated booklet issued by the Department to visiting sportsmen. The Wairarapa heads, the Nelson collection, and those from north Otago (Lake Hawea district, Ahuriri Gorge, &c.) were in each case grouped together, and were numbered so that by reference to the Department's pamphlet the visitor could easily tell the place of origin of each trophy. The Wairarapa heads numbered thirty-five, those from Nelson sixteen, and the north Otago heads thirty-three; the stalkers whose rifles contributed to the great collection were the Rev. W. C. Oliver, Messrs. E. Hardcastle, H. E. and C. D. Hodgkinson, R. H. Rhodes, J. Forbes, E. J. Riddiford, T. E. Donne, E. W. Bunny, and a number of other New Zealand sportsmen. In symmetry and perfection of development of the tines the North Otago heads were a remarkably fine collection. In the group of Nelson heads there was that of the first stag imported into the district. In addition to the red-deer there were a number of good types of fallow-deer heads, from Motutapu Island, in the Hauraki Gulf, and the Waikato, sent by Mr. F. H. Coombes of Auckland; also from Nelson and from the Blue Mountains in Otago.

New Zealand's other great sport, trout-fishing—open alike to the working-man and the millionaire sportsman—was illustrated by a splendid collection of big rainbow and brown trout, the like of which no other angling country can boast. The Tourist Department has a very close concern in the fishing of the colony, for not only are its trout-stocked waters a fine source of recreation to its own people, but they are a powerful factor in attracting visitors from abroad. It is pretty certain that no other fishing-region could offer the angling enthusiast such splendid trout as the specimens mounted in this court—an eighteen-pounder from the swift snow-fed Waitaki, another from one of the shingly streams of the Temuka district, a 19½ lb. fish from Ashburton—all three brown trout; an 18½ lb. rainbow trout from Rotorua; and—monarch of all the finny beauties—a great rainbow, also from Rotorua, scaling 21½ lb. Giants indeed of the trout race these, typifying in their way the wonderfully favourable conditions of these new lands for the fullest development of not only man but the useful animals and fishes and plants that are introduced from the older, colder countries of the north.

Other branches of sport were represented by stuffed specimens of game, such as pheasants, wild duck, &c. In addition, some of New Zealand's curiously interesting avifauna, now under the protective mana of the Government, were shown—the flightless kiwi and kakapo, lovers of the forest gloom, and the kea parrot, notorious because of its fondness for living mutton. There was a painting by Miss Mabel Hill of another remarkable South Island bird, the very rare, wingless, blue-plumaged takahea, or *Notornis hochstetteri*, which has by this time probably followed its huge cousin the moa to the Reinga of birdland; if one does still haunt the great dripping forests of western Otago, it will be in very truth a *rara avis*.

The famous hot-spring spas under the control of the Tourist Department were brought to mind by an attractive replica of a bath and dressing-room at the Rotorua Government Baths, consisting of a white and inviting-looking bath, sunk below the floor-level, with its bright tiled walls and floors, its hot and cold shower arrangements, and its comfortable furnishings.

Other features that enhanced the interest and beauty of the court were a unique series of ornamental specimens of New Zealand timbers, each bearing on the lower part of the panel a picture of the tree; a large glass case filled with a splendid collection of specimens of kaurigum of all kinds, from pieces of a rich-brown colour to those of a clear amber-like pellucid beauty; and some fine examples of Maori art in wood-carving, of which the best was a handsome *pare*, the work of an Arawa artist with chisel and mallet, surmounting the rear door of the court, with its necessary complements in the form of *waeuae* or "legs," beautifully carved, on either side of the doorway. Then, set about the room were writing-tables with supplies of stationery, directories, guide-books, itineraries, and photo-albums for the use and information of visitors. At the Inquiry Office, information on all sorts of topics was furnished by the officials of the Department, and many thousands of travellers were supplied during the exhibition season with answers to all the multifarious questions that they asked, from directions as to how to find various other sections of the Exposition to the particulars as to accommodation and cost of travel, spas, sport, and so on, that come within the special sphere of the Department. A large quantity of literature dealing with the pleasure-places and health-resorts of the colony was distributed to visitors.



A MAORI DOORWAY, TOURIST DEPARTMENT'S COURT.

The Tourist Court was constructed and arranged under the personal supervision of Mr. Donne, who was assisted by Messrs. F. Moorhouse and J. W. Hill, of his Head-office staff. Mr. Hill and other officers were in attendance in the Inquiry Office during the season, and were kept busy night and day. The visitors' book in the court contained about twelve thousand signatures by closing-day, but many thousands of those who visited the court did not trouble to enter their names.

GEYSERLAND IN MINIATURE.

