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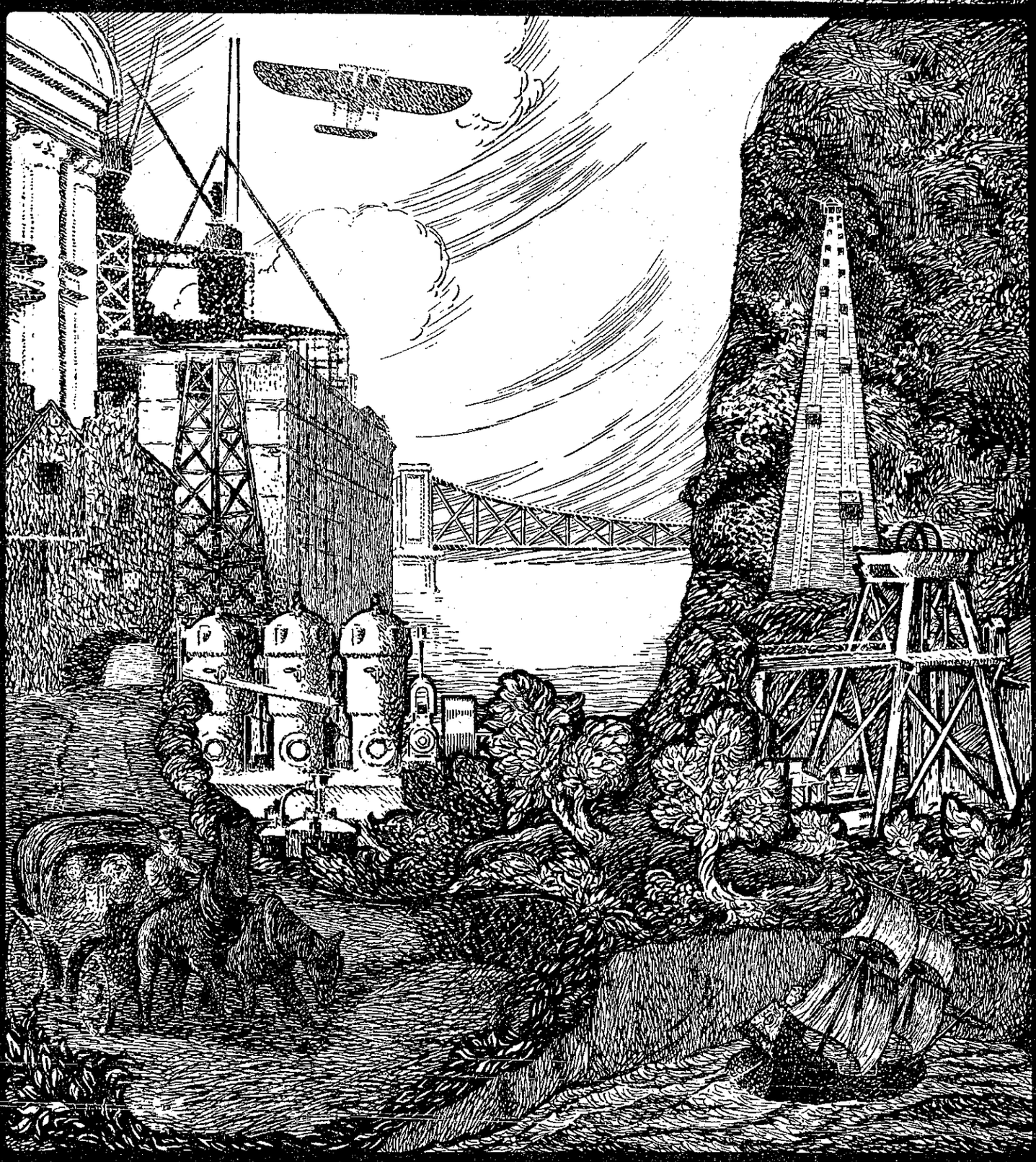

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Cards

PROGRESS

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Progress

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EDITORIAL COMMENT.

Progress of Auckland.

It is of course possible to say that the progress of Auckland is the progress of the Dominion. But the fact that the northern city has outstripped the rest of the Dominion in progress cannot be gainsaid. We are glad to see from an article reprinted in our building section, that the progress includes the beautification of the city by the erection of fine buildings. It makes one open one's eyes to read that the sum of £490,000 is being spent on a few named buildings. It also is surprising to read so modest an estimate as the writer's, which contents itself with putting down the extras for so many buildings over such a large aggregate at £10,000, or about two per cent. He is evidently thinking of the millennium and praying for its advent. He has reason, because the building programme for the next decade which follows in the article will call for some very large contracts. We trust the building stones of the country will not be neglected by the men responsible for this programme. We trust also that the possibilities of concrete now so vastly greater than they were but a few years ago will tempt the architects of taste, who abound in the northern city, and, indeed, are not rare in the Dominion —in spite of the rash and altogether wrong headed criticism of Lord Plunket, our late Governor, to the contrary—to consider the beauty of the streets for which they are designing edifices. We trust also that the Municipal authorities will, while enforcing the sanitary rules, now getting to be so well understood, not forget the claims of beauty. It is time now to think of the uniformity of street lines, of the planting of streets with handsome timbers, and the dignified ornamentation of the street fronts of all buildings. Some interesting remarks on this subject in the letter of our Christchurch correspondent ("Arts and Crafts") show what the practice once was in this respect and what it is now. This is only another way of saying that the jerry-builder is not to be encouraged in any possible way. It must be evident that if the architects were encouraged by the men who build, to insist on drawings and models of all ornamental work requiring artistic skill and distinction, they would be better able to secure the essentials of building stability also. Consider for one moment the medley of hideous piping projecting aggressively from the roofs of a city in our day and you will weep or be moved to hilarious laughter according to your temperament. Let house owners read the small sketch they will find in our building section, "What the Chimney said to the Vent Pipe," and they will realise in a moment what a responsibility is theirs. They should understand—it is high time—that there is no need to stamp the brand of ugliness hard down on everything that is necessary or useful. The prosperity of the Dominion as typified in the building figures supplied from Auckland is going to give grand opportunities for "the city beautiful" of the future. Let the matter only be taken in time.

The Navy.

In another column we illustrate and describe an entirely new process of launching devised by Sir William Armstrong and Co. at their Elswick yards, and also a new method of building which shortens materially the time of construction, and lessens the cost appreciably. In some respects the private yards beat the Admiralty yards, as this incident shows. Of the strength of these establishments we get a glimpse at the same time. This vessel represents, for example, the one hundred and thirty-fifth warship built by the firm, at a cost, we may safely assume, at anything between fifty and sixty million sterling in the aggregate. The reverse of the medal is that more than half has been constructed for the foreigner. If our builders are building for the foreigner as good, if not better, warships than the Government builds for itself, and if our mercantile marine is to be manned largely by Lascars and "Dutchies," what are we coming to? It is pleasanter to reflect on what extended use might be made of these fine private establishments, of which this of the Armstrongs is the greatest and best managed in many respects. The Admiralty is, however, now making more use of them for its own programme, which is one comfort, and may become a greater. Another is that the ship owner is finding the back of his sailor men up against the "Dutchy" and the Lascar. We can only trust that the British sailor, who is, according to some authorities (who happily exaggerate) nearly as extinct as the Dodo, will end by sweeping "Dutchy" as completely from the decks of the mercantile marine of Britain as his fathers swept him from the face of the seas. These are the feelings inspired out in these overseas by the state of things in the Navy and the mercantile marine. We trust that the thoroughly representative character of our Prime Minister who was present in his representative capacity at the launch of the Dreadnought "New Zealand," will be understood as covering this anti-Dutchy sentiment. We are all ready to subscribe to the Navy, even to go on building "Dreadnoughts" if it is necessary. But if the British shipowner is to be allowed to spoil the source of the Navy's man supplies, we shall very soon get tired. These shipowners are not favourites with us for another reason, namely, that they keep up freights against us so that it is sometimes cheaper to buy in America goods a little dearer than the same are in Britain. The British ship owner is getting a trifle too cosmopolitan for the endurance of British folk, and it is high time he were made to feel it, and something more: *ridelicet* the need for mending his very unpatriotic manners.

Wireless Telegraphy.

Two articles in another column are fascinating reading. One from our Paris correspondent tells the story of the scientific success in the measurement of time which has obtained for the Eiffel Tower a free pardon for the unpardonable sin—in Paris at all events—of ugliness. The other translated for us from the German, narrates the marvellous discovery by which wireless telegraphy is made absolutely safe against all possible prying and all conceivable inquisitiveness. It is the invention of Capt. Hovland, of the Norwegian Navy, who has made a great record. The marvel of ingenuity here is a cypher which is sent through space to its destination, which keeps up its incognito all the way, and on arrival automatically translates itself into ordinary (printed) letter for the information of the person entitled to receive it, and for him alone. All that is necessary is for two stations to agree on is a letter combination, and after that a simple regulator keeps the two instruments in tune within negligeable limits of error. It will be seen that neither Marconi, nor de Forrest, nor Valdemar Paulsen, nor the Telefunken people possess this device. It is the invention of the Norwegian officer, and may be applied to any system. We trust the New Zealand Government will display its usual promptitude in the provision of an installation.

Architecture of the Future.

We publish to-day a picture of Lord Islington's seat in Wiltshire, and also one of the design for the N.S.Wales Parliament House. The first is too late for Government House, but is worth the study of those who wish to build with dignity and comfort on a large scale in the country. The second is an admirable design for the pending competition, which, we trust, will not be postponed on any account.

Arts and Crafts.

Industrial Exhibition Art Gallery.

Much credit is due to the Art Committee for the collection of pictures they have managed to get together and arrange to such advantage in the Art Gallery.

It is an interesting though not a brilliant show—a large proportion of the best work owned by Wellington people was not procurable. Many of the owners are at present on a trip to the Old Country; others did not care to be without their valued treasures for some two months or more. Of the local artists' work a good average standard is shown, some good and interesting work has been loaned, the product of other countries, and quite a large show is made from the brushes of past and dead masters of art in New Zealand—J. M. Nairn, J. C. Richmond, John Gully.

STUDY IN PHILOSOPHY. E. Baldwin Warn.

It seems a pity that the committee were unable to arrange a Nairn "corner," as they had hoped. The best of Nairn's work was evidently not procurable, but we are all glad to see again the dozen or so the gallery shows. The low-toned oil sketches, the clear, crisp water-colours of Wellington Harbour, the fine little oil interior, "Charlie in His Cabin," and the heavy red "Sunset."

Then, too, what a pleasure is the large oil, "Evans Bay," with its golden hill, its heavy shadow shore opposite. We should have liked to see more of his oil work of this size.

A splendid landscape by J. C. Richmond is 139, with its hot, bush-covered hills, but his "Isle of Arran" (62) is cold and thin, as if from another hand altogether. "Schist Rocks, Otago," is more pleasing.

A fair and representative amount of John Gully's water-colours are shown, enough to convey a just impression of his talent and style.

There are many pictures in the Gallery by names Italian and otherwise, not known here, and more or less interesting and good, and some few we might say peculiarly bad.

Of the good, "Unloading Boats, Ischia," and "Capri from the Sea," both by V. Loria, are noticeable.

A good show is made in the collection of local work and of exhibitors whose work is often seen here.

There are many water-colours by F. M. Hodgkins, by M. O. Stoddart, D. K. Richmond, Esmond Atkinson, and a fine show of illustration work, black and white, and colours by H. Linley Richardson, R.B.A. Two or three small Vander Velden sketches in water-colour, "The Monk," by Datillo Rubbo, a number of figure studies in oil by May Lingard, three or four oil studies by T. Linley Richardson, some land and seascapes by G. E. Butler, a portrait, "Dr. Tripe," by M. E. R. Tripe, and three pastel figure studies by Sybil Johnson. Albert Hanson is represented by two charming and delicate water-colours, and Dr. Hay has given us a treat by lending the water-colour, "Homeward from the Hunt," Tom Scott, R.S.A. The same may be said of the "Study of An Old Woman's Head," Gordon Coutts. A glittering, cosy little oil is the "Trysting Place," Carrar, distinctly a study influenced by temperament.

Many small water-colours, and a number of delightful small oil sketches of all styles and thought furnish the best part of the collection.

One or two of the best bays in the Gallery hold work it were better to be without, and whose effect is depressing and irritating. Doubtful copies of very doubtful old masters, dingy Maoris, hard, glassy arrangements of still life. The middle floor space of each section is occupied by a stand holding different collections of jewellery by G. Ditkethly and Mr. and Mrs. Alfred Atkinson, by pottery, old books, curiosities and art treasures of all kinds, over which one could amuse, interest and puzzle oneself for many an hour.

For those who care to go there is W. G. Baker's display of pictures—many and large—a gallery of themselves. Truly the Exhibition caters for all tastes!

Christchurch, June 16.

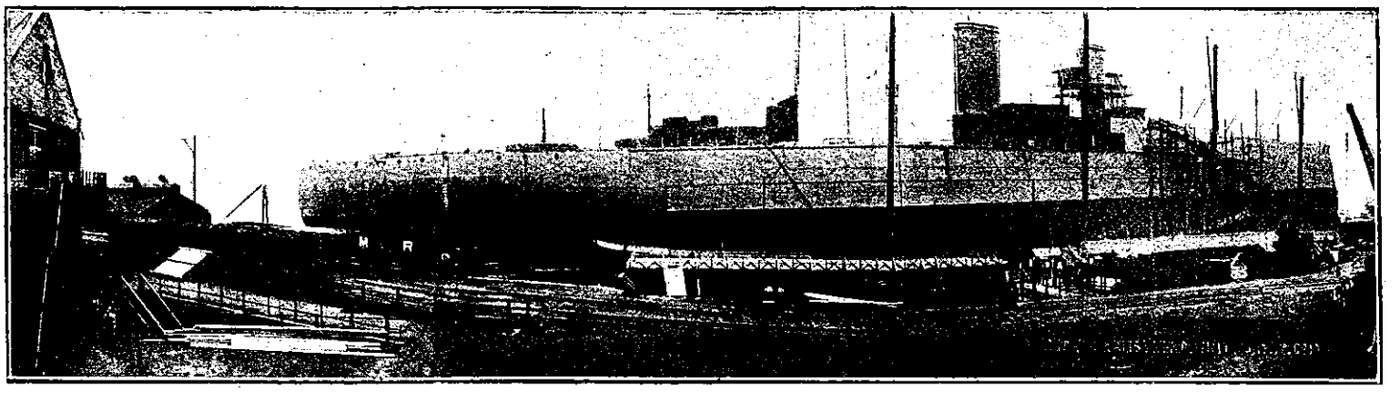
At the present time collections are being made towards erecting memorials to the late King throughout the Dominion. In several places memorial statues have been suggested. A well-designed and modelled representation of our late King is certainly a fitting memorial, but let those committees who have these memorials in hand take the advice of those who are familiar with the work of the foremost sculptors in Europe before finally making their arrangements. In many of our cities pieces of sculpture are to be seen, but in few can there be found a piece of any real artistic value. There are a number of memorial statues in Christchurch, and one or two are really quite passable, but I could mention others that are very inferior, and for which a sum of money was paid that would have assured a work of high artistic merit if the commission had been given to a sculptor of repute. Wellington was fortunate in its selection of its first piece of sculpture. The Queen Victoria memorial is both a fine likeness and a fine piece of sculpture.

It is difficult to understand where those responsible for the selection of a number of the statues in the Dominion discovered their sculptors. Most of the work appears to have been imported, yet the names of the sculptors are quite unknown as far as the European exhibitions are concerned.