Some of New Zealand's most characteristic wonders of wild Nature were cleverly illustrated in replica form in the Tourist Department's miniature "Geyserland," a little slice of Rotorua, all in its manuka-fenced reserve, at the rear of the main Exhibition Building. Here Dr. A. S. Wohlmann, Government Balneologist in charge of the famous Rotorua Spa, had constructed a marvellously exact copy of some of the more remarkable features of the thermal regions, such as may be seen within small compass at the Whakarewarewa Geyser-valley. A square enclosure open to the sky was surrounded by a high thick brushwood fence of the manuka that is the universal shrubbery of the geyser regions. Entering a gateway surmounted by Maori carved figures, the visitor found himself all at once transplanted to the land of sulphur and *wai-arikis*, geysers and steam-holes. The scene was in every detail a bit of Geyserland, even to the background, for above the manuka fence ran a canvas (130 ft. in length) that was an excellent piece of scene-painting: it pictured the great broken sombre volcanic hills forming the background of the Rotorua thermal plain looking east and south—a typical Geversland landscape. Everything within was in harmony with the wonders of Hot-Spring-Land, even to the stunted manuka that grew in clumps and tufts in the clefts of the siliceous rocks and alongside the sulphurous springs. Just inside the gate, too, stood a rush-built thatched Maori whare of the old type, with its door on one side and its single little

window like the square port-window of some old-fashioned ship; just such a hut as one may see to-day at the Tikitere thermal valley of horrors, where the modern ugly iron-



THE GEYSERLAND REPLICA.

roofed weatherboard cottage has not yet replaced the raupo whare. Beyond the whare jets of steam issued from the rocky earth, and in the centre of the enclosure rose the geyser-cone, a replica to a large extent of the mound of the beautiful Waikite Geyser at



IN THE MODEL GEYSERLAND.

Whakarewarewa. Vapour came in soft white clouds from the geyser-well, and every now and then the *pūia* burst forth (regulated in some occult fashion behind the scenes

by the guardian white *tohunga*, Mr. Turner, from Whakarewarewa), and hurled its glittering columns of water and spray into the air with all the fuss and commotion of "the real thing." The fact that the thin spray when it fell on one was cold in no way detracted from the general effectiveness of the imitation *puia*. In constructing this rocky cone of the imitation Waikite, with its smoothly polished geyser-lips, its silica incrustations, steps, and terraces, and miniature pools, Dr. Wohlmann made considerable use of plaster casts obtained from the actual geyser-mound at Whakarewarewa, so that it was to the smallest detail a faithful reproduction of the finest of Geysersland's great *puia*s. To the left of the geyser was a solfatara, an exact imitation of one of the steaming sulphur-holes which are to be seen in their thousands at and around Rotorua: the escaping steam, mixed with sulphurous-acid gas, deposited crystals of sulphur on the surrounding rocks. There were a number of fumaroles sending out here and there gently sighing steam-jets. Half concealed by a clump of low manuka scrub was a grey-hued mud-volcano, an exact replica of one of those in the thermal area at Arikipakapa, between Rotorua and Whakarewarewa. The cone was about 6 ft. high, and in its little crater-top hot mud bubbled and plashed just as in its Nature-built prototype. Near by was a typical "porridge-pot" or spring of unctuously boiling grey mud, containing volcanic mud specially brought from Rotorua for the purpose. In front of the Maori whare was a steam cooking-hole, similar to the natural steam-ovens at Whakarewarewa and Ohinemutu, in which the Native women cook their food. This fumarole often came in useful for cooking not only the Maori kumara and potatoes, but also hams and puddings and other pakeha eatables for the Exhibition restaurants.



COOKING AT THE HOT SPRING, IN THE MODEL GEYSERLAND

Next to the geyser the great attraction of the model Geysersland was the warm bathing-pool, surrounded by the same silica rocks that one sees in the hot-springs districts; this pleasantly hot *wai-ariki* was generally occupied by a party of lively Maori children from the pa, splashing about and diving with a liberal display of brown nature unadorned for the pennies and coins of greater worth that visitors were never tired of throwing them.

"Geysersland in Miniature" was an ingeniously contrived and exceedingly faithful presentment of some of the features of our northern Wonderland, and no visitors were more pleased with Dr. Wohlmann's clever work in building an "Exhibition Whakarewarewa" than the Hot Lakes Maoris themselves.

The ceremony of formally "starting" the geyser was performed on the afternoon of the 1st November, the opening-day, by Lady Ward, in the presence of a large gathering of visitors. The geyser had been christened the "Awarua," after the southern constituency of which Sir Joseph Ward is the parliamentary representative. Lady Ward, in the course of her pleasant little address, congratulated Dr. Wohlmann on the excellent taste and the scientific skill displayed in producing such a good representation of what was to be seen in the thermal districts of New Zealand. After the "Awarua" had been "turned on" and had demonstrated its working capabilities by spouting to a good height, cheers were given for Lady Ward and for Sir Joseph Ward, and on the Premier's call a similar compliment was paid to Dr. Wohlmann.

GOVERNMENT DEPARTMENT OF LABOUR.

The court devoted to the exposition of the functions of the New Zealand Government Department of Labour was situated in the southern portion of the Main Building near the northern side of the Canadian Court. The Department's work is to a large extent supervisory and statistical, and so does not lend itself particularly to a picturesque display; but the court proved in many ways a source of more than casual interest to Exhibition visitors. The front of the court consisted of three wide white arches, with the name of the Department in bold gold lettering over the entrance. Inside, the walls were painted in a light-straw colour, with a handsome frieze, a portion of which was painted by the Wellington Painters' Industrial Union of Workers. The union also sent samples of decorative panel-work, which were used in the adornment of the Court.



COURT OF THE NEW ZEALAND DEPARTMENT OF LABOUR.

It was under instructions given early in 1906 by the late Right Hon. R. J. Seddon, Minister of Labour, that the Labour Department made preparations for its exhibit. The scheme outlined by the Minister was that the Department should illustrate its functions and work by means of photographs, statistical charts, special publications, and models.

Since its establishment in 1891 the Department has steadily grown in importance and in its solid advantages to the workers of the colony, and the Exhibition Court focused in an exceedingly skilful manner its wide range of uses, and made a special feature of information dealing with the growth of the colony's manufactures and the numbers of workers employed in the various factories and workrooms that came within Governmental supervision. The special publications shown included a handbook of the

labour laws, compiled by Mr. Edward Tregear, Secretary to the Department; a work entitled "The Department of Labour, its Organization and Work"; an illustrated pamphlet explanatory of the growth of the Department since its establishment in 1891; and various annual reports of the Department, also awards, recommendations, &c., made under the Industrial Conciliation and Arbitration Act; decisions under the Workmen's Compensation for Accidents Act, and the New Zealand labour laws, bound in six volumes.

The statistical charts exhibited included those showing the numbers of workers in factories, male and female, and annual increases in the number of employees from 1895 to 1906 inclusive; the number of registered factories in New Zealand, 1895-1906 (these increases were shown in a fashion that compelled attention by a drawing to scale of a factory building, each year's increase being shown by an addition to the main building); two coloured charts showing the number of employees in some of the principal trades in New Zealand, from 1895 to 1906; charts showing the number of men and their dependants assisted to employment by the Department for the same period of years; a chart showing the conditions of labour in New Zealand in regard to the wages paid per hour and the number of hours worked per week, as compared with labour in Great Britain, the United States, France, Germany, and Belgium; two charts showing (1) the number of industrial unions of employers and unions of workers registered under the Industrial Conciliation and Arbitration Act; and (2) the membership thereof.

Some of the facts brought out in these charts are worthy of record here. In 1899-1900 only 152 new factories were registered in the colony, whilst in the last three years shown (1903-6) the number of new factories opened were 698, 750, and 758 respectively. The coloured charts illustrated the fluctuations in the principal trades in New Zealand since 1895, and revealed some interesting facts. One line showed the growth of the flax trade and its remarkable fluctuations up to the Exhibition year. In 1895-96 there were 350 hands employed in the flax-mills of the colony; in 1904-5 the total hands employed numbered 3,300. A significant difference was shown in the line illustrating the condition of the bootmaking trade. In 1895-96 there were 3,000 hands employed in the boot-factories of the colony; in 1898-99 there were 3,250; but since then there has been a steady though small decline until in 1905-6 the number of hands employed were 3,050. The employment chart brought prominently before one the excellent work done by the Department in finding employment for people out of work and in doing away with the "unemployed" difficulty. In 1905-6 it was shown that not only had a large number of immigrants in want of work been dealt with by the Department, but that departmental aid had also been exceedingly useful to employers who required labour. The industrial charts showed that in 1905-6 there were 261 unions of workers with 29,869 members, and that the unions of employers at the same date totalled a membership of 3,276. In addition to these charts, returns were shown giving the prices of commodities, &c., in various centres of New Zealand and also in the principal centres of Australasia. Through the courtesy of the British Commissioner, Captain Atkin, the Department also exhibited duplicates of the charts, somewhat reduced in size, shown in the British Court (exhibited by the English Labour Department and Board of Trade) illustrating the statistics of trade employment and conditions of labour in the United Kingdom.

To oversea visitors the co-operative system of carrying out railway and road works has always been a matter of great interest. The Department showed a very fine group of enlarged photographs depicting the class of work upon which co-operative workers were engaged, and also showed the class of houses, whares, and tents in which they lived.

In connection with the Workers' Dwelling Act, there was an interesting exhibit consisting of a number of specially drawn sketches and plans of workmen's model houses contributed by the architects who were successful in the competition promoted by the

Government for the best designs for this class of building. The Department also showed photos of cottages already erected, besides small models of these dwellings. In the Exhibition grounds a house on the lines of one of these model dwellings was specially built and furnished from the plans of Messrs. Hurst, Seager, and Wood, and was inspected by a large number of those who visited the Exhibition. This model cottage stood on the south side of the Victoria Lakelet, between "Wonderland" and the tree-groves of the park. It was a two-story building, furnished and fitted completely, fenced in, and with garden attached. It contained four rooms, scullery, bathroom, &c.

A model of an interesting character included in the exhibits was that of a shearing-shed, the original of which stands on a sheep-station near Masterton: it was an excellent example of the improved class of shearing-establishment, with spacious and comfortable sleeping and dining quarters for the men employed. A large number of photographs were also exhibited in illustration of the class of accommodation provided for shearers in various parts of the colony, and which by virtue of the Shearers' Accommodation Act, is under the supervisory care of the Labour Department. Other large photographic views, showing various phases of the wool industry, were those presented to the Department by the Canterbury Sheepowners' Industrial Union of Employers, through Mr. F. H. Labatt, Secretary, and Mr. Rutherford, of Glen Wye. A series of views showed shearers at work with the machine as well as with the old hand-shears.

Amongst the exhibits sent by industrial unions of employers and workers was a good collection of kauri-gum, comprising samples taken from every important gumfield in the Auckland Province, by the members of the Auckland Gum-diggers' Industrial Union of Workers. A fine piece of balm rimu timber measuring 14 ft. 6 in. in length by 4 ft. in width was contributed by the Wairarapa Sawmillers' Industrial Association of Employers. There were some exhibits of interest connected with the printing trade, including an old printing-press of primitive character; photographs illustrative of machines used in the early days in New Zealand, and of "old hands" in the printing trade, sent by the Christchurch Typographical Union; and an album from the Wellington Typographical Union of Workers containing samples of letterpress printing done by members of the Union. On the walls of the Court, both inside and out, were displayed a large number of photographic views, including pictures contributed by various factory-owners in the colony, showing the hands at work. There were also portraits of the successive Ministerial heads of the Department since its establishment, from the Hon. W. P. Reeves, the first Minister of Labour, to the present head of the Department, the Hon. J. A. Millar.