If the few commissions for sculpture were given over to the foremost sculptors in Great Britain we should not only be assured of a good likeness, but our art students would have the advantage of studying the technique of the best craftsmen. As it is, the craftsmanship in several cases in Christchurch does not soar above the work of the monumental mason. Strange to say, the carving and decoration generally which was executed thirty to forty years ago on the buildings in Christchurch is infinitely better than the work produced to-day. I do not for a moment think this is because the best craftsmen available to-day are inferior to those in the past, but I should say the work is left to the builder, who is generally satisfied if the carver simply irritates the surface, as long as the price is cut down to its finest limit. In the past it would appear that the architect decided who should do the carving, and made a point of getting sketch models of the work before it was finally executed.

The Christchurch City Council has made a grant of £50 to the Council of the Canterbury Art Society towards a fund for the purpose of purchasing the work of New Zealand artists for the permanent collection at its annual exhibition in March, 1912.

THE NAVY.

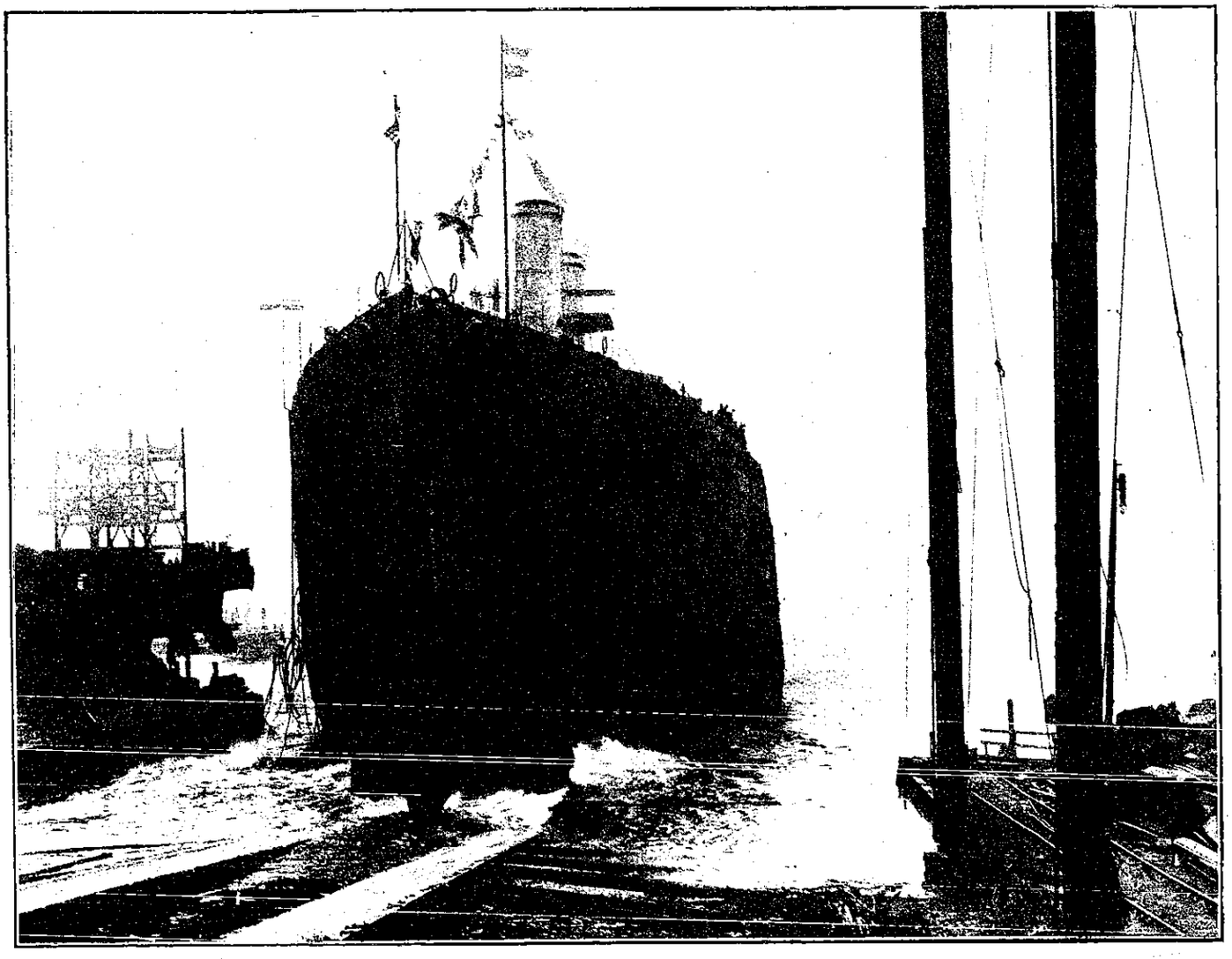


THE "MONARCH" ON THE STOCKS.

H.M.S. Monarch Launched.

A New Process.

Complete success attended the launch of His Majesty's battleship "Monarch" from the Elswick shipyard of Sir W. G. Armstrong, Whitworth and Co., Limited, on the afternoon of Thursday, March 30th. This vessel was the second of the four "contingent" ships of the 1909-10 programme to take the water, the others being the "Thunderer," which was laid down on April 13th, 1910, and launched on February 1st last; the "Conqueror," laid down on April 5th, 1910, expected to be launched early last month; and the "Princess Royal," laid down on May 2nd, 1910, the launch of which is expected to take place in a very few weeks. The keel of the "Monarch" was laid on April 1st of last year, and good progress was made in her construction until the trouble arose with the workmen, resulting in the lock-out. This was on the 3rd September, or five months after the laying of the keel. At this time the weight on the blocks was considerably over 5000 tons, the weight worked in during this period, averaging over 1000 tons per month. The lock-out extended over a period of fifteen weeks, during which time the work on the "Monarch" was entirely at a standstill; but upon the men returning to work on December 15th, rapid progress in her construction was again resumed.



THE "MONARCH" STARTING INTO THE WATER.

The "Monarch" has been built under the usual veil of secrecy, and altogether authentic details cannot be published; it may, however, be taken that she has a length overall of 581ft. and a breadth of 88ft. 6in. The main armament will consist of ten 13.5in. guns, capable of throwing a projectile of about 1250lb. weight. The secondary armament consists of twenty-four 4in. guns, and there are also three 21in. torpedo tubes. The designed speed of the "Monarch" is 21 knots, with a horse-power of 27,000. The turbines are of the usual Parsons' type, with the cruising system incorporated with the high-pressure turbine, as has been adopted in all the later battleships of the Dreadnought type. Steam will be supplied by Babcock and Wilcox water-tube boilers, which, like the turbines, have been manufactured by R. and W. Hawthorn, Leslie and Co., Limited. of Newcastle-upon-Tyne. The maximum coal-carrying capacity will be 2700 tons, and in addition there will be accommodation for 1000 tons of oil fuel. A belt of 12in. thickness extends fore and aft about 400ft., and is continued to the extremities by thinner plating. Above this is a belt of 9in., and there are armoured bulkheads where the thinner plating ends and a protective deck above the belts. It is understood that the "Monarch" will, like the other battleships of her class, have armoured control positions as an alternative to the control position on her tripod mast, and that the turret armour will be 10in. in thickness.

The "Monarch" was built upon a ferro-concrete piled berth, the keel being laid at a declivity of ½in. per foot. The launching ways, 5ft. 6in. wide, are laid at a declivity of 9/16in. per foot, with a camber of 12in., the length of the ground ways being 569ft., and the sliding ways 449½ft., giving a bearing surface of 4946 square feet, and an average pressure of nearly 2 1/3 tons per square foot. Special arrangements and strengthening were introduced at the fore end in way of the poppets to carry the weight of about 2110 tons thrown upon that part when the stern first floated. For releasing the vessel four hydraulic rams, each actuating a trigger, were fitted in the standing ways, all being connected to one centre on the launching platform, where Mrs. Lewis Harcourt (the wife of the Colonial Secretary) pulled a lever which released the pressure from the rams and set the vessel free. Owing to the narrowness of the river Tyne the "Monarch," after clearing the ways, had to be quickly brought up, and for this purpose about 700 tons of drags were arranged in five groups each side, each group coming into play 40ft. after the previous one. The launching weight of the vessel was about 11,500 tons, this weight including, besides the main structure, all the boilers, funnels, funnel uptakes, castings, etc., together with a large amount of auxiliary machinery and about 2000 tons of armour. This last-mentioned weight was made up of the armour bulkheads and the barbette armour of the ship. The installation of the latter before the launch of the vessel has allowed the plating of the various decks in the vicinity of the different barbettes to be finally put in place and riveted up, and in this way a great advantage has been gained inasmuch as the course usually adopted in vessels of this class, namely, temporarily to secure the deck plating and remove it after the launch, to permit of the armour being got into position, has been avoided. The remaining weight of the armour on board is made up of a large quantity of side armour from the Openshaw Works, which has been put in place. The quantity of armour already fitted in place will greatly facilitate the work on the battleship.

The fact of a first-class battleship being built on a slip, and having all these weights incorporated before being launched, is a performance which has never yet been attempted in this or any other country. To some extent the same course was adopted at Elswick in respect of the cruisers "Newcastle" and "Weymouth"; but the work which was undertaken in the "Monarch" is of much greater importance. Each of the eighteen boilers weighs 23 tons; the funnels are 53ft. high above the upper deck and weigh 18 tons each. It will be apparent that these large boilers could not be got into place excepting through large openings in the five decks above the boiler-rooms. The usual practice hitherto adopted in such battleships has been to put the deck plating in place, and in order to give the necessary strength for launching the vessel, to rivet or bolt down temporarily a large quantity of plating which has to be removed after the launch to permit of the boilers being shipped. This plating weighs some hundreds of tons, and is secured by many thousands of bolts and rivets. Therefore, by installing the boilers, funnel uptakes, etc., in the early stages of construction, not only have the decks and other structures been finally completed, but the engine contractors have been able to proceed with the other work in the boiler-rooms, which are consequently now in a very advanced state.

In making a tour of the "Monarch" just prior to the launch, one was impressed with the forward state of a large part of the internal work, such as the pumping, drainage, and ventilation, the fitting up of the magazines, shell-rooms, and store-rooms, and the electrical installation, the ring main in connection with which is already in place. Regarding the upper structure, the funnels are erected, the upper deck casings, etc., as well as the deck-house and bridges, are all completed. A large part of the wood is laid on the upper deck, the handrail stanchions, awning stanchions, bollards, fairleads, and other deck fittings, are all in place. It is quite certain that no first-class battleship has ever been launched in such a forward condition, and when it is remembered that the whole of the work has been done in 219 working days, it speaks volumes for what can be done in the private yards of this country when desired.

In the dockyards vessels are launched at a much earlier date of construction, and it is the custom to place them in dry dock after launching, in some cases for several months, when such work as water testing can be completed, which otherwise would be done on the slip. As private yards have not such docks at their disposal, it is necessary for them to complete more work before launching, and then in such battleships as the "Monarch" they do not go into dry dock until a few days before the official trials and then simply for the painting of the bottom, examination of the under-water fittings, testing of gun sights, etc. It is interesting to note that the "Monarch" is the forty-third warship built for the British Government out of a total of 135 warships built by the Armstrong firm, or, in other words, Sir W. G. Armstrong, Whitworth & Co., Limited, have built for the British Navy nearly 200,000 tons displacement, and for other Governments 300,000 tons, making a total of 135 ships, and nearly 500,000 tons displacement. It is confidently expected that the "Monarch" will leave Elswick shipyard in October, and be ready for official trials in November next, but it will not be a matter for much surprise if these dates are anticipated by a few weeks.

Wireless Telegraphy.

The Paris Wireless Telegraph Station.

(From Our Own Correspondent.)

Paris, March 20.

The various practical applications of wireless telegraphy have of late years aroused great interest, not only among scientists and engineers, but in the general public throughout the world. Not the least important of such applications is the service which it appears destined to render to navigators. With a view to keeping New Zealand readers *au courant* with the progress in this direction I recently made several visits of inquiry, and in the subsequent paragraphs I am presenting some of the principal facts that came under my notice.

An Interesting Subject.

The rigorously exact determination of the position of a vessel at sea has at all times been a subject claiming close attention and study from those interested in navigation. The methods of astronomical and chronometrical observations in use up to the present, although they yield approximately exact results, are not free from the risk of errors which may involve serious consequences. The application of radio-telegraphy to the transmission of time should, however, soon suppress every possibility of error. The multiplication of the stations in communication with one another will in the near future enable the surface of the entire globe to be covered by means of the Hertzian waves. The latest improvements affected in wireless telegraphy will rapidly lead to the achievement of this result.

Radio-telegraphy renders it possible to transmit to all ships within a radius of 3000 kilometres or more a given time, say the hour of noon, mathematically exact within one-tenth of a second, the speed of the Hertzian waves being almost equal to that of light, 300,000 kilometres a second. This puts the sailor in possession of the chronometric time, which assures the determination of the exact spot where the vessel is at that moment; that is to say, it enables him to calculate the longitude and latitude of the place with absolute exactitude.

Importance of Exactitude.

And the importance of this exactitude in the knowledge of the time, by means of which most serious errors can be avoided, will be appreciated by everyone who reflects that the best marine chronometers in use may, after a few weeks or

months of navigation, be subject to variations of two or three seconds or more, and that each error of one second in the time corresponds with an error of 450 metres in regard to the exact position of the ship.

The new method was first experimented with in June last. At that date an increase in the power of the electric batteries and improvements in the other instruments employed at the Eiffel Tower enabled long-distance radio-telegraphic signals to be sent and received. Certain wireless telegraphy stations in the United States which have water power at their disposal and are thus able to produce large quantities of electric energy had already sent electric waves as far as Europe, where they were registered by sensitive apparatus. And a serious effort is being made in France to equip the principal radio-telegraphic stations, and notably that of Paris, with instruments and electric energy to ensure that signals may be transmitted and received with certainty and regularity.

In order to ascertain the working of this important service I decided to investigate the question of the transmission of the hour, and for this purpose two visits seemed to me to be of equal importance—one to the Observatory, the other to the Laboratory at the Eiffel Tower.

At the Observatory.

The approaches to the Observatory have a severe aspect quite appropriate to the temple of the most ancient of human sciences. Passing through the gate and little garden laid out in geometric patterns, around which stand the pavilions where the modern disciples of Prometheus are engaged in wresting from the infinite the tell-tale image of the stars, if not the heavenly fire, one enters the sanctuary, rendered so illustrious by great discoveries, through a low archway which evokes ideas of a crypt.

There, on the silent ground floor, with walls more than two metres thick and covering over deep catacombs, were originally installed the clocks, instruments of precision, designed to serve as standards in the verification of the mean time, faultless dials whose truthful hands with their absolute synchronism have realised the ideal of Charles V. after a lapse of four centuries.

But even the shelters, which seem the most secure are liable, it appears, to be affected by certain climatic influences. After the inundations the whole installation of horary instruments was removed to the first floor. Under its fine rotunda, ornamented by portraits and astronomical instruments, the assistant astronomers quietly take their observations beneath the high windows which illuminate the spot where Louis XIV. visited Cassini, a scene of which Lebrun's famous picture has illustrated the souvenir.

On the wall are fixed the two principal clocks, regulated to the hundredth of a second, which were ordered by M. Baillard, the eminent director of the Observatory from M. Leroy, the well-known chronometer maker of the French navy. It is these two clocks which twice every twenty-four hours, that is, at 11 a.m. and at midnight, will signal the time to the four points of the compass by means of the electric apparatus of the Tower.

The Transmission of the Hour.

Shortly before the decisive moment (exactly at 10.59 a.m. and at 11.59 p.m.) the astronomer on duty, with one eye on the telescope, watches the hand of the clock, and sends the first electric signals to the wireless telegraph station of the Champ-de-Mars. From there, immediately transmitted by radio-telegraphy, they travel immense distances, warning navigators and other wireless stations. Then exactly at the hour and twice again at intervals of two minutes, the clockwork automatically establishes a contact, by means of which an electric manipulator in the Eiffel Tower sets up a discharge of Hertzian waves. And these waves, spreading through space, reach the limits of the immense circle of which the tower is the centre, influencing all the receivers in this area, and conveying to all, as it were, the beat of a heart which is felt in the pulsations of the remotest arteries. A wonderful result, which impresses even the least reflective when they realise this power of instant and direct communication between human beings scattered all over the surface of the globe.

As I witnessed this simple operation of moving a handle and the contact of a pendulum, it recalled to my mind a very impressive souvenir: that of the solemn moment at the funeral of King Edward VII., when at the very moment of the lowering of the Royal coffin into the vault at Windsor, all work was stopped throughout the extent of the vast British Empire, and it seemed as if, at a signal, the pulse of an entire nation had for some seconds ceased to beat!

And radio-telegraphy performs this miracle every day!

At the Champs-de-Mars.

Here the military authorities hold absolute sway. The transmission of the time is one of the many functions of this important station. Directed with great ability by Major Ferrier, assisted by several distinguished officers, it keeps Paris in touch with the frontier and even with remote posts in Africa. In fact, it was the great service rendered by wireless telegraphy during the French expedition to Morocco which led to the military wireless telegraphy corps being given its present improved quarters to replace the shed in the Champs-de-Mars which it had occupied from 1902 to 1908. The new quarters are connected up with the antennae on the summit of the tower by a special wire.

These quarters are all underground and their entrance, situated about a hundred metres from the Tower, leads to the principal laboratory. It is here that the engineer, officers and sergeants carry out their daily experiments, by the aid of an equipment which is being perfected every day.

On one door may be read the impressive words: "Danger to life." An officer explained to me that it led to the first battery, which has already been in operation for several years. It gives upwards of 50,000 volts and a range of 2500 kilometers.

"We have another in the new laboratory," added my informant, "which was only recently installed, and which the President of the Republic came to see about three weeks ago. This enables us to get 100,000 volts, and we think we shall be able to double our range of action."

The Range of Communications.

"Do you know how far it can carry now?" I asked.

"We are not exactly certain yet. We learn the range only gradually by reports from vessels navigating distant seas. We are already in touch with some of our farthest stations in Africa. That at Dakar, for instance. Communication is not yet perfect as regards transmission to regions where atmospheric phenomena are of much greater intensity than with us. But many messages are distinctly perceived."

"Do you communicate with the American coast?"

"We receive and register the waves sent from the Lake Bay station, which has at its service a force of 500 horse-power; and we believe that, with considerable less energy, we shall be able to send our waves over there. But it is not enough to talk: what is said must be listened to. And, according to international conventions, only the small stations of the Marconi wireless telegraphy system are bound to listen and to answer; the large stations are under the same obligation in regard to distress signals, which they are bound to receive and to transmit. But questions are to be put officially in regard to this matter and will certainly be answered in a satisfactory way so as to enable us to exchange direct communications with the United States and Canada."

"Your service is gaining daily in importance and extent. And thus the longevity of the Eiffel Tower is assured in spite of the ill-humour of the administration of the city of Paris, which on several occasions has manifested its desire to rid the capital of an unaesthetic and cumbrous monument?"

"Yes, but superior considerations will undoubtedly override considerations of art."

"It is certain that its noon cannon, from the point of view of public utility, constituted an insufficient argument."

"Oh," said the official, laughing, "that cannon is no more military than it is chronometric. It is simply fired during the fine season by an employee of the tower, who, with the aid of a glass, watches the dial of the Lyons railway station and fires off his petard when it marks midday in order to remind Parisians that it is the time for *dejeuner*. It may be hygienic; it is in no way scientific."

"And, since hygiene and science are fitted to agree," I replied, "let us note that it is noon, the cannon has remained silent, but the breakfast hour has struck in our empty stomachs. *Au revoir, messieurs et merci!*"

Secrecy in Wireless Telegraphy.

(Translated for PROGRESS.)

As is well known, the waves from a transmission station travel in exactly the same way as the waves caused by a stone dropped into water, *i.e.*, in circles. In many cases this is an advantage, *e.g.*, in communicating standard time and in the case of ships sending out signals of distress, so any station within signalling area could receive the message. For business telegrams, however, and diplomatic correspondence, it is preferable that secrecy

could be obtained if desired; and for communications in time of war, this is practically imperative. This fact was recognised soon after Marconi had made his discovery, but till quite recently no thoroughly satisfactory solution of the difficulty had been arrived at. The invention of "directed" wireless telegraphy proved a step in the right direction, for it meant that the course of the waves was under control to a certain extent. Even then, however, the waves were several miles broad, and so the message could be received by any station within that area, which happened to be in tune with the transmission station.

Good results were looked for from the introduction of the "undamped oscillation" system, by means of which the receipt of a message was prevented, if there was the slightest discordance between the two stations. Operators working on this system agree upon a definite frequency to be observed in sending the message, and stations at which the wires are not set for exactly the same frequency, cannot receive the message; in fact, as a rule, the waves do not affect them at all. Apparatus has since been invented, however, by means of which the time of the wires can be changed quickly and easily, until the tune of the transmission station has been found. This done, any unauthorised station can receive the message.

Attempts have been made to prevent such a proceeding. The two stations agree upon, not a single frequency, but a series of different frequencies, which follow one another in a prearranged order. Before an unauthorised station has discovered the first frequency, the transmitting station has passed on to another. This system is, however, not sufficiently reliable, for if the two stations did not set their wires in time for the different frequencies at the exact instant, the message would be unintelligible.

A comparatively simple solution lies in the adoption of a cipher system. Such a system has in many cases proved successful, but is open to one serious objection. The transcribing of the message from the cipher requires a considerable time, and such a delay might be disastrous in time of war, besides involving possibilities of error.

Captain Hovland, of the Norwegian Marine Department, set himself the task of inventing a system, which should be as reliable as the cipher system, and yet enable a message to be received as quickly as if sent by the ordinary method of transmission. Results prove that he has been successful. The generator of his apparatus resembles a typewriter, having marked keys corresponding to the letters of the alphabet. Every time a key is pressed, a series of contacts is produced, which gives rise to the current and which transmits the required letter.

The characteristic feature of Hovland's system is that his apparatus admits of rearrangement, and by means of a special piece of mechanism, called a cryptograph, which consists of several number discs, after the style of a combination lock, a large number of cipher combinations is provided. The effect of the rearrangement of the apparatus is that, instead of the actual contacts corresponding to the individual letters, certain other contacts are made, in accordance with the chosen combination. The receiving station must set its cryptograph for the same combination, and then the contacts received are automatically changed into the original corresponding letters.

An example will make this clearer. Two stations agree to work with the combination 3-724-156. Both set their cryptographs at this number, and the transmitting station, to telegraph the word Berlin, for example, presses one after another the keys B E R L I N. By reason of the rearrangement of the apparatus, however, quite different letters will be telegraphed, perhaps S R K H R N. Unauthorised stations could receive these letters, but could make nothing of them. In fact, even of the stations which have Hovland apparatus, only those could translate the message which knew the actual combination used, or which discovered it by trial, and that is practically impossible where there are 720 possible combinations. The apparatus at the receiving station, however, will automatically change the letters according to the combination, and the word "Berlin" will be read.

In the latest machines, as in typewriters, the letters are written on paper, so that the telegram can be read immediately. This accomplishment is all the more remarkable, as exact synchronization of the apparatus at both stations is imperative. It is well known, too, that Charles V. spent a lot of time and trouble in vain, in trying to make two watches in one and the same room work absolutely regularly. Hovland, however, has succeeded in regulating the action of the two stations. At each of them there is a large revolving cylinder, fitted with contact pieces, which at each revolution make and break the current. Slight irregularities in the working of the apparatus are unavoidable, but by this means they are prevented from becoming greater, as they are reduced to a negligible quantity at each revolution of the discs.

Hovland's system can be used in ordinary telegraphy, a fact which is certainly of secondary importance, though in time of war it might prove to be of great value. —"Frankfurter Zeitung."

The Linde Process for Preparing Hydrogen from Water-gas.

(Translated for PROGRESS.)

For some time past hydrogen, of the purity and lifting power requisite for aviation purposes, has been manufactured from water-gas, which contains about 50 per cent. of hydrogen. The favourite method hitherto has been to pass water-gas and steam over lime heated to 500deg., thereby eliminating the impurities of the water-gas, and producing pure hydrogen

The new process of Linde has proved both cheaper and more effectual. It is an application of a method originally devised and still used for extracting pure oxygen and nitrogen from air. It consists of a coil of two concentric tubes, the outer of which opens into a small bulb, from which the liquified gas is ultimately drawn off. The inner tube ends in a fine jet. The purified gas is compressed and cooled, and then led through the inner tube at a pressure of about 3000lbs. to the square inch. On issuing at the jet it expands and consequently cools, and passes on up the outer tube. In doing so it lowers the temperature of the gas passing down the inner tube, which in its turn expands and cools in the bulb, and passes into the outer tube. The continuance of this process results in the ultimate liquefaction of carbonic oxide at a temperature of 200deg. C. below zero. The hydrogen in a practically pure gaseous state passes on through the outer tube. This hydrogen can be still further purified by very simple means, until one obtains a gas containing 99.5 p.c. hydrogen, which fully satisfies the demands of aviation. At the same time, a fairly pure carbon-oxide is procured, with which the gas-motor used in compressing the water-gas can be driven. The maximum cost is thus greatly reduced, and as coke and water are the only materials needed, the preparation of hydrogen by this method entails comparatively small expense.

Previous to the discovery of this method, the lifting power of the hydrogen obtained was 1.98lbs. per cubic yard, whereas now hydrogen, with a lifting power of 2.009lbs. per cubic yard, can be prepared.—"Frankfort Zeitung."

Correspondence.

(To the Editor.)

Engineering in New Zealand.

Sir—"He who can make two ears of corn grow where one grew before is a benefactor to his race." "He who can double the product of his plant is equally a friend of mankind." "The methods which increase product also increase profits and benefit mankind at the same time." Engineering in New Zealand is not by any means what one could wish; cost of labour is high, and raw material is expensive, owing to the distance it has to be brought, and consequently the locally produced article is too high in price to compete successfully with the outside world. At the same time, if manufacturers would realise the benefits to be derived from labour-saving machinery, they would certainly not have so much cause to complain.

Take the labour cost, and this has been pointed out to the writer as the chief trouble. What is to stop the manufacturer from using the up-to-date labour-saving machine tools that have been put on the market by the older countries? These tools are the outcome of very careful experiments, and are being used successfully in some of the largest engineering shops of the world, and what they are doing in those shops they will do for New Zealand.

The employer often says he has not enough for any further plant. He does not seem to realise that by throwing out his old, antiquated machinery and replacing it by modern tools his working expenses would be cut down by 25 per cent. to 50 per cent., and in some cases even more. The employer is too prone to consider the first cost and not look at the actual result, and, after all, it is the latter which counts.

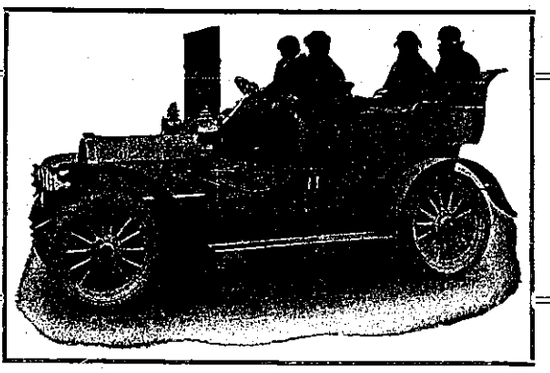
Several firms are using "high speed" steel for their cutting tools, and some complain that they get very little better results than with ordinary tool steel. Probably not; their old-fashioned machines will not allow them to take full advantage of the new steel.

One manufacturer held up a piece of work of which he said the labour cost for machining was ninepence, and considered that good. The same kind of work is being done in some English shops at a cost of not more than twopence; the difference in wages is not so much as that.

The use of labour-saving tools would benefit the worker as well as the employer, inasmuch as the better workman would be able to command a higher wage for increased production, while the indifferent workman would be weeded out; and how many indifferent workmen are in the workshops of the Dominion to-day drawing the same pay as first-class men?

The ironmasters are agitating for an increased duty on imported machinery. Why not use modern tools and methods of production which would bring them larger profits (and this is what they are in business for) rather than wait for a duty which if levied would probably not benefit them.—CENSOR.

Motors Motoring



NOTES.

(From Our Own Correspondent.)

London, May 12, 1911.

Undoubtedly the more interesting item in this week's motor news is the fine debut made by the "Thomas" transmission. This takes the form of a villainously severe reliability test under the auspices of the Royal Automobile Club; a continuous non-stop run of 2000 miles over steep gradients having been made.

New Zealanders' enthusiasm over the success of the Thomas Transmission will become real when I mention that Mr. Thomas' partner in the evolution of his invention is Mr. K. J. Thomson, a Maorilander himself, and brother to the one-time surveyor of Karori Borough, Wellington.

The essential features of this really wonderful invention must be referred to. The transmission is by electro-mechanical means, though not essentially an electrical system.

Ever since the petrol car took the popular fancy, attempts innumerable have been made to devise means for providing an infinitely variable gear: that is to say, one which would increase or decrease the engine tongue in relation to the driving wheels progressively with the demand for power.

Broadly speaking, no practical application of the principle involved has been made. The friction drive actually gives an infinitely variable gear, but, on account of its very characteristics, has not met with favour in the engineering world.

It has, therefore, been necessary to rest content with the arbitrary ratios, two, three or four in number, which obtain with the well-known epicyclic and sliding-gear boxes. No one ventures to claim for these that they represent constructive finality; hence the interest excited by the Thomas gear.

Not to be too technical, and for the sake of brevity, I will describe the Thomas transmission as one which provides two paths for the power of the engine: one mechanical and the other electrical. These paths are interconnected by means of two (small) electrical machines and a simple, differential-type, epicyclic gear.

Situated behind the engine is the epicyclic gear, the casing of which is made integral with the flywheel. Each of the two "sun" wheels is attached, by means of concentric shafts, to the electrical machines (a dynamo and a motor).

The action of the gear is such that the closing of the field of the dynamo not only causes a current to be generated (which is utilised by the motor), but also puts a mechanical drag on one sun wheel, with the result that the other has to move, a motion which sets the vehicle travelling. By a simple type of rheostatic control, the drag of the dynamo armature is progressively increased, and causes the vehicle to gather speed.

The reliability trial I referred to earlier was of a two-ton 30/40 h.p. lorry, loaded with four tons of sand in sacks. Over the steepest of hills this burden has been borne by the Thomas transmission. Gradients of 1 in 10 have proved no obstacle. Wet and fine, night and day, for close on a fortnight, the vehicle has run, and testimony as to the excellence of the conception and manufacture of the gear is rendered by the fact that no breakdown has occurred.

New Zealand commercial vehicle users, in particular, and motorists in general, will appreciate the scope there is for this gear in the colonies. For the information of readers of PROGRESS, I will mention that 14 Leonard Place, Kensington, London is the address of Messrs. The Thomas Transmission, Ltd.

I may say that I have been watching the evolution of this gear for some time, and have had several runs, on both private and commercial cars, fitted with it. Among the features apparent to even the casual observer are:—(1) Self-starting, per medium of a small accumulator, the dynamo, and the epicyclic gear; (2) from 10 to 20 "speeds" forward, the lowest being so low that the car fitted with it can climb the side of a house; (3) electric lighting, without additional cost; (4) accumulator automatically charged by the dynamo; (5) a smaller engine power is made possible; (6) a higher compression can be used; (7) the engine always runs at the best rate of speed, and therefore generates more power and that continuously.