The Court was designed and arranged by Mr. J. W. Collins, of the Head Office of the Department, under instructions from Mr. E. Tregear, Secretary for Labour. During the Exhibition it was under the charge of Mr. W. H. Hagger, of the Christchurch office.

ENGLISH "SWEATED" INDUSTRIES EXHIBIT.

In sad and unpleasant contrast to the exposition of the methods which this great and benevolent Department of State has adopted in the interests of our workers, was an exhibit of articles made by "sweated" labour in Great Britain. This was a large collection of garments and goods of all kinds, from nails to children's toys, gathered for the purpose of showing the miserably paid condition of thousands upon thousands of workers in Great Britain. They were collected at the request of the Hon. J. A. Millar, Minister of Labour, by the New Zealand High Commissioner in London, the Hon. W. P. Reeves. At first it was hoped to borrow the exhibit shown in London by the proprietors of the *Daily Mail*, but as this exhibit was still on show throughout the British provinces the idea was abandoned, and the High Commissioner was asked to purchase similar goods

and send them to the Labour Department as soon as possible. To emphasize the fact that the goods were actually made at the prices quoted, the names of the contributors to the Department's collection, together with the organization they belonged to, were given in the catalogue prepared by the Labour Department.

They were a great and significant object-lesson, these products of the poor sweated people of the great cities. Mr. Edward Tregear, the Secretary of the New Zealand Department of Labour, in his introduction to the descriptive catalogue, forcefully indicated the reasons which actuated the Department in making the display, and the evils not only to workers but to society in general which were the result of such a debasing system as was here illustrated. "These materials shown," he said, "are exhibited as a warning against that which will happen if strenuous and sustained efforts are not made to bar the entrance of the system through which such results become possible, and to strengthen the present determination of the colonist that no such modes of working or such payments for work shall flourish, or shall even begin their evil influence, in this colony. New Zealand for some years has, by means of a stringent Factories Act and by awards of the Arbitration Court, &c., endeavoured to control not only the wages paid and the earnings of workers in local industries, but also the health conditions under which industries are carried on. These controlling powers have two distinct directions, one of an economic and the other of a hygienic character."

The economic evils of the English sweated industries were brought vividly home to New-Zealanders by the labels on the goods, representing almost inconceivably low payment for hard, exhausting, unremitting toil; and the hygienic dangers were only too apparent when one reflected on the awful conditions of dirt, disease, and misery generally which exist in the homes of the British workers in which these trades are carried on. New Zealand, as Mr. Tregear remarked, saw that there was a hygienic side to the question of "sweating" and "home-work." "It was recognised that people starved, badly clothed, and badly housed would probably be diseased and spread disease. It was therefore enacted in this colony that on every garment intended for sale and made outside a registered factory a large label should be placed, such label stating that the garments had not been made in a registered factory. Severe fines were to be inflicted if this label were removed or concealed before the article was publicly sold. Fortunately no such labels were ever needed. Textile work (tailoring, dressmaking, shirtmaking, &c.) is now usually executed only in registered factories, whose spotless cleanliness and healthful surroundings are fully open to inspection. Moreover, if among the workers in any factory dealing with textiles or with food-preparation any person is considered by the Inspector as in a state whereby contagion or infection could be conveyed to others, such worker is at once suspended from work until the Public Health officer gives him or her a clean certificate. With such precautions the citizens of the colony have nothing to fear either that English rates of pay in the sweated industries will induce our people to compete in such trades or that the goods locally made are vehicles of virulent diseases."

The following articles were amongst the most glaring examples of "sweated" industries in the collection:—

- Box-making*.—Rate paid, 2d. to 2½d. per gross; average working-day, sixteen hours; average earnings of worker, 1s. 3d. per day. (New Zealand rates paid to women and girls range from 7s. 6d. to £1 10s. per week of forty-five hours; men are paid from £1 5s. to £2 10s. per week.)
- Hooks and Eyes, Carding* (Birmingham).—Rate paid, 4½d. for 72 cards; workers find their own cotton and needles, amounting to about 4d. in every 3s. earned; average earnings, 3s. 3d. weekly.
- Carding Buttons* (Birmingham).—Rate paid, 3s. per 100 gross of buttons; worker's outlay for thread, &c., 2d. in every 3s. earned; average earnings, 3s. 6d. per week.
- Paper-bag Making*.—Rate paid, 6d. per thousand; average working day, twelve hours; average earnings, 4s. 6d. per week. (In New Zealand this work is done by machinery, and the average wages paid to women over twenty years of age range from 13s. 6d. to £1 per week of forty-five hours.)