That we are learning more every day about the prevention of side-slips is brought home to us by the report of the tests held recently of a new gyroscopic anti-skid device. At the outside, let me say that this invention, though certainly a mitigator of skid, is not an infallible preventative. Were it so, a new era could be said to have started. The gyroscopic device consists of a high-speed flywheel, of no very considerable weight, mounted on a bracket as nearly over the front axle as possible. It is allowed a certain amount of vertical movement in order that it may "precess" and set up the force necessary to overcome the skid. The moment the back of the car commences to move sideways, it begins to pull the gyroscope round, an attempt which the latter immediately resists with that wonderful latent energy it is known to possess. Trials have been made with a car on a prepared greasy road surface, and the results, when the gyro. is working, and also when its action is suspended, prove conclusively that the inventors of the new principle are on the right trail. Incidentally it should be mentioned that the steering cannot possibly be affected.

New Zealand motorists are, as a body, interested in the question of spring-suspension. The cost of driving a car becomes very much enhanced when the springs are either too stiff or too flexible. In either case the tire bill is inordinately high, a fact that points to the economy of laying out a little capital to correct errors in springing. With a car that is sprung too hard at the rear it should be possible to improve matters, either by lengthening the springs, necessitating an alteration to the brackets, or by taking out a leaf and fitting shock absorbers. For a lightly sprung car, I have known several cases in which an additional top leaf has been added, in order to check the rebound action generated when the car is travelling at speed on an undulating surface.

Again the passenger's comfort can be increased if a few pounds are expended in increasing the depth of the cushions, and by upholstering them in such a way that the displacement of the air in them can only occur gradually.

I was riding last week in one of the new 12/20 h.p. Humbers, and can vouch for the gain in comfort which results from having cushions of from nine to ten inches deep.

To an onlooker it would seem strange that the average motorist in the United Kingdom has accepted the imposition of the new motor-car and petrol taxes with the placidity he does. Yet the fact stands. The reason is not far to seek. The money is all being well spent on roads improvement, and therefore is well worth the paying. I wonder whether a similar tax has yet been mooted in New Zealand? If so, and if it goes to better the roads it is a worthy tax. If it is used to relieve the rates it is an imposition.

In Ireland, for instance, the motorists stand to benefit most materially. As I know to my cost, the roads there are in a pitiably decadent state. But a healthy sign is the competitive rush for precedence in favour which the country road authorities are making. It is known that there is not enough tax collected to go round, and, consequently, the County Councils are willingly offering to subsidise any grants they may receive from the newly constituted Road Board.

I mention this matter since I feel that the time is ripe for the New Zealand motorists to get together and agitate for better roads. To gain their point it would pay them to subscribe, by means of a tax,

and force an improvement more rapid than could be expected in the course of the existant administration of local affairs.

As I conclude these notes I am sitting in a hotel away up in Sligo, a western county which possesses such gems of scenic beauty that one would have to be a Tom Moore to describe them.

I rowed, late last night, up the river to Lough Gill; by moonlight it was, and the time and place and associations of this country impressed me deeply. The boatman who accompanied me (and did most of the sculling!) has seen 75 summers slip by. He entertained me with stories of the famine years in Sligo (1846 *et seq.*) and the cholera plague in 1848. He remembers the quicklime cart and coffin waggons which patrolled the streets and dealt with the dead (and dying, too!); such were picked up, thrown into coffins, covered with lime and burned. This quaint old waterman related a story about a Patsy Gallaghan. Patsy happened to slip and fall in the street just as the coffin and lime carts were passing, accompanied by the doctor. They picked him up, threw him into a coffin and were about to "lime" him when he opened an eye and said: "Sure you won't be after putting the lime on me?" "We will," says the executioner. "But I'm not dead," pleaded Patsy. "Not dead, ye say, not dead! Would ye give the lie to the doctor, who has just cartified ye?"

Yes, I enjoyed the row last night, but the boatman was put out that I had not gone by daylight, so he could point out the historical places to me. "Why the h--l didn't ye shtart betimes?" he kept muttering, and emphasised his disgust by sculling nearly 40 to the minute! A man of 75, mark you, and as strong as an ox. I asked him whether he had the old age pension. "Old age pension, is it?" and withered me with a snort. "Glory be, and what 'ud I be doing, taking *their* charity."

I am off in five minutes to the far west, to Belmullet. The weather is glorious, and this part of Ireland grips one. It brings home to the visitor the antiquity of the Irish civilisation—a civilisaton that flourished when the Englishmen dressed in woad.

Various Hints.

(Our Californian Correspondent.)

Los Angeles, May 20.

Buying a Car.

A man came into my store the other day and asked me how manufacturers of automobiles classified them according to price. This man wanted to know why it was not just as well for him to buy a car costing from £250 to £300 as to buy one costing from £350 to £400, according to the equipment of the car. I suppose a lot of people ask themselves this same question. It must be puzzling to a man who is just preparing to buy a car to determine just why he should pay £40 or £60 more for one car than another. Here are a few of the reasons.

Certain Standards in Mind.

Every person who starts out to buy a motor car should have in mind certain standards by which to judge a car. Briefly, these are: Simplicity of design, good looks, ease of control, comfort for both driver and passenger, proper proportion of weight to size and tires, and the factors of safety, which are—wheels, frame, brakes and steering connections.

Now the reason for buying a car costing from £350 to £400 rather than one costing from £250 to £300 is that the cheaper car cannot have the good manufacture, materials, and the good finish of the higher-priced car. The cheaper has what is known as second-grade leather and second-grade hair in the upholstering. The bodies of cheaper cars are often "dipped" rather than painted. The work on the body cannot be as good. The same high-grade materials and workmanship cannot go into the cheaper car that go into the car costing from £350 to £400.

Care Necessary in Washing Cars.

Washing a car is not a great stunt, provided one knows how and has the proper equipment to do it, for outside of the added complication of the greasy chassis, the art of washing a car represents the wisdom of ages as handed down to us by the coachmaker, the coachman and the livery stable-keeper.

Now the main requisites in washing a car, especially a new one, are plenty of water, long hose, pail, some good chamois skins and a soft sponge. Mud should be washed off every night when the car comes into the garage, with cold water freely supplied from the hose. Be sure and let the water soak in well before sponging or wiping it off. The water, of course, must be cold. Nor is it necessary to use soap every time a car is washed, but if need must, a castile or other fine toilet soap is best. Do not let the soap-suds dry on the varnish. After the car has been well washed with running water it should be rubbed down with a clean chamois skin. The chamois should be rinsed and wrung out and made into a smooth pad so that it will take up any water left on the car from the hose or sponge.

It is always well, too, to have two sets of sponges and chamois skins, and two pails, so that the set that is used on the greasy chassis will not come in contact with the finely finished surface of the body of the car. Sometimes, however, after the car has been washed it may look a little greasy. The remedy then is to take a piece of cheesecloth and rub it off.

Do not use any so-called furniture polishes and renovators. They do more harm than good. The best thing to use is the coachmakers' and pianomakers remedy, plenty of cold water and clean chamois skins. The cold water will harden and brighten up the finish and the chamois will do the polishing.

Care of Tires.

The average motorist has learned by experience to take proper care of the mechanism of his car, but he, too, often neglects his tires. Ordinary care accorded spare envelopes and tubes is good insurance, and will save the motorist much trouble and money.

A few suggestions at this time regarding the proper care of tires may benefit the reader.

Never carry spare tubes unprotected in the tool-box; they will inevitably come in contact with sharp tools and greasy substances, resulting in their serious injury. It is a well-known fact that oils and grease are deadly enemies to rubber.

Exposure Injures Rubber.

Exposure to strong light and varying degrees of temperature is also very injurious to rubber, robbing it of its elasticity and making it brittle. All of these dangers are overcome by the use of waterproof bags made especially for carrying spare inner tubes. These are supplied by all accessory dealers.

Motorists sometimes carry spare tubes in the original card boxes. The jolting of the car in motion causes the tubes to chafe against the sides of the boxes, eventually weakening or even wearing away the rubber. Unless the tubes are to be stored in the garage, they should always be taken from the original boxes and placed in tube bags.

Cycling and Motor Notes.

Mr. Colin B. King has just completed a 7000 mile touring run in a 30 h.p. Cadillac car, shod with Dunlop tires, journeying from Brisbane, passing through New South Wales to Sydney, over the Blue Mountains to Melbourne, and across the desert to Adelaide and Broken Hill to Cunnamulla, passing within a few miles of the historic spot on Cooper's Creek where the Burke and Wills expedition perished of thirst and privation, the only survivor, by a strange coincidence, being a man named "King." This is the Australian record long distance touring run in the one car with the one set of tires, and is the event of the year in motoring.

* * *

The probable date of Australia's premier road contest, the Dunlop Road Race from Warrnambool to Melbourne (165 miles) is Saturday, October 14th, the Dunlop Rubber Co. having applied to the League of Victorian Wheelmen for that date. The Saturday selected—Caulfield Guineas Day—is a week later than the date upon which the "Warrnambool" is usually held, the change being made with a view of missing the Flemington Race traffic, thus obviating to a great degree the overcrowding of the road associated with the last few "Warrnambool" finishes. The conditions of the race will be practically the same as last year, perhaps with an additional rule requiring contestants to wear suitable costumes, including stockings, thus doing away with the scanty track racing costumes many of the competitors now foolishly ride in. The prize list—totalling over £200—together, with conditions, etc., will be issued at an early date.

* * *

A matter that worries many motorists and intending motorists is the question as to whether it is better to have a single seated body or the ordinary tonneau (i.e., double-seated body) fitted to their cars, irrespective of the wisdom of fittting a light body on a chassis sprung to carry a heavy tonneau. For economical motoring there is no doubt the single-seater—which can be made to carry three people—is a long way better than the tonneau, the saving in tires alone being very considerable, for it is the lateral strain and the additional weight of the extra passengers and body over the back tires that causes fifty per cent. of the tire troubles met with on the road. Of course, the man with a family wants his four or five-seated car, and would be selfish to fit his car with a single seat, but for the motorist who has on family ties there is no doubt that he will get cheaper and better motoring on a single-seater, with chassis designed for the purpose.

* * *

Some remarkable figures were recently established on the Brooklands racing track (London), by a freak 2-cylinder Lion-Peugeot light voiturette (small car). The freakish nature of the engine will be understood when it is stated that the bore of the cylinders was only 80 millimetres, with a stroke of 280 millimetres (over eleven inches). The times recorded were: Flying half mile in 24.24sec.; fifty miles in 39min. 47sec.; hundred miles in 89min. 28sec.; and 78 miles in the hour—remarkable travelling for such a type of car.

Dredging at Waikaia.

(By A. Gordon Macdonald.)

A rather novel method of dredging is being carried on at Waikaia by the Mystery Flat G. D. Co., by means of which ground hitherto considered fit only for sluicing is being worked by the dredge.

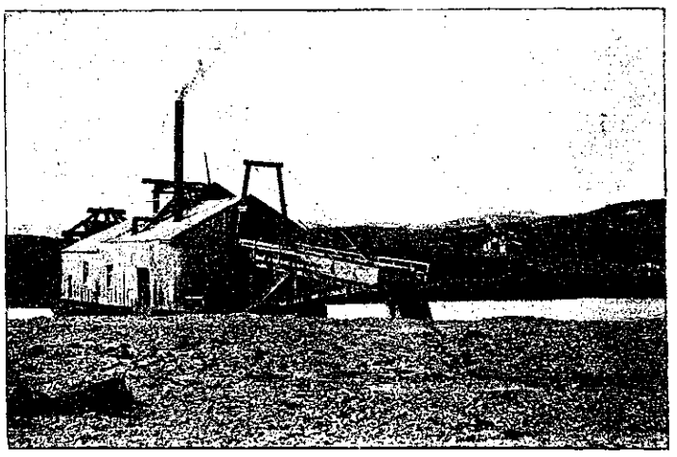
After dredging all the available river flat, the dredge is now working its way up the gentle slopes of the terraces and foothills surrounding the river flats.

To do this, water has been brought on to the claim by means of a race some two or three miles long, and commanding ground at an elevation of about 50 feet above the river level. The dredge works in a paddock supplied by this race and continually stacks the tailings behind, forming a dam to keep up the level of the water in the paddock. As the ground is shallow a tailings elevator is not required, the dirt being washed through a sluice-box, as shown in the illustration.

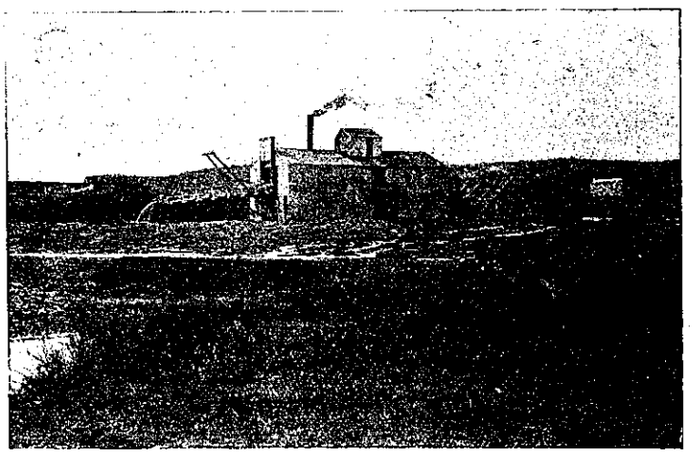
It was found that the tailings dam would not rise with the rise of ground unless a low dam was first built up to hold the bulk of the tailings. Once started in this manner the tailings keep building an efficient retaining wall for the paddock. These low dams of sods and brush will probably have to be built up occasionally as the dredge advances and rises.

At the present time the dredge is some thirty feet above the river level, and it is the intention of those in charge to work right up to the water race. After reaching that level pumping will be necessary to keep the paddock full, for the present intention is, if possible, to work over a low saddle at an elevation of about 50 feet above the level of the water race, and so into another gully, down which the dredge will work its way to the river again.

From the progress already made by the dredge, it would appear that this method of working is quite successful, and it may come about that ground so far considered unworkable, owing to the lack of water for sluicing, may yield profitable returns when worked by dredging in this manner. At all events, the immediate future of this dredge will be watched with interest by all associated with the progress and development of mining, and of dredging in particular.



The Masterton Dredge in the foreground, the Mystery Flat Dredge in the background, showing the track up which the latter dredge worked to gain its elevation. *A. Gordon Macdonald, photo.*



THE MYSTERY FLAT DREDGE, "WAIKAIA," which is dredging up-hill by depositing its tailings as a dam behind it. This photograph gives a view of the dam, which is seen to be fairly high. It is intended to dredge almost to the top of the low hills in the background. *A. Gordon Macdonald, photo.*

Aviation.

Ingenious Ornithopter Design

Professor H. La V. Twining, president of the Aero Club of California, and head of the department of physics and electrical engineering at the polytechnical High School, of Los Angeles, California, has completed an ornithopter in which he has embodied a knowledge of the principles of bird flight, gained during a close study of bird habits for twenty years.

The framework of this machine is made of bicycle tubing. It has a total weight of 100 pounds. The wings measure 27 feet from tip to tip. They are four feet wide near the body of the machine, being triangular in shape, narrowing to a point at the tip. They are operated by hand and foot levers. The levers connect by links to the front rib of the machine, within three inches of the main bearing, the hand levers being on the inner and the foot levers being on the outer side of the main bearing.

The bearings are ball throughout. The weight of the aviator is thus thrown upon the front edge of the wing both to raise and to lower it, the aviator at the same time being able to exert a pull between the hands and feet, the hands moving up while the feet move down to lower the wing. To raise the wing, the weight is thrown upon the hands, and at the same time the feet and the hands are made to approach one another by pulling up with the feet and pushing down with the hands. The levers give a mechanical advantage of two to one. By this means a pull of 250 pounds can be brought to bear upon the wings on both the up and down stroke.