- Ladies' Shoes*.—3d. per dozen pairs; average earnings, 6s. per week.
- Uniform Buttons*.—From 2s. to 8s. per gross; workers can earn from 1½d. to 2d. per hour.
- Uniform Buttons*.—6d. per dozen; weekly earnings average 6s. 9d.
- Peaks for Soldiers' Caps*.—1s. per gross; worker provides own glue.
- Boys' Knickers*.—1½d. each; worker finds machine and thread, and can make one garment per hour.
- Sailor Suits*.—3s. 2d. per dozen suits complete.
- Hair-brushes*.—1d. each. The brush exhibited was made by a woman who has been at the trade for fifty-seven years. She began work when six years old. She can neither read nor write. Each brush takes forty minutes to complete, and the average earnings average 5s. 6d. per week.
- Slippers* (sold at 2s. 3d. a pair).—2s. 6d. per dozen.
- Children's Shoes*.—8d. to 2s. 6d. per dozen.
- Babies' Shoes*.—1s. 6d. per dozen pairs; wholesale price, 7½d. each; retail, 10½d.
- Knickers*.—1s. 3d. per dozen.
- Waistcoats*.—1d. each; worker finds own cotton.
- Trousers (Men's)*.—5d. per pair; by working sixteen hours a day worker earns 7s. 6d. per week. (In New Zealand the minimum rates paid to clothing-factory-workers are fixed by an award of the Arbitration Court, as follows: Coat, vest, and trousers makers and machinists, female, £1 5s. per week; improvers, first-class coat and vest hands, £1 0s. 6d. per week; second-class, 17s. 6d. Apprentices are paid—First six months, 5s.; second, six months 7s.; third, 10s.; and so on in all branches of the trade. The hours are fixed at forty-five per week.)
- Shirts (Men's)*.—From 9½d. to 1s. 9½d. per dozen; average earnings at 1s. 6d. per dozen, 9s. 6d. per week, at twelve hours a day. (In New Zealand women over twenty years of age earn from 15s. to £2 per week of forty-five hours, and men from £1 15s. to £4 per week.)
- Tweed jackets*, 7d. each. *Coats*, 7d. each. *Skirts*, 3½d. to 1s. 5d. each. *Ladies' blouses*, from 1½d. to 4½d. each. *Babies' pelisses*, 8½d. each. *Ladies' Belts*, 1½d. each. *Babies' bonnets* (fur-trimmed), 2d. each (similar-class bonnets are retailed in New Zealand from 7s. 6d. to 8s. 11d. each). *Babies' pinafores*, 6d. per dozen. *Costumes*, 10d. to 1s. 1d.; worker finds machine and thread. *Chemises*, 2s. 6d. per dozen. *Skirts*, from 6d. down to 2½d. each; earnings for average working-day of ten hours, 5s. 6d. per week.

The exhibit of "sweated" industries was on view in the Labour Department's Court for three months, and was during that time visited by, it is estimated, 160,000 people. After the close of the Exhibition, it was placed on view for public inspection in the chief centres of the colony.

GOVERNMENT LIFE INSURANCE

A short distance inside the Main Corridor, as one entered from the main vestibule, was the court of the Government Life Insurance Department. The front was a handsomely designed one, consisting of three arches separated by fluted columns having carved capitals and surmounted by a decorative pediment. The exhibits were concrete objects and diagrams illustrating the progress of life insurance generally in the colony, and the scope and progress of the Department in particular. On one side there was a pile of cubes of various sizes representing blocks of gold, denoting the accumulated funds of the Department at various periods from 1875 to 1905. Other designs showed in a form that readily caught the eye the sums assured at risk and the bonuses declared at various periods of the Department's existence. Wall-diagrams showed the progress made in life insurance in New Zealand as compared with other countries, the building-up of the accumulated funds of the Department, the sources of income and the manner in which it had been expended and invested, and comparisons between the business done by the Department and that done by other offices transacting life insurance in the colony. A panel depicting a lighthouse symbolized the State guarantee given with the Department's policies. Three of the calculating-machines used in the Head Office for the purpose of reducing labour in actuarial work were also shown.

Some of the salient facts among the information furnished to visitors by the Department included the following interesting items: During the thirty-six years of the Department's existence premiums were received for upwards of six and a half millions sterling. Considerably over four millions were returned to policyholders or

their representatives, and the existing funds of the Department amounted to nearly four millions sterling. There were at present upwards of 45,000 policies of all classes

in force, assuring a total of nearly eleven millions and three-quarters, including bonuses. The accumulated funds increased from £5,113 in 1871 to £3,822,577 in 1905. All profits are divided amongst the policyholders. Assets are held in trust for the policyholders by an independent Board, being specially "earmarked" by statute, and the financial position of the Department is actuarially of the soundest character, and has been vouched for time after time by eminent English actuaries. The guarantee of the State goes with every policy issued by the Department. A liberal system of non-forfeiture protects every insurance policy, and the policies issued contain no unreasonable restrictions. The business of the Department is confined to New Zealand, the healthiest country in the world, and all money received is invested in the colony. For every £100 collected in premiums the Department has returned to its policyholders or their representatives, or holds in trust for them, £117. At the 31st December, 1905, £179,000 in cash was distributed amongst the policyholders in bonuses.

The Department issued a special Exhibition number of its periodical, the *Recorder*, containing plans of the City of Christchurch and of the Exhibition Building, together with other illustrations. These were distributed by thousands to visitors at the Exhibition.

Mr. D. F. Dennehy was in charge of the Life Insurance Court during the Exhibition. In the visitors' book kept at the court over thirteen thousand names were inscribed during the seven months. Opportunity was taken of recording the age, height, weight,



A CORNER OF THE GOVERNMENT LIFE INSURANCE DEPARTMENT'S COURT.

and nationality, and the opinions of each visitor; and at the close of the Exhibition the book was sent to the Head Office, in Wellington, to be kept as a statistical record.