Professor Twining states that he can beat the wings fifty-two times per minute, a beat being designated as one movement of the wing down or up. The machine was suspended from a spring balance, in recent experiments, and the following data was obtained: Weight, 240 pounds with operator; speed of stroke, fifty-two beats per minute; area of wing surface, fifty square feet; sweep of tip of wing, ten and one-half feet; hands moved through 13 inches; feet moved through sixteen inches. With hands and feet moved up the levers so as to get a leverage of two to one, a lift of 120 pounds was obtained on the down stroke, the machine at the same time rising two inches. On the up stroke of the wing the machine moved forward and showed a slight lift. Owing to the difficulty of suspending the machine from its centre of gravity the whole leverage, four to one, could not be tested. The Professor says in his machine the weight of the wings will be borne by springs, which will relieve the operator of having to bear their weight in handling the levers. The wings, when flapping, displace air and force it away at the rear tips and more air moves towards them at all other points, so that pressure is developed under the wings. The up stroke of the wings in bird flight is very important, and has been ignored by those who have previously built bird-like machines, but he thoroughly believes that he will be able to use this force to excellent advantage. While the theory is correct, he believes that practice may develop unknown factors. In case of a failure in this instance, he intends to continue his experiments until he solves the problem.

Prof. H. L. Twining is at work on two machines of this type; the result is that he has continued his experiments and expects to soon build another. He is also engaged with Warren Eaton and F. S. Eaton, of Los Angeles, in the construction of a monoplane similar to the Bleriot. An important change in the control has been introduced since, instead of warping the wings or changing the angle of incidence of the fore and aft planes, auxiliary sliding planes are to be used. The sliding planes at the ends of the main planes, slip simultaneously to the right or left, thus decreasing the surface on one side and increasing it on the other. The tips of the rear planes slide in the same way, and the whole rear plane slides fore and aft, thus

increasing or decreasing the leverage exercised by the elevator. This secures fore and aft stability. The machine otherwise has the exact dimensions of the "Bleriot XII." Fourteen machines are being constructed in or near Los Angeles.

Planeless Flying Machines.

Notes on the Action of Gravity and the Force of Propulsion.

If the centre line of propulsion is directed at an angle of 30 degrees with the horizon (60 degrees to the vertical), taking gravity at 16 feet fall per second, a force of 32 feet per second will produce a resultant which is level, as shown by the diagram Fig. 1 on the well-known principle of the parallelogram of forces.

It follows, therefore, that if we increase the propelling force (A Fig. 2) the gravity force (B) of course being constant, we lower the angle of propulsion as shown by the diagram, the resultant (C) as before being level.

To maintain a level line of flight, therefore, we must employ the propelling force at the proper angle according with the intensity of the force, otherwise the resultant will incline upward or downward as the case may be. This is where the airman's skill comes in, and only time and patience and experience will bring this about.

Gyroscopic Action on Planeless Flying Machines.

(By Peter Ellis.)

If four-screw propellers are arranged with their axes at right angles (as per sketch plan), and revolving at a high rate of speed, the machine cannot easily capsize, either fore and aft, or crosswise, because of the gyroscopic action of the propellers. Of course, screw propellers set up in this manner will not work so as to propel the machine, but if the side propellers (AA Fig. 2) are shaped to drive the air tangentially instead of axially, the difficulty may be overcome. I am at present experimenting on these lines.

Notes on Weight.

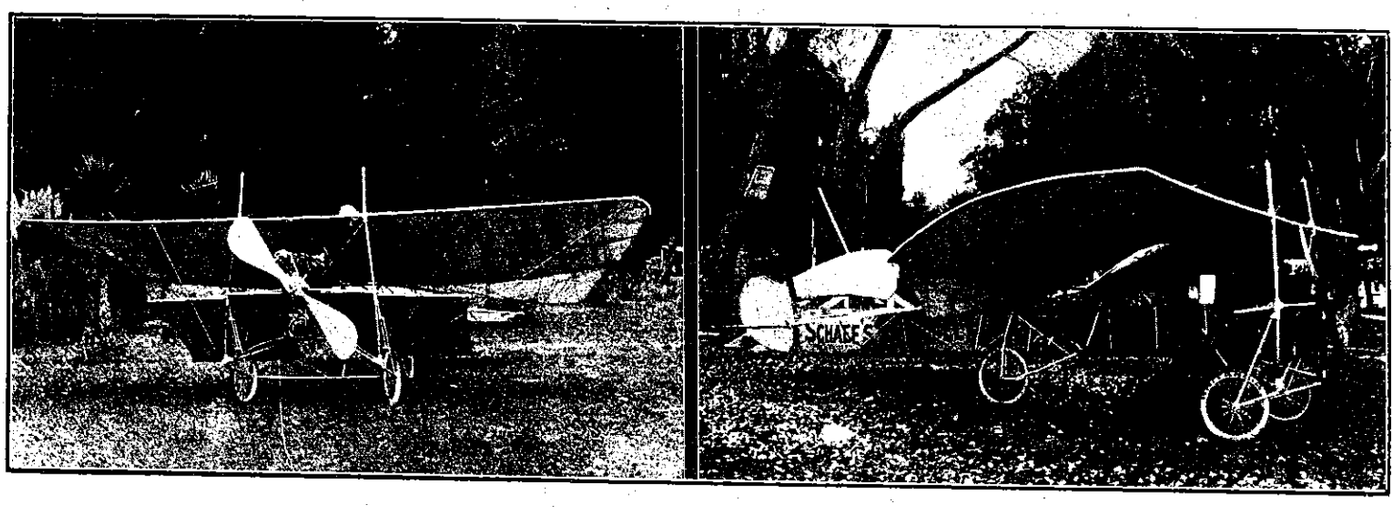
(By Peter Ellis.)

We say that a body weighs a ton, a hundredweight, or what not, according to the nature and quantity of its substance, unless, however, the body is free to move or in the act of moving it has no real weight. This may seem a startling statement, but it is true, as I will explain. Taking the earth and all belonging to it, including its atmosphere, in the aggregate it is a mass everywhere attracted to its own centre; that is to say, all the particles composing the Earth are drawn toward a common centre within it, and such particles have weight when not balanced, *i.e.*, when free to move toward that centre, but when such material rests on other material and cannot get nearer to the centre, its weight ceases. It may be said to press on the material it rests upon, but only in the same sense as its own particles press on one another. The Earth, considered as a whole, can have no real weight except in the direction of its orbit, unless it is drawn by some influence outside or inside or above or below that orbit. Weight being caused by the ability to move towards a certain spot without hindrance. If, for instance, the Earth could fall into the Sun it would have weight towards the Sun, or if it could fall towards any other spot it would have weight towards that spot.

Notes on Gravitation.

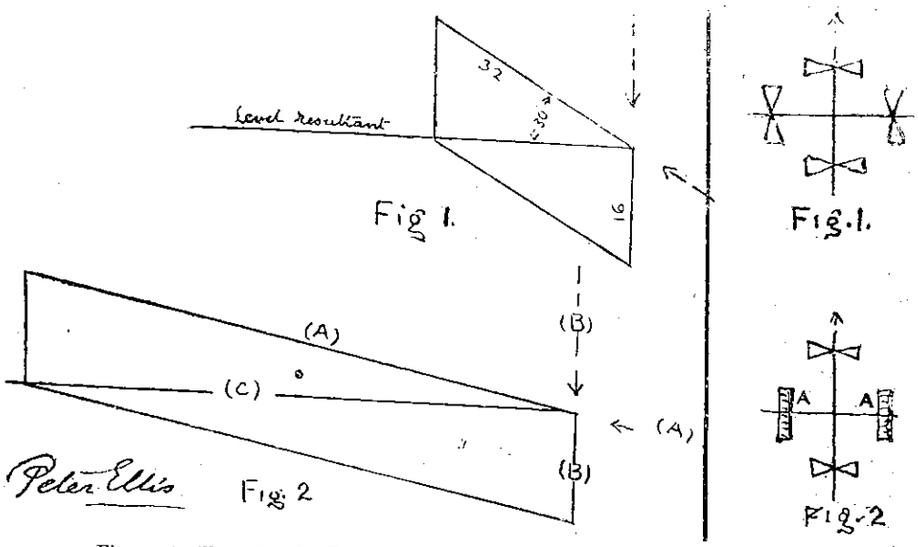
(By Peter Ellis.)

The earth being a mass of material existing in space (its shape being approximately spherical, the form that all bodies naturally assume if possible) its particles must, of necessity, hold together in order to be a mass; gravitation then, is simply the holding together of the atoms. When a portion of this material is by any agency lifted away from the parent earth, it will return again to its bosom on the first opportunity; were it not so the earth must fall to pieces and cease to exist.



A NEW ZEALAND FLYER.

Designed by Mr. Schaef, of Wellington. The novelties of this Monoplane are the fore and aft elevating planes and the broad tiller of the steering rudder.



Figures to illustrate Mr. Ellis' Planeless Flying Machine and Gyroscopic Action.

Berlin to Hamburg.

On March 28 two German officers, in training for reconnaissance purposes, flew from Berlin to Hamburgh, covering the distance (143 miles) between 11 a.m. and 6.30 p.m., which works out at an average of about 20½ miles an hour. But the actual going, exclusive of stoppings, was 41.2 miles. Their machine was a new type of biplane which has been built to the designs of the military authorities at the Albatross works. The biplane carries a 50 h.p. Gnome motor and is provided with air-cooling apparatus. A special feature is that the seat for a passenger is placed at as high an elevation above that of the pilot as possible, so that the officer who acts as "passenger" can carry out reconnissance while his companion controls the machine. The weather was favourable, light breeze and steady.

Engineering by Land and Sea.

Highest Dam in the World.

(From Our American Correspondent.)

Shoshone Irrigation Enterprise.

Los Angeles, May 15.

The Government has added another sprig of laurel to its wreath of victory by building the highest dam in the world. Incidentally it has waved the magic wand for an additional flourish and a vast tract of land, parched and unproductive desert, lost in the wild eddies of rugged mountains, has thrown off a lethargy and is blooming as the valley of the Nile. In this desert are being planted towns that are to be cities. Thought is being given to the future, and they are being laid down for posterity for a hundred years to come. Each is being modelled after Washington, the Capital City, and the only municipality ever built with the far future in mind. A score of little Washingtons are being planted in the West by the Reclamation Service, but the latest of these is Powell, under the great Shoshone dam.

The announcement of this project's completion has just been made. When the snows of Yellowstone Park melt this spring and rush, as they usually do, into the precipitous gorges thereabouts, they will find one outlet blocked. Across the great Shoshone Canyon there stands a bar of masonry that will effectually block the progress of these rapid waters. They will be halted and imprisoned, and when the time comes that they can serve man well they will be led to the near-by plains and set to work doing his will. In the big Buffalo Horn Basin, where the buffalo made its last stand, the plough will have opened a furrow for the waters to follow, and alfalfa will be set to grow where a score of years ago "Buffalo Bill" rode forth in buckskins to shoot big game.

A month ago the huge cranes lifted the last bucket of concrete to the top of the dam at Shoshone, a lever was pulled and the substance spilled over the mould which represented the completed dam. A three years' task, at which men had worked three shifts, night and day, was completed, and in this wild canyon had been placed an additional monument to the prowess of America, a monument that is intended to last for ever. The dam, 328 feet high, measuring from bedrock, 48 feet higher than the Flatiron building, and containing enough material to build a hundred like it. Yet so precipitous were the walls of the canyon, rising half a mile above the stream almost perpendicularly, that they were about 200 feet apart at the top of the dam. The base of the structure, measuring up and down stream, is 108 feet. This width decreases gradually towards the top, forming a parapet only as wide as a waggon road. The Croton dam, which supplies water to Denver, had hitherto held the record for height, it mounting up the 300-foot mark. Long since had America passed the altitude of the Assuan Dam in Egypt, once regarded as a world's wonder, and lacking 100 feet of the height of the Shoshone.

The engineering data for complete project is:—Reservoir, Shoshone—Area, 6600 acres; capacity, 456,000 acre-feet; length of spillway, 300 feet; elevation of spillway, 233 feet above stream bed. Storage dam, Shoshone—Type, concrete arch; maximum height, 328½ feet; length of crest, 200 feet; contents, 69,000 cubic yards. Diversion dams, Corbett—Type, reinforced concrete; maximum height, 18ft.; length of masonry, 400 feet; length of earth fill, 440 feet. Length of canals—13 miles with capacities greater than 300 second-feet; 21 miles with capacities less than 300 and greater than 50 second-feet. Aggregate length of tunnels, 19,000 feet.

The new structure has been so put up as to become one solid rock, and to form a part of the cliffs on each side, just as though it had been placed there in geologic times as a part of them. It is a solid concrete mass. Its feet are driven far into the bedrock that underlies the stream. Great ditches were cut into the sides of the cliffs, and the concrete was poured into these to weld itself with them. The Government prosecuted the work alike in summer and in winter weather. The structure was heated by steam pipes and encased in a canvas covering that damp cement might not freeze and crack in winter. All the material came over a road blasted into the cliff side, for only the mountain goat might find secure footing here. The immense structure was built as in an arch laid on its side, with the top turned upstream. The arch is a bearer of great weight. Immense buildings in all the cities rest upon arches. This dam is to bear great weight, but the pressure is to come from the waters that are impounded behind it. Therefore, the top of the arch is turned upstream, and all the pressure that bears against it will but have the effect of making it more solid.

When the waters are stopped here a lake will be formed that will cover ten square miles of surface, and have an average depth of seventy feet. This will amount to the storage of 456,000 acre-feet of water, or enough of it to cover the entire state of Rhode Island to a depth of one foot. The artificial lake will take the place of a natural one, which existed there in prehistoric times, before the stream cut its way through these cliffs and ate its way down. It will be fed by streams that abound in fish, and its shores will be visited by things of the wild from the country round about, a country that has felt the hand of man less than any other section of the United States. It will be the Mecca of sportsmen and an outing resort equal to those of the Alps.

The dam will stop the waters and hold them for ever. But its usefulness depends upon supplementary works. Into the cliff on one side near the base plunges a tunnel in the solid rock, guarded by gates of iron, so big and heavy as to weigh 10,000 pounds each, and to require an engine to lift them. It is the purpose of these gates to let the desired amount of water back into the stream that it may find its way to the diversion dam lower down and

THE SPILL WAY. A DIVERSION CANAL. WORKING TO A TUNNEL. A STAGE OF ROCK CUTTING.

eventually into the canals which lead to the open plains. Thus the dam catches the flood waters and holds them for timely distribution through the tunnel, leading them on to lands that may be irrigated.

Then on the other side of the dam near the top is another great tunnel through the solid rock. This is meant as a spillway for the flood waters. When the freshets raise the water mark to a position anywhere near the top of the great dam the flood gate will be opened into this tunnel, which is 20ft. across and built with a fall of 40deg., and these waters will plunge through the mountains with such a roar as to shake the earth. This arrangement for the storage of the waters, the disposal of flood water and a leading to usefulness of that water that is to serve a purpose, completes the scheme in so far as the great dam is concerned. But all this is done for the sake of the result that will be brought about in the basin below.

The Big Horn Basin lies 60 miles further down. Here the sediment of the ages has washed down from the mountains of these desert lands over the soils of other regions where rain is more plentiful and where the life is washed out of the soil by too much water.

The reclamation service has diverted small amounts of water into the basin before the completion of the reservoir. For the past three years the Government has thrown open for settlement 15,000 acres each season, and has provided a water supply sufficient for the irrigation of these tracts from the regular flow of the river. They have been absorbed by the land hungry from many States, and new homes and new towns have sprung up. Ralston and Garland were two such towns. The latest village to be born in the basin is Powell, now a rapidly growing infant city of one year. All are located along the Burlington Railroad, which traverses the basin.

It is in these new towns that thought is being taken of the future, and a town is being grown to order, a thing that has happened but a few times in the history of the world. Powell is the best example of this taking thought. The reclamation service realises that when it opens up a new tract of intensely fertile land, many towns and cities will develop with a probability of sometime becoming greatly populated. It is, therefore, giving thought to the manner in which the ground plan of a city should be laid out. It appreciated the fact that Boston is labouring under the handicap of a maze of streets that are without system and that grew up from the footpaths of the early settlers.

There is the one American example of a city laid out with the idea in the beginning that it was to grow into considerable proportions—the city of Washington, which is the prettiest and most conveniently laid down municipality in the world. The new towns on the West are being laid out on an almost identical plan. As Washington began with the Capitol building, these begin with the public square containing the schoolhouse. From this, at right angles, extend streets in accordance with the cardinal points of the compass. In the wide right angles of these streets are run diagonal streets in the same way that the capital city ran its avenues named for the States.

The near-in lots are small and intended as business sites. Those a little further out are larger and meant for residences, with a yard and garden around them. Still further out the subdivisions are yet larger, amounting to five acres at a distance of a quarter of a mile. A hundred and sixty acres is set aside as a town site, and the lots are divided in this manner and sold at auction. The map of the future town is in this way absolutely controlled by the men who lay it out. But the Government goes still further and lays the surrounding country in a similar plan. Within a mile of the town site no individual is allowed a tract of more than forty acres. This means that to every square mile there will be not less than sixteen houses, a density of settlement that makes the community almost a village throughout. Outside the mile limit no settler may acquire more than eighty acres of land. There are few of the prosperous farming communities in the best of the eastern States that have a family on each eighty acres.

The irrigated country lends itself to the working out of an ideal manner of life. There the individual needs but a small amount of land to produce a competence. This means that the homes will be close together and that the bane of country life, its isolation, will be done away with. The neighbours will be sufficiently close together to maintain high-class, graded schools, to get rural free delivery, party telephones, to maintain good churches, social life, and libraries.

The new-planted town of Powell is just taking this form. Already it has the central school, a church, the nucleus of a business section. The Government refuses to sell additional land until a given radius is settled up to the prescribed density. The system of its subdivisions will dovetail into that of the near by towns which are similarly built. The roads meet exactly those from adjoining communities. Water is distributed to these people, and their existence depends on the operation of the laterals. These are in the hands of a farmers' organisation which draws all the members together in a community of interest. This has already developed along other practical lines. The farmers found, for instance, that if they would guarantee to produce a given number of carloads of potatoes, they could contract them to good advantage to big dealers. The organisation asked what farmers intended raising potatoes, and to what extent. The report furnished a basis for an agreement and sales were made in advance for good prices. The farmers in these communities are co-operating on the sale of all their products, a thing rare, but much needed in all such communities.

The completion of the Shoshone Dam means that this kind of farming may be extended to 150,000 acres of land as soon as there are settlers for it. This means homes for 30,000 productive people. The Government will extend its canals each year to a sufficient extent to take in as much land as there seems a demand for. Just now there are 300 farms going begging at Powell, because there are no takers on the ground. When these are settled up there will be an additional number put on the market. The land still belongs to the Government, having been withdrawn

GIANT CRANES AT WORK.

round about, and filled in the depression until it is as smooth as a floor, but slightly tilted. There are mountains on all sides of it protecting it from storms, and pushing their peaks into perpetual snow. The Yellowstone Park is but 76 miles to the west, and the town of Cody, near by, is one of the points from which tourists start the overland trip to that great wonder. Yet the region outside the far-famed park differs but little from it and offers wonders of its own that appal those who visit it for the first time.

Since the buffalo disappeared from the Big Horn Basin there has been little use made of it other than the pasturage of an occasional herd of cattle or sheep. It has slept perenially beneath the sun, and harboured its latent productiveness against the time when man might divert the waters of the Shoshone and irrigate it. The rainfall has not been sufficient to produce any manner of growth. Neither have the waters flowed over it to dissolve the salts of the soil that mean great fertility should plant life ever be brought to grow here. The latter fact accounts for the superiority

from settlement when the project of reclaiming it was begun, that it might be dealt out just the right way through the reclamation service to actual settlers and not pass into the hands of large owners. The land was previously worth absolutely nothing, but as soon as it is irrigated it immediately acquires a value of £30 an acre, and yields returns that mean a handsome interest on an investment of that size. The principle of all the projects is the same.

The reclamation fund comes from the sale of Government land in the West. All money taken in by the Government from that source is to be used for the purposes of reclaiming desert land. It is, however, but an advance on the part of the Government which will eventually get all the money back. All expenses of the Government in building reservoirs and canals are charged against the land. The farmer is to pay it in ten equal, annual instalments. In the Big Horn Basin, for instance, the farmer must pay £1 2s. an acre per year for his water. This pays for the maintenance of the project and one-tenth of the construction cost. In ten years he has paid off the original charge against the land and has to pay an amount sufficient to maintain the project, probably less than 4s. an acre.

The amounts may seem high to the man unfamiliar with irrigated lands, but as a matter of fact the returns from these lands are so great that the assessments may be easily met.

The Trackless Trolley System in Great Britain.

During the past twelve months great efforts have been made to introduce into England the system of trolley traction without the use of rails, which has been installed in a number of Continental cities, but although a number of municipalities applied to Parliament in the session now drawing to a close for the necessary powers, these were not granted. Indeed, in some cases, the proposed powers were withdrawn from the bill before the committee stage was reached. Nevertheless, the Railless Electric Traction Co., Ltd., was formed, and as the result of having examined all the systems at present working on the Continent, the Company have decided upon designs which it is anticipated will meet the probable requirements of authorities here and at possible alteration. Moreover, inasmuch as the railless feeder lines of this character will usually commence at some distance from the tramway carsheds, it is desirable that the railless vehicle, when coming from or returning to the car sheds, should be able to make use of the existing line equipments of the tramway. These conditions require that the trolley head should be of the usual under-running type, carried at the end of a rigid boom and kept in contact with the overhead conductors by raising springs in the trolley base.

Another essential condition is that the trolley head should remain in contact with the overhead conductors under all conditions of service, and should permit of sudden and wide diversions of the car on either side of the entire of the centre lines of the wires. It is necessary, at the same time, to overcome the prejudices, if any, of tramway managers and engineers. An experimental line has been installed at Hendon, on the outskirts of London, by arrangement with the Metropolitan Electric Tramways, Ltd., who are running the car, which has been built by the Railless Electric Traction Co., Ltd.

The Company worked upon the assumption that railless traction lines in this country would be extensively employed as feeders to existing tramway lines, and that these extensions may themselves afterwards be converted to tramway lines, when the traffic has developed sufficiently to justify the extra cost of rails. It is therefore requisite that the overhead equipment should be of such a character as will be equally serviceable to either system of traction with the least speed. It was apparent that this condition would not be fulfilled by the ordinary swivelling trolley base, and subsequent experiments have demonstrated the correctness of this conclusion. In order to meet the prescribed conditions in a satisfactory manner, a special trolley base has been designed in which, besides the usual raising springs, there are additional springs working in a horizontal plane and controlling the pivot of the trolley base in such a manner as to relieve the trolley wheel of excessive side pressure against the trolley wire, even when the car is running at some distance from the wires. With this attachment the head travels freely under the wires and without appreciable side pressure, at whatever angle the pole may be trailing, from 90deg. on one side to 90deg. on the other.

A point, to which considerable attention had to be devoted, was the absolute prevention of any metallic portion of the car becoming alive, as the simple tramway expedient of binding all metallic parts to each other and to the underframe, whereby they are necessarily maintained at earth potential through the medium of the wheels and rails, is obviously not applicable to a vehicle shod with rubber tyres. Continental engineers have so far ignored this danger and have placed full reliance upon the insulation of the motor circuit, but it is recognised that tramway engineers in this country will require some means of obviating or minimising a danger from which tramcars are effectually protected. The Company claims to have overcome this danger absolutely by a patent triple trolley head and triple line hanger. These designs require that the overhead line should comprise three trolley wires, of which the two outer wires are positive and the centre wire negative. Three trolley wheels are mounted on a single rotatable head, the two outer wheels, which are connected together making contact with the outer or positives wires, and the inner wheel with the centre or negative wire. To ensure that the inner wheel may not, under any circumstances, come in contact with either of the positive wires, the negative wire is supported at an elevation of several inches below the positive wires, and the negative trolley wheel is mounted in a corresponding position relative to the outer wheels.

The three conductors are supported by a triple hanger, which may be made either in one piece or in three separate parts bolted together. If it is decided to equip the route as a tramway, it is only necessary to undo the bolts in the hanger, remove the centre portion with the centre wire, and slide the two outer portions with their trolley wires to any desired position upon the span wire.

In the triple trolley head a pair of wheels is used for making contact with each of the positive trolley wires. Each wheel is capable of a slight axial movement, and the pivot from which it is mounted is free to move vertically under the motion of a coiled spring. A distinctive feature of the triple trolley head is the rigid base. The trolley pole is made up of two separate poles which form two sides of a parallelogram, of which the two ends are the trolley base and the head, respectively. The head, therefore, always remains parallel to the base, and in consequence, approximately parallel also to the surface of the roadway. By this device the stability of the head is enhanced, and it is found that variations in the actual and relative heights of the trolley wires are more easily met by the coiled springs under each wheel, than by allowing to the entire head a rocking motion about each horizontal axis. By a socket and plug attachment the head may be converted into the usual single pole trolley head, which can be used for running the trackless car along the route of an existing tramway line. The return circuit is, in this instance, provided by the rails, to which connection is made by a pair of slippers which are suspended from the rear platform of the car and travel in the groove of the rails. The suspension is effected in such a manner as to permit the railless car to deviate several feet on either side of the centre line of the track. An alternative design has been prepared in which two trolley wires only are used, but as this does not remove the possibility of the metal parts of the car becoming alive, provision has been made for audible notification of the existence of this condition of things. As a matter of fact, the two-wire system is in use on the experimental track. In this design one wire is positive and the other negative, and the positive and negative trolley wheels are mounted as before on a common rotable head.

The framework of the car, instead of being directly attached to one of the trolley wheels, is brought to the middle of a single pole double-throw switch, by which it can be connected at will, to either one or the other trolley wheel. A polarised relay is mounted on the car, one coil of which is energised by the trolley circuit, the other by a small storage battery. When the single pole switch is in the correct position to connect the framework of the car to the particular trolley wheel which is at that instant in contact with the negative conductor, the relay is inoperative. But should the polarity of the trolley wires be for any cause reversed, the relay instantly brings into action an electric hooter mounted in the front canopy of the car.

Observations on Statical Force.

(By Peter Ellis.)

Is there such a thing as "statical force"? I am aware that I am unorthodox in asking the question, but claim the right of independent thought. With all due deference to orthodoxy, I am of opinion that force implies movement, and statical or stationary force is an anamoly. It may be convenient to assume that such

a thing exists for the purposes of calculation, research, etc., but in reality when two equal and opposite forces meet they eventually destroy each other, and the only real force after all is "Kinetic," or moving force—it cannot be latent. I am aware of the difficulty of proving my contention. The constitution and behaviour of matter being so complex, nevertheless, their subtleties are worth studying. Take, for example, a heavy weight, hanging on, say, a rod of steel, or by a chain, we say the rod upholds the weight, and is in a state of tension. Or we take a weight resting on a column, and we say the column supports the weight, and is in compression. This is true, but when the rod has been extended, or the column has been compressed, force ceases. It was force when the extension or compression took place, because there was movement, but when movement ceased, force ceased, and until movement re-commences (which may never happen) there will be no further force exerted; the very idea of force implies action, and as long as force can overcome opposition, it exists, but when it is balanced by its opponent it is dead and inert. The fact that force cannot be measured except in terms of motion shows that there is no force without motion.

The Dominion's Engineering Trade.

(By F. Cooper.)

It has been stated that there is no better barometer to gauge a country's prosperity or decline than the condition of its engineering and iron industries, and, considering that the advance of nearly all other industries is immediately reflected back upon that of engineering, there appear to be good grounds for the statement. The universal application, however, is nullified considerably in this country by the Gilbertian position of an industry carried on under practically free trade conditions, having to do so with protected labour; a considerable handicap when compared with our competitors, who have the advantage of a protected industry carried on with free labour. Our captains in the Dominion's engineering industry no doubt appreciate the compliment implied, but unfortunately the results of the peculiar position are shaping to such disastrous ends that an exchange for a less complimentary, and a more common-sense position would be more acceptable by those interested.

It is difficult to conceive the equity of isolating an industry so important to a community as that of engineering from the protection so necessary for any industry carried on under the unique position brought about by our legislators, a protection granted to most other industries carried on in the Dominion. Farming, woodworking, furniture, printing, woollens, coachbuilding, cement, are all more or less protected and flourishing. This all tends to upset the application of our opening remarks. Engineering can only advance side by side with other industries when placed on an equal footing; that the industry is not advancing the following figures will prove, and at the same time indicate how the profits of the industry are disappearing:—

In 1908 the number of hands engaged in the industry increased by 99 over the preceding year, and the wages had increased by £47,057.

In 1909 the hands increased by 94, and the wages by a further £45,936.

In 1910 the hands decreased by 469, and despite such decrease the wages increased a further £26,001, or, in the 3 years a gross decrease in the number of hands by 276, with increased wages paid over the 3 years, amounting to £118,994.

In 1906, the last census period there were 4729 hands receiving an average annual wage of £88 per hand.

In 1910 there were 4683 hands, receiving an average annual wage of £114 per hand.

This declining position is further intensified when considered in relation to the population, as during the time the hands engaged in the industry decreased by 267, the population of the Dominion increased by 73,607.

In 1907 there was one hand employed in the industry to 184 of population; in 1910 it was one to 211.

It is safe to say that the extra facilities in the shape of plant and improved methods are not a factor, as there is no doubt but that the condition of the industry has cramped expenditure in this connection. The number of hands in all factories of every description over the three years shows a decrease of 819, 276 of which was in the engineering trade. The importations of engineering products are heavy, but it cannot be laid to lack of enterprise or ability on the part of those engaged in the industry. This is evident by the testimony to our engineers' abilities to be observed all over the Dominion, including such items as locomotives and waggons, stationary engines and boilers, sawmill plants, steamboats, steel bridges and other steel structures. Mining and dredging machinery, agricultural implements and machines, including threshing and chaff-cutting machinery, oil and gas engines, tramway cars, dairying and milking machines, hydraulic and other power lifts, suction and producing gas plants, wind engines and numerous other engineering productions, comprising a varied collection of infinite credit to a country of only one million souls, and comparing in quality to the best imported.

It behoves those in power to so adjust matters that this industry should receive a very necessary consideration and utilise to the Dominion the undoubted facilities that are here in the shape of artisans and plant for the enrichment of the country, as well as to utilise the energies and abilities of the many youths who are being educated at our colleges and technical schools, a factor which under present conditions is being alienated from our use by lack of opportunity, and what is possible, further building up the industry in competing countries to our further undoing.

At a time like the present, when we are with pardonable pride exhibiting the manufactures and products of the Dominion, it is regrettable that so important an industry as that of engineering should be suffering from legislative restrictions to its undoing, when the very industrial existence of the country is so bound up in its necessary progress.

During the four years previous to, and including 1909, there were imported into the Dominion gas and oil engines to the Customs value of £362,021. This, with freight charges, etc., would represent a local expenditure of about £543,000, or £135,750 per annum. What is there against this amount being reserved to the country by a protective tariff? It contributed £24,000 as duty.

During the four years previous to, and including 1909, there were imported into the Dominion mining and dredging machinery to the Customs value of £191,325. This, with freight charges, etc., would represent a local expenditure of about £287,000, or £71,000 per annum. What is there against this amount being reserved to the country by a protective tariff? It contributed £3564 as duty: less than 2 per cent.