Mr. John T. Donovan, an Irish Nationalist delegate visiting the colony, expressed his opinion of the Government Life Insurance Office by writing in the visitors' book, "Unique as a national institution; progress marvellous; enterprise magnificent."

LANDS AND SURVEY DEPARTMENT.

At the western end of the West Coast Court, and directly opposite on the western avenue, the New Zealand Lands and Survey Department had some excellent examples of mapping and other work on view. There was a fine collection of maps of New Zealand and the various districts of the colony, prepared by the staff of the Survey Department; besides a series of photographs, including good views of alpine scenery. The principal exhibit was a large original pictorial map of New Zealand, shown in a glass case. This map, measuring 8 ft. in length by 4 ft. 6 in. in width, was the work of Mr. W. Deverell, Chief Draughtsman in the Department's office at Invercargill. It was a triumph of the draughtsman's art as a topographical picture-map. The mountain features were shown in pictorial relief, and all the rivers, lakes, glaciers, and other prominent features of the country were clearly and prominently indicated, besides railway, coach, and other routes, and steamer distances along the coast. The making of the map occupied Mr. Deverell for nearly three years, and it cost over £1,200. A large number of reduced copies of this very complete map were distributed to visitors to the court. Another large map shown was one of Dunedin City and suburbs, the first of a series of city maps to be issued by the Survey Department.

The exhibits were arranged by Mr. H. McCardell, of the Department's Head Office, Wellington, and Mr. Goldsmith, the Chief Surveyor for Canterbury.

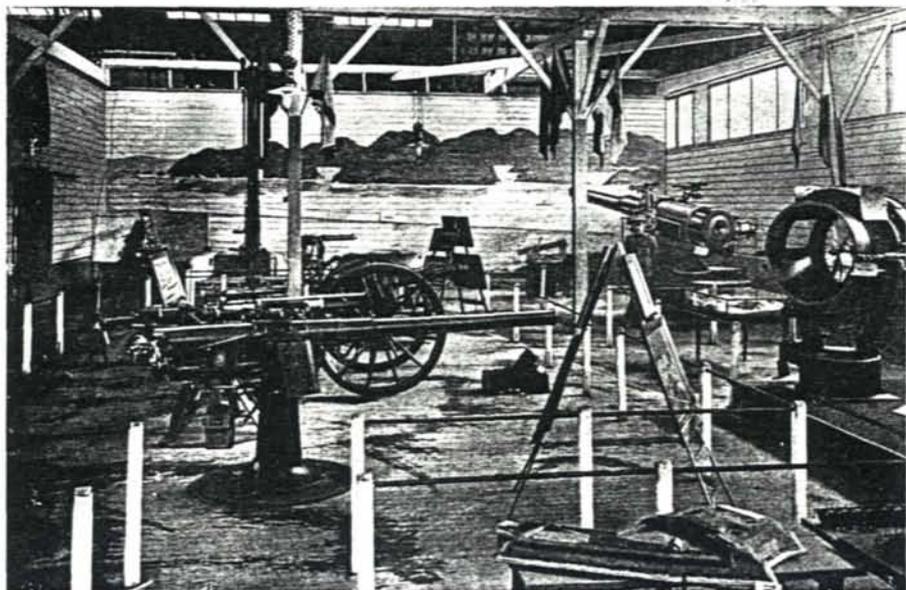
GOVERNMENT PRINTING DEPARTMENT.

In a small court near the southern side of the Main Corridor the Government Printing and Stationery Department made a display of its printing, lithographing, process-engraving, and bookbinding work. The Department, employing over four hundred and fifty hands, undertakes the whole of the printing required by the Government, and covers a great variety of important work, from postage-stamps to railway-tickets and survey maps, besides a multitude of books, including illustrated books and pamphlets of high artistic quality, as, for example, those printed for the Tourist Department. Specimens of the various important books and Government reports which form part of the immense volume of work passing through the Printing Office were shown. Conspicuous amongst these were the six handsome red-bound volumes of John White's classic work "The Ancient History of the Maori." Then there were specimens of stereo plates and electrotyping work; the lithographic work so largely required in map-printing; exhibits illustrating the various stages of process-engraving work; an unusually large photographic negative measuring 30 in. by 30 in.; lantern-slides, and other specimens of high-class artistic work. Various classes of bookbinding work were shown, demonstrating that in this as in other divisions of the Department work could be produced quite equal to that turned out by the best private printing firms in Australasia. Mr. John Mackay is the Government Printer, with Mr. B. B. Allen as Chief Clerk.

THE DEFENCE COURT.

The methods adopted for the defence of the country were well illustrated in the Government Defence Court, which occupied a position off the Main Avenue near the general machinery exhibit. The Court was erected by the members of the Permanent Force in Lyttelton, under the direction of Captain W. P. Wall, the local officer com-

manding the R.N.Z.A. All classes of ordnance and small-arms in use in New Zealand were shown, together with ammunition manufactured in the colony, and submarine-mine fields. The exhibit that first caught the eye on entering the court was the great 6-in. breech-loading gun, garrison mounting, such as is used in the forts at the chief ports of the colony. With this gun it is possible to throw six 100 lb. lyddite shells per minute a distance of 10,000 yards with a 20 lb. charge of cordite, or an 11½ lb. charge of modified cordite. This great projectile leaves the muzzle of the gun with a velocity of half a mile per second, and its penetrative power at 100 yards is through 15 in. of wrought iron. The gun was fitted with automatic and rocking-bar sights. The gun with its pedestal weighed 16 tons. Several other pieces of artillery were shown. One was a particularly useful and beautiful weapon, a 12-pounder quick-firing gun on a pedestal mounting. This gun can fire fifteen 12 lb. shells per minute; its range is 8,800 yards; it is fitted



THE NEW ZEALAND ARMAMENT AND DEFENCE COURT.

with electric firing-gear and with similar sights to the big 6-in. gun. The special work of the 12-pounder in case of war would be the repelling of torpedo craft. Another gun was a 6-pounder Nordenfeldt, Mark VII, mounted on a garrison central pivot mounting. This gun was fitted with an aiming-rifle, and at its muzzle was affixed a "dotter," somewhat similar to those used in England, but of local manufacture and design. The artillery "dotter" was invented by Captain (now Admiral) Percy Scott, of H.M.S. "Powerful," who assisted in the defence of Ladysmith at the Boer War, and its use is considered to have been mainly responsible for the great improvement in gunnery practice in the British navy, for it greatly simplifies and assists the aiming of the gun. Other guns on exhibition were an infantry Maxim, with carriage ready for field-work; a 15-pounder breech-loading field-gun, such as is used by New Zealand's Field Artillery Volunteers; a 3-pounder Hotchkiss, mark I, mounted on an elevated stand, and capable of firing fifteen shells per minute; a parapet Maxim; and a field Maxim on a Dundonald galloping-carriage, a most useful weapon in rough country, and one that would probably

be excellently adapted to the defence of New Zealand. Along the sides of the court were exhibited projectiles for use in various guns, shown in sections.

The northern wall of the court, behind the guns, was covered by a painting of Lyttelton Harbour, showing the Banks Peninsula side. This was the work of assistant-artificer S. E. Wright, who also painted the coats-of-arms and other decorations which adorned the court. The harbour picture formed the background for a running target in the form of a cruiser, which was manipulated by a string passing from east to west of the wall. This target illustrated the manner in which a gun would need to be laid on a moving vessel from the forts. The methods of training the guns were shown by members of the Royal New Zealand Artillery.

Attached to the electrical section of the Court was a signalling plant comprising heliographs, lamps, and a semaphore. An excellent raised contour model of a piece of country constructed by Lieutenant O. Luttrell, assisted by Mr. T. Andrews, was shown, and was highly commended by many military experts who visited the court.

In small-arms, racks of rifles round the walls showed a century's progress in the manufacture of infantry weapons, from the old flint gun and "Brown Bess" up to the modern Lee-Enfield and Lee-Enfield rifles. A number of revolvers and pistols of various makes and dates were also exhibited.

A particularly interesting section of the court, to both Volunteers and civilians, was the exhibit of the Colonial Ammunition Company of Auckland. This company makes all the small-arms and ammunition used by the Defence Forces of the colony. A case was shown illustrating every stage of the manufacture of a .303 cartridge, from its initial stage right up to the finished article. At the back of the case was a rope of the crodite used in loading the cartridges. Pictures of the company's works at Mount Eden, Auckland, and of the company's founder and managing director, Major A. Whitney, were shown.

In a corner of the court a number of models made by the Dunedin Engineer Volunteers were exhibited, including a model blockhouse and a good model of Fort Jervis. The Submarine Mining Corps of Wellington exhibited the apparatus used in its mine-laying and other work. A Mark III projector of the latest pattern was shown, containing a horizontal lamp, an electric dial for direction and an electric motor for elevating and depressing the projector. The power of this light is from 45,000- to 60,000-candle power.

The walls of the court were fittingly decorated with trophies of rifles, revolvers, swords, and bayonets. There was also on view a handsome case containing the badges of every regiment, British and colonial, which took part in the late Boer War in South Africa. This collection was presented in South Africa to Mr. T. Pollard, who lent it for exhibition.

PRISONS DEPARTMENT.

Even the Prisons Department of New Zealand had its exhibit—one that opened the eyes of visitors to the skill and ingenuity often possessed by inmates of the gaols. This display was located in a corner of the Machinery Hall, and was under the charge of Acting Principal Warder J. Down, of New Plymouth, assisted by Warder Spier, of Lyttelton; the former officer was responsible for the arrangement of the court. A large collection of work of a miscellaneous character, done in the Lyttelton and other prisons, was on view. In the Lyttelton Gaol many prisoners are taught carpentry and joinery, and a number of excellent specimens of useful work were the result. One of the prison-made pieces of furniture was a well-constructed wardrobe; another, a wooden mantel and overmantel: the basis of the mantel-design was marble picked out with gold; the overmantel, of American ash and New Zealand rimu, had some clever carving done with a penknife only. Another product of Lyttelton prison industry was a model of a