During the four years previous to, and including, 1909, there were imported into the Dominion agricultural and dairying machinery, of a Customs value of £670,000. This, with freight charges, etc., would represent a local expenditure of about £1,000,000, or £250,000 per annum. What is there against this amount being reserved to the country by a protective tariff? It contributed nothing in the shape of duty.

In the four years previous to, and including 1909, there were imported into the Dominion portable and traction engines of a total Customs value of £104,054. This, with freight charges, etc., would represent a local expenditure of about £156,000, or £39,000 per annum. What is there against this amount being reserved to the country by a protective tariff? It contributed nothing in the shape of duty.

The Stone Quarrying Industry.

(By Theodore Arnold, M.E.E.)

The enactment of "The Stone Quarries Act 1910" directs attention to the importance of this industry in this Dominion. The Anderson's Bay quarries at Dunedin are claimed to possess the most up-to-date appliances, as well as the best stone for general purposes. In the Dominion no granite is found, the best rock found being of the Trap species. The term "Trap" is derived from "Trappa," the Swedish name for stair, and is applied to this rock because rocks of this class frequently occur in large tabular masses, rising one above another like steps or stairs. Basalt is one of the best varieties, and an excellent deposit of this nature is found at Anderson's Bay. It is a dark green stone, composed of both augiste and felspar, very compact in texture, and of considerable hardness. Basalt itself is an Ethiopian word, for iron, hence its application to this particular class of stone. Trap rock is a large group of igneous rocks allied to granite, and is composed of felspar, augite and hornblende. Felspar is opaque, yellowish in colour, composed of silicuous and aluminous matter, with a small proportion of potash.

The principal uses of these rocks are for paving and macadamising. They are vastly superior to flinty stone, which, though hard, is brittle, and easily reduced to dust by the attrition of traffic. It may always be recognised that granite, and granity stone is the best road metal procurable, and flint and flinty stone the very worst.

At the Anderson's Bay quarries, the boring of the rock for blasting purposes is performed by the Giant rock drills, made by the Ingersol Rand Company, which are driven by compressed air. Hammer and drill work, the dull and dreary old method, is here a thing of the past, and six holes can be driven by a Giant drill in the time formerly occupied in drilling one. The method of blasting, too, is an advanced one. Time fuses are discarded, and electric detonators used. The result is total immunity from danger from blasting to the workmen, and a considerable saving of time. When the holes are charged and ready for shooting, it is only necessary to remove the men from the danger zone for half a minute while an electric spark is transmitted to the charge, and the blast has taken effect, and work is resumed. The stone is conveyed from the quarry to the quaratory stone-cutters by tramlines, the cutters being machines by Jacques (for screenings), and by Austin (for metal). For power, electricity is used, the works being supplied with three electric motors of 50, 30 and 15 b.h.p. respectively. The Dunedin Corporation possesses a quarry of excellent stone, which is, however, difficult to work, on account of the excessive amount of overburthen, or stripping, necessary to be removed before the stone is accessible.

Queries.

What is the difference between an object moving through still air at the rate of 10 miles an hour, and a breeze blowing at the rate of 10 miles an hour against the same object stationary?

Answer: Whether the pressure against the object is obtained by the object moving or the wind moving is immaterial. The pressure would be exactly the same in either case.

Patents.

Paper read before the Canterbury Engineering Society by Mr. Climie.

(Continued.)

Having briefly touched upon the origin of patent law, we will now proceed to consider the essential of a patentable invention.

For sake of convenience, patentable inventions may be divided into the following classes:—

1. New and useful machines for new or old purposes and improvements in existing machinery;

2. New and useful combinations in mechanical parts and of materials;

3. Improvements in existing manufactures, processes, or parts of processes;

4. Novel and useful results and products of manufactures and processes;

5. New or improved processes for which

special machinery may or may not be necessary;

6. New principles coupled with the mode of carrying the same into effect.

A short examination of each of these heads and a few examples will make these matters clear.

A new machine or contrivance may be for an entirely new purpose or it may be for use in connection with an old purpose. The first is an extremely rare class of invention, while the second is most common. As an example of the first, take the subject of the transmission of speech over long distances by electricity. Here was a new purpose, and the telephone, with its vibrating plates, transmitter and receiver, formed the new apparatus for this new purpose. Therefore the telephone was a patentable invention of the first order; namely, a new apparatus for a new purpose.

As an example of a new machine for use in connection with an old purpose, the original sewing machine might be instanced. Sewing is among the oldest of arts, but the first sewing machine was an absolutely new contrivance for this old purpose, and therefore forms good subject matter, though not so high class as the telephones, seeing that the purpose to which it is applied is old. Improvements in existing machinery, which is also included in the first class, probably form the bulk of the patented inventions. As an example of this kind, I may instance the hundreds of patented improvements on the original sewing machine. In all classes of machinery of which large quantities are used, an improvement that may appear to an outsider to constitute a very slight advance is often the source of a fortune to its inventor, and is, of course, patentable subject matter.

With regard to the second class, namely, new and useful combinations of mechanical parts and of materials, it must be said at the outset, that a combination to warrant a patent must, of course, show invention, obvious combinations not being good subject matter. Therefore, in every case it is necessary to take the merits into consideration to decide whether or not the combination shows invention. All engineers have at their disposal a certain number of well-known mechanical parts and motions which form the stock-in-trade of the mechanical arts. In building a machine for a certain purpose an engineer may make use of these and by combining them, produce an apparatus fit to perform a certain function. So long as he merely exercises judicious selection and puts the different parts to their obvious uses, he does not necessarily exercise invention, but only the skill of an ordinary workman, and in that case the machine, although perhaps the first of its kind, is not necessarily a patentable invention. As an example of the simplest form of combination, we may take the case of the first sausage-making machine, which was the mere combining of a well-known mincing machine and an equally well-known machine for filling skins. The question of invention in this case, which was brought before the Court of Appeal was decided against the patent. Still, even this simplest type of combination might be patentable if the method and means used to connect them called for invention. For example, merely to place a folding machine in line with a printing machine, so as to print and fold continuously, instead of separately as before, would not be invention if nothing more were done. But if the continuous printing and folding involved some necessary transmitting mechanism, requiring design and the exercise of invention to pass each printed sheet separately to the folders, then the combination would be patentable subject matter.

It is impossible to patent the combination of a concrete thing with an abstract property; as Baron Pollock, in deciding a case of this nature, once said: "You cannot have a valid claim for the combination of 2½d. with a pound of butter."

Neither is it possible to patent a combination of two things, between which no real combination exists.

In dealing with a claim in which a particular chain adjusting gear for a cycle was claimed in combination with a step for mounting such cycle, the judge remarked that the patentee might as well have said: "I claim that gear in combination with a hat on a man's head.

Referring now to class three. Improvements in existing manufactures, processes or parts of processes, we might take, for example, the manufacture of pile fabrics. Instead of adopting the usual plan of weaving the pile in loops and cutting these loops by an after operation, an inventor might produce a new method of weaving pile fabrics, face to face, in a double web and cut the pile by an after operation of separating one fabric from the other, thus saving both time in the weaving and in the pile cutting. This would be a patentable improvement in that particular manufacture.

In dealing with the next class, namely, novel and useful results and products of manufactures and processes, it might be mentioned that doubt appears to exist as to whether a new product, apart from the means used to produce it, is good subject matter for a patent. The most reliable writers on patent law lean rather against the proposition.

(To be continued.)

Railway Carriages.

For this same service a number of specially roomy day and night coaches were constructed, and in their appointments these carriages reach the high-water mark of railway carriage construction which has been going on in New Zealand for a number of years, both in the Government workshops and in the Wellington works of the late Wellington and Manawatu Railway Company.

The width of the Main Trunk carriage is 9ft. 3in., one foot wider than all other carriages in use on the railways, and the length over all is 50ft. The sleeping cars have accommodation for twenty persons to sleep. There are six compartments in each car, four of which hold four passengers each, and two have two bunks each. The bunks are arranged across the car, what a seaman would call athwart-ships, and a corridor runs the length of the carriage, with lavatories at each end. The day coaches and dining-cars are of the same roomy type, the second class being unusually comfortable.

The whole of a North Main Trunk train is New Zealand built, from pilot to tail-lights, and while the critical mind can find faults in some points, such would be the case in any railway equipment. It is, on the whole, a very well appointed train, and the only pity is that the fine engines which haul it are not given better opportunities of showing their pace. The timetable is too slow.

Substitution of Cement for Lumber.

Two years ago there was an overproduction of 100 per cent. staring cement manufacturers in the face, as the estimated capacity of the plants at that time was 100,000,000 barrels per year and the consumption only 50,000,000. Present conditions indicate a consumption of 75,000,000 barrels this year. This increased demand, coupled with the fact that large Eastern manufacturers for two years have sold large quantities South and West at unprofitable figures, has caused the advance. The increase, we believe, is largely due to the sale of Portland cement to farmers and other small consumers and the general prosperity of the South and West. Western dealers report sales of 16 barrels of cement per 1000 feet of lumber, against one barrel per 1000 feet five years ago.—From the *Manufacturers' Record.*

Machine Labour in Gas Making.

At no time in the history of gas manufacture (says "Engineering") has there been such activity in the replacement of hand labour by machinery as at the present time. The chief area for the exercise of such machines is that of which the retort-house is the centre, embracing the coal-store and the coke-store. Whilst vertical retorts are in some works being installed, as the more or less natural development of the inclined system, yet in many others the horizontal retort is being retained, with the application thereto of mechanical operation. The mode of transmission of the motive power to these various machines has something to do with determining the collateral features in the coal stores and the coke stores. Whilst wire rope, compressed air, hydraulic, and electrical transmission have all their representatives in this field, yet in the combined schemes of taking in coal, stoking, and delivering coke, the electrical appears to have advantages worthy of careful consideration. Of the several types of electrically-driven stoking machines, the Fiddes-Aldridge occupies a unique position, inasmuch as it is the only one charging and discharging simultaneously a 20ft. to 22ft. length of horizontal retort. To this distinction is added another—namely, of taking automatically a supply from the overhead hoppers into the machine as desired. The result is that one machine attendant performs what is often three distinct operations in other systems. The only conceivable drawback to the system of simultaneous discharge and charge is that the retort is not ordinarily inspected at each operation and to its general condition and soundness. But if such inspection is desired, it may be arranged by the operator not taking in coal until the retort has been discharged. In practice, however, this hypothetical objection has not been found a serious one, and as the economy of operating is unquestioned, the machine is meeting with very much favour.

Astronomy.

Astronomical Notes for July.

The Sun is in the constellation Gemini till the 18th, when he enters Cancer. His distance from the Earth is greatest on the 3rd. His northerly declination is now decreasing, making a rise in altitude at true noon of nearly 5 degrees. The solar surface, during the past month, has been almost entirely devoid of spots, denoting a close approach to time of minimum "spot" activity.

The Moon, in her monthly circuit of the heavens, comes into the vicinity of the planets and some of the brighter stars, and serves as a convenient pointer to them. She will be near Jupiter on the evening of the 5th; Uranus on the evening of the 12th; Mars on the morning of the 20th; and Saturn on the morning of the 21st. She will be passing through the following constellations during the early evenings of the given dates:—In Leo on the 1st and 2nd; Virgo on the 3rd, 4th, and 5th; Libra on the 6th and 7th; Scorpio on the 8th; Sagittarius on the 9th, 10th and 11th; Capricornus on the 12th, 13th and 14th; Aquarius on the 15th and 16th; after which she rises late in the evening.

Phases of the Moon in New Zealand mean time—

First Quarter ..	3 days	7 hrs.	50 min. p.m.
Full Moon ..	12 days	0 hrs.	23 min. a.m.
Last Quarter ..	19 days	5 hrs.	1 min. p.m.
New Moon ..	26days	7 hrs.	42 min. a.m.
Apogee ..	9 days	2 hrs.	12 min. p.m.
Perigee ..	24 days	10 hrs.	6 min. p.m.

Mercury is a morning star at the beginning of the month, in Gemini. He will be in perihelion on the 1st, in superior conjunction on the 4th, and his descending node on the 9th, and in greatest heliocentric latitude north on the following day; in conjunction with the Moon on the evening of the 27th; and in conjunction with the bright star Regulus on the 30th, when a very interesting view of both bodies may be had in a small telescope, or pair of field glasses, and better in a telescope of larger proportions, when useful comparison can be made of the two bodies, their light, magnitudes, etc.

Venus is now the brilliant evening star of the western skies. Shining brightly in the waning light of early evening, she immediately arrests the eye of the observer looking towards the west. She is at her greatest eastern elongation on the 8th, at which time her angular distance from the Sun's centre is 45.5deg.; she is in her descending node on the 17th; and in conjunction with the Moon on the 29th, and will appear close to the body on the same evening, when the two will present a very interesting appearance in the western skies.

Mars is still a morning star in Pisces, slightly west of the star Mu. He is still too far away for useful observations to be made of his surface markings; the only object clearly visible upon his small, ruddy disc is his snow cap. He will be in perihelion on the 2nd; and in conjunction with the Moon on the 20th.

Jupiter is an evening star on the borders of Virgo, and is a splendid object in our evening skies at this time. He well repays telescopic scrutiny, even in a small "hand' telescope his disc may be made out, and his four larger moons clearly seen, and their motions watched. He will be stationary amongst the stars on the 3rd; in conjunction with the moon on the evening of the 5th, at 51min. past 8; and will be in quadrature with the sun on the last day of the month.

Saturn is a morning star at this time rising about three hours before the sun, in the constellation Aries. He will be in conjunction with the Moon on the 1st, being 3.5 degrees to the south of our satellite at the time. His beautiful ring system, now well inclined to the observer's line of sight, presents an object of great beauty, and one that should not be missed by telescopists at this time who find themselves "opposed" to him in the early morning hours.

Uranus is an evening star in the constellation Sagittarius having a retrograde path amongst the stars at this time. He is in conjunction with the Moon on the 12th.

Neptune is a morning star in Gemini. He is in conjunction with Mercury on the 9th, and with the Moon on the 25th.

Meteors.—A radiant located in the constellation Aquarius may be watched during the early part of the month. These are generally slow-moving meteors with long, bright trains, and the centre is near the star Delta.

The Constellations for the middle of the month at about 8 p.m. are placed as follows:—Hercules and Bootes, with the Northern Crown (significant at this time) near the meridian. It may be of interest to those who take interest in these matters that, as the Coronation ceremonies are taking place in London, we in New Zealand may see Corona Borealis at its culmination in our evening skies. Serpens and Ophiuchus, with Libra and Scorpio still higher, well up to the zenith. In the east we may see the Eagle rising, easily identified by the three bright stars, the central being Altair, the brightest. Capricorus and Sagittarius are over these, and Grus and Pisces Australis further towards the south. The Southern Cross is now making its way downwards on the western side of the South Pole, followed by the "pointers," Alpha and Beta Centauri. To the left of the Cross are the Triangle, Pavo, Indus and Toucan, and Hydrus below. Argo and the brilliant Canopus are now getting well down in the south, while Achernar is rising in the south-east. In the west Leo is setting, also part of Hydra, the Water-snake, bearing down with himself, Corvus and Crater, and over these is Virgo and the bright star Spica.

June 30, 1911.

Professor Bickerton.

His Lecture—Sketch of Proceedings.

The Chairman (the Right Hon. Sir George Reid, K.C.M.G.): Professor Bickerton is not, I regret to say, a native-born Australian, but, like many Englishmen, he has been greatly improved by a visit to the Antipodes. Many years ago he was one of the most distinguished students in the Mother Country and one of the most successful teachers. He went out to New Zealand thirty-six years ago. He has come home to endeavour to draw public attention to a theory of his which has already been received with great respect by most of the high authorities and which may in days to come bracket with his name one of the most wonderful discoveries of science. What his theory is Mr. Bickerton will himself explain to you.