Whitechapel cart, built of mottled kauri and walnut, neatly lined and painted, and mounted in silver. There were photographs and a pen-and-ink sketch of the gaol buildings. Other branches of industry illustrated by exhibits were sign-writing, and illuminating, and metal-work. From Wellington Gaol came a large number of coir-fibre mats, worked in colours and carrying a variety of designs: also flower-pots, tobacco-jars, model clay figures, and a quantity of bricks. From Mount Eden, Auckland, came specimens of the volcanic stone quarried for the construction of the new gaol. Some of the prisoners in the New Zealand gaols are drafted to tree-plantation camps at Waioapu in the Rotorua district and in other parts of New Zealand, for the useful work of afforesting the treeless parts of the country. Some of these "outdoor" prisoners contributed specimens of the work of their leisure hours. The Waioapu camp sent a wax model of the Christchurch Roman Catholic Cathedral: the Dumgree tree-planters sent a collection of well-made flax baskets. A stone-arched window was sent from the Napier Prison. Warder Down, of New Plymouth, showed a very clever model of the New Plymouth Gaol, made of plaster-of-paris, on a scale of $\frac{1}{2}$ in. to 1 ft., with every detail of the building complete. This model was the result of several months' diligent and ingenious work. Another excellent exhibit, also the work of Mr. Down, was a model of St. Mary's Church, New Plymouth, of the same material as the gaol model, and lit by electricity. By means of a phonograph inside the model building the church chimes and a musical service were cleverly reproduced.

THE FISHERIES.

Cool-looking and white without, and cooler still within, and soothing to the senses with the rippling flowing of waters and the crystal clearness of the glass-cased tanks in which beautiful fishes swam to and fro, the Aquarium of the Government Fisheries Department was a delightful little retreat in the hot days and warm nights of summer. This home of Pisces stood in the rear of the main Exhibition Buildings, and faced the Victoria Lake. It was erected under the direction of the Chief Inspector of Fisheries, Mr. L. F. Ayson. It was but a small building, but in the opinion of many visitors it came next to the Fernery as the prettiest court in the Exhibition. Both by day and by night it drew its crowds of visitors all through the Exhibition season.

The front of the Aquarium above the entrance bore a relief moulding that appropriately indicated its character, the familiar conventional representation of old Poseidon's ocean-monster, open-mouthed, half-dolphin half dragon, a sea-freak that to many Maori visitors—for the Maoris took a particularly great interest in the Aquarium—suggested the dreaded *taniha* of their own ancient mythology. Within the building were sixteen glass wall-tanks devoted to various kinds of fish, and a large square pool containing monster trout. The tanks were constructed after the designs of the latest American aquaria, as seen by Mr. Ayson on his visits to the United States. They rested on a platform running round the outside of the building, where they were open to the air: the tops were open except for a gauze cover that would be represented in a permanent aquarium by a glass sky-lit roof. The glass fronts of the tanks were from 5 ft. by 2½ ft. to 3½ ft. by 2 ft. in size, with the backs sloping inwards to the bottom. Into each tank a supply of fresh water continually flowed from an artesian well which had been specially sunk. This well went down 422 ft., and the water, rising 20 ft. above the ground, gave a flow of 3,500 gallons per hour, nearly all of which was used in the tanks. The supply was quite free of minute life, so that the fish were altogether dependent upon artificial feeding, but its clear and sparkling translucency was a great advantage from the spectator's viewpoint. There, only a few inches between his eye and the fish, he could literally watch them breathing, as they swam slowly round and round, with soft tail-fannings and little rudder-twists, now to port, now to starboard, that reminded one

at once of the steering of a ship; or lay at their ease on their silver sands and amidst their miniature rocks, opening and closing their mouths as they peered at their strange visitors through the front windows of their glassy homes.

The wall-tanks contained specimens of all the species of imported trout naturalised in New Zealand, and four varieties of salmon from the hatcheries at Hakataramea. In the tanks the visitor as he walked around also saw tench and perch, American catfish, goldfish, silver carp, quinnat salmon, young landlocked salmon, American brook-trout, Californian rainbow trout, English brown trout, zebra trout, eels, and some very beautiful little Japanese double-tailed goldfish. The large floor-pool, 2 ft. 6 in. in depth, contained the largest trout that Mr. Ayson had been able to procure in New Zealand. The hatching and care of fish-fry were illustrated by the exhibition of hatching-boxes filled



IN THE FISHERIES COURT.

with young fish. An interesting exhibit was McDonald's automatic type of box, largely used for the hatching of cod in America. By means of a siphon arrangement the rise and fall of the tide was simulated in the hatching-boxes. This ingenious arrangement and the Downing white fish jar were illustrations of the great care given nowadays to the propagation of fish.

There was also an excellent display of mounted specimens of trout taken from New Zealand waters, contributed largely by the Canterbury and North Otago Acclimatisation Societies. An interesting fish shown was a mature quinnat salmon, caught at Hakataramea when a large run of salmon came up from the sea into the Waitaki River and some of its tributaries. Other mounted fish were salmon of various kinds, and fine specimens of English cod, turbot, and lobster.

The walls of the building above the tanks were covered with coloured pictures of various fishes of the world, including a particularly good display of Japanese fish.

The sea-fishing industry was represented by a model steam-trawler towing a net.

In the way of fish-products, Mr. Ayson showed a novel article in the form of a quantity of shark-oil; a powerful shark fertiliser was also exhibited.

The Marine Department made a display of various articles connected with the equipment of vessels, including port lights, side-lights, and masthead-lights. Another item of interest to sailormen was a portrait of the "sailors' friend," Samuel Plimsoll.

In addition to the other ornaments in the Aquarium, Mr. Ayson had two large mounted albatrosses of the royal and sooty varieties.