After the paper, published in PROGRESS last month, the following discussion took place:—

The Chairman: I wish to propose a vote of thanks to Professor Bickerton for his address. I lack the necessary qualifications to follow with certainty the brilliant theory he has expounded, but I do not think we need scientific knowledge to recognise that the theory is far more in harmony with what we believe of life and the mysteries of life than the theory which points to a dying universe. The spiritual theory is singularly in accordance with the theory of the address to-day, for it teaches that out of death comes a more glorious life, out of mortality immortality. That theory runs side by side with the theory propounded by Professor Bickerton: the theory that out of the collisions and collapses of Nature come a new life and a fresh universe. One or two thoughts crossed my mind while listening to Professor Bickerton's address. It is the first time, I think, that Australia has sent to you a man to speak on one of the great mysteries of science. We have sent cricketers, plenty of them, and fine fellows, as you know. We have sent men to your rifle meetings; we have sent champion scullers; we have sent statesmen. But now Australia, in Professor Bickerton, has sent a man of scientific mind dealing with the mysteries of the Universe. I wish to express my thanks to the Royal Colonial Institute for arranging for this address. As the Professor said, I think it is within the broad scope of the work of this admirable Institute. Is it not a grand thing sometimes that our attention should be taken from the earth upwards to the skies? How seldom the average man or average woman looks up to the skies, except on a question of overcoat or umbrella; but to-night we have been taken on a grand excursion into the remotest spaces of the heavens. I feel that the work to which the Professor has devoted his life will not only bring to him great fame, but will add marvellously to the light which is being shed more and more upon the marvels of Creation. What a marvellous work the illustrious Darwin did in his theory of Evolution! But the theory of Evolution dealing only with the visible living things on this little earth, is as simplicity itself compared with the evolution of the broad and mighty Universe, which may contain thousands of worlds and forms of life infinitely greater than our own. I do not think in the history of this Institute you will have a greater subject brought before you than this which Professor Bickerton has introduced. The Professor comes here with the highest credentials. The Government of New Zealand and the men of science in New Zealand are so impressed with the value of his discoveries that they have contributed out of the public funds to his mission to the Mother Country, and Lord Dudley, the Governor-General in Australia, made a splendid donation out of his own private purse. I ask you to join with me in a cordial expression of thanks to the lecturer.

Professor Bickerton: I am much obliged to you for your vote of thanks, and I have to thank our chairman very heartily for his very kind remarks. We all know how extremely busy he is, and that we should have him here on this inclement day to listen to a discussion on such a very erudite subject is a great compliment to us. I beg to propose a vote of thanks to the chairman.

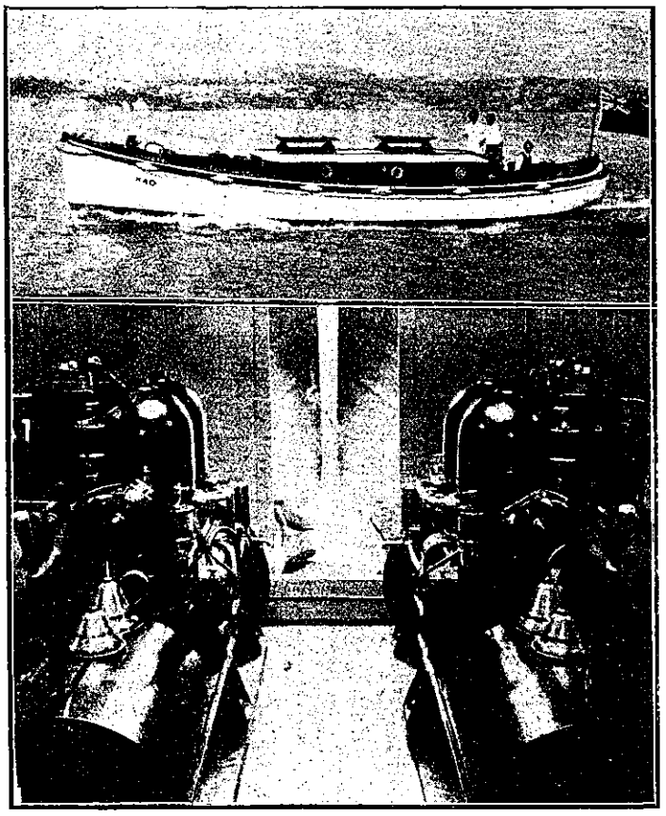
Mr. E. B. Knobel (President of the British Association, Past President Astronomical Society): I have much pleasure in seconding the vote of thanks to the Chairman. It has been an extreme pleasure to me to listen to Professor Bickerton's eloquent address. I have given some attention to astronomy myself, and I can say that the basis of Professor Bickerton's theory is such that it must command not only the attention and consideration, but, I think, the assent of the majority of astronomers.

Yachting and Motor Boats of the Dominion.

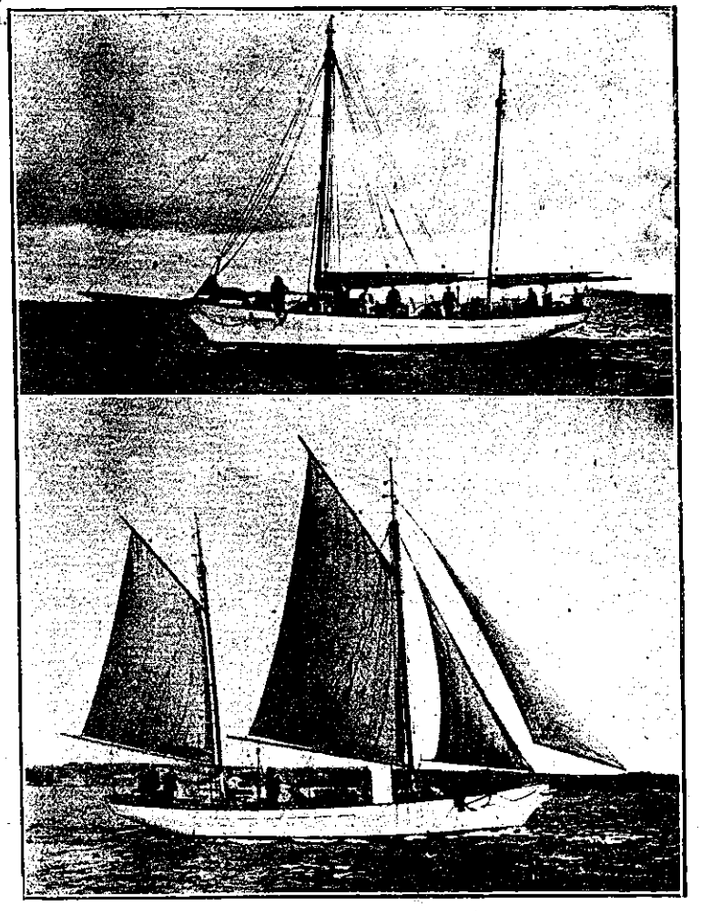
By Oscar Freyberg.

The accompanying photographs are of the yacht "Selwyn," auxiliary ketch, designed and built by C. Bailey, jr., Auckland, to the order of the Melanesian Mission for work among the Solomon Islands. She is, as will be seen from the pictures, a beautiful little vessel, staunch, able in a seaway, and perfectly adapted for the purpose for which she was built. Her principal dimensions are: Length over all 56ft., beam 15ft., draught 7ft., and her accommodation is really wonderful for the length.

The name "Selwyn" is, of course, in memory of that intrepid navigator, our first Bishop, whose diocese comprised New Zealand and the Melanesian Islands. The stupendous task of visiting his flock, even to the most distant outlying islands, was effected in a little 5-ton schooner, which he commanded himself, having taught himself navigation on the way out from England. He left an example of daring and seamanship to be emulated by our cruising yachtsmen.



"KAO." King George of Tonga, Owner. Anderson Engines. *Photo by Whitnall-Smith*



"SELWYN," under Power and under Sail. *Photo by Whitnall-Smith*

Starting from aft, there is first the captain's room, with a comfortable bed, sofa, wardrobe and lockers for navigating instruments, and a full size chart table, while just inside the companion hatch there is a set of pigeon holes containing the flags of the international code. Forward of this is the engine-room, which contains the Kelvin engine, a 30-40 h.p. job, which drives her about 7 knots. Light in the daytime and fresh air are obtained by a skylight. Then come the missionaries' quarters, about 15 x 15ft., with full headroom. There are two good built-in beds and wardrobes, with extra stowage space under the sofas, a dining table and the usual conveniences. A storeroom or hold, of 15 tons cubic measurement, separates the cabin from the forecastle, where there are bunks for four men. The cooking arrangements are in a scow galley carried on deck, and look somewhat inadequate to provide for the complement the "Selwyn" will carry when she has her Island crew and the sky pilots aboard.

Another very handsome little vessel for the Islands is the twin-screw power launch "Kao," just completed by the same builder for King George Tabu, of Tonga. Her twin Anderson engines, of 14 h.p. each, which are capable of driving her at 10 knots, are clearly shown in the photo of her engine-room. The other photo shows "Kao" making 10 knots on her trial run of Mechanic's Bay. She was shipped to Tonga by the Union Co. recently.

* * *

The Port Nicholson Yacht Club are holding classes of instruction during the winter in navigation, seamanship, and signalling, and it is to be hoped that junior members will roll up in full force to these, so that we may have a supply of navigators and signalmen on the ocean racers next season. Don't let us have a repetition of last season's performance, when four out of the six skippers didn't know where they were when they made the land. Keep a careful check on your position by cross bearings, or sextant angles, at least every hour. Don't set a course, more or less (generally less) correctly, and then rush on blindly for hours without fixing your position, and finding out whether you are going where you are supposed to be pointing. That sort of thing invariably means trouble, and perhaps disaster, though a man generally contrives to muddle through somehow or other, but it isn't seamanlike and it isn't safe. To be at all correct in one's navigation a good compass is absolutely essential. The very best is just good enough. Buy, beg, borrow, or—I was going to say steal—but, anyhow, *get* a good compass. Go without brass-bound clothes and badge caps, or beer, or even tobacco, but do see that the little box that contains the North is safely aboard, and the best that money can buy, *and* that you are on friendly terms with all its peculiarities by the time you set sail. A thorough knowledge, or even a moderate knowledge of the uses of that priceless possession will save you many an anxious hour. Many a dirty night you will be lying snugly at anchor, "Riding in blanket bay stem on to the pillow," when the other fellow, who hasn't the knowledge and the instrument, will be beating about outside in dire distress and discomfort, cold and wet, and waiting for dawn to show him where he is. Don't neglect this. Get right in now and learn, there is plenty of time, all the winter, in fact, and when you go to sea next season you will be

able to say, "I'm going into Port Underwood, Port Gore, or Port Hardy," wherever you may be going, and you'll get there, even if it's twice as dark as the inside of Sheol.

The "Muritai."

The new steamer "Muritai," which was launched the other day by Messrs. S. Wood & Co., was built by them to the order of the Wellington Steam Ferry Company, and should help materially to relieve the pressure of traffic on busy days in the harbour. She is to be a general utility vessel, and will be used for towing as well as passenger carrying. She is to have a large water tank aft, capable of holding 14 tons, for carrying fresh water out to vessels in the stream, and will also be fitted with a Duplex two-cylinder horizontal pump, capable of throwing 4500 gals. of water per hour, which will be of use in case of fires occurring to shipping or on the waterfront, and also for salvage jobs.

Her principal dimensions are:—Length, over all, 77ft. 6in.; length, water line, 72ft.; breadth, 16ft.; draught (normal), 8ft.; least freeboard, 3ft.; freeboard, bow, 6ft. 6in.

As may be imagined, for towing work her construction is of the strongest, and is a credit to the builders. The keel, kelson and sternpost, are of Ironbark, while the stem is cut from a single piece, a natural grown crook of Rata. The planking is Kauri, fastened to double steam-bent Spotted Gum frames. The deck beams and carlines are Jarrah, as are the hatch combings and rail capping, while the deck planking is 2½in. by 5in. Kauri, caulked and payed with pitch as usual. The topsides are finished in black, with a white boot-topping, and the bottom is muntz metal sheathed. Her power, which is being installed by Messrs. Cable & Co., is a single screw triple expansion job, of 130 i.h.p., built by Plenty & Sons, of Newbury, as was the multi-tubular marine type boiler.

As the "Muritai" lies at present alongside the Ferry Wharf, she does not look much like a ferry boat, but in about two weeks' time, when the superstructure of bridge deck, ventilators, companion ways, skylights, etc., has been added, she will have quite another appearance.

The whole of the after space will be taken up with engine-room, tanks, and bunkers, so the accommodation for crew is forward. She will have one mast, for signalling and derrick purposes. I have to thank Messrs. Wood & Co.'s kindly foreman, Mr. W. E. Bowen, who showed me over the vessel.

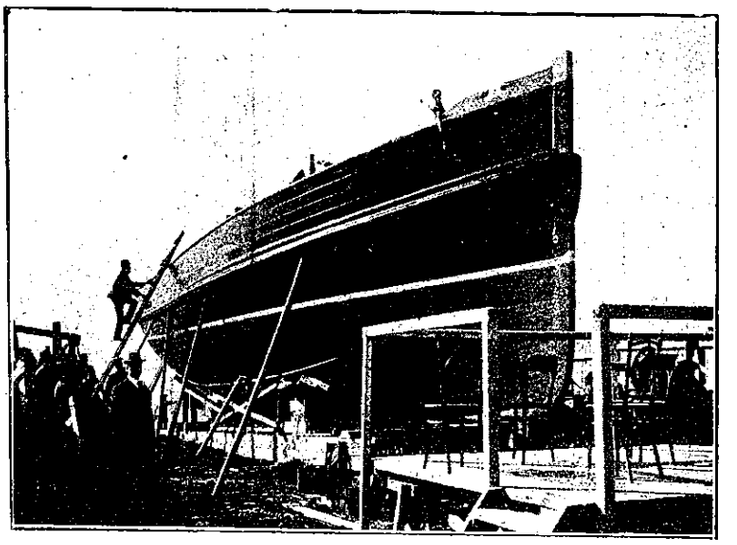
The pictures show "Muritai" on the ways just before launching, and a group of the owners, etc., which speaks for itself.

The thing which strikes me most about this locally built ship is the fact that while they had her built here, the United Kingdom supplied the machinery. Surely a local foundry could have done as good work.

I would like to correct an utterance of Mr. A. E. Mabin at the launching ceremony of the "Muritai," reported in "N.Z. Shipping and Commerce" of the 26th ult., that the last vessel built in Wellington was the s.s. "Opawa," fourteen years ago. This is incorrect. Messrs. Bringings & Bailey launched a 30-ton auxiliary, the "Sally," subsequent to this. I saw her last year at Nelson.

THE LAUNCHING OF THE "MURITAI."

Back—Messrs. Galbraith, Jellett, Pilcher, Burkett, Cable, Short, jun., Bowen, Wood (builders), Mrs. Short, jun., Mr. Short, sen. *Middle*—Messrs. Hume, Burke, Mabin, Miss and Mrs. Mabin, Mr. Zohrab (Manager), Mrs. Zohrab. *Front*—Messrs. Samson, Bezair (Super-Engineer), Mabin jun., Silver.



TUG "MURITAI."

Built by Messrs. Wood & Co., of Wellington, for the Wellington Steam Ferry Company, and launched during the month of May.

Wellington Cruiser Club.

This Club decided another points race last Saturday (27th May), the starters being "Rona" (scratch), "White Heather" (4min.), and "Kotiri" (16min.). The start was timed for 2.30, but the "Kotiri" was five minutes late. The other two competitors, however, waived their right to a punctual start and waited for the full handicap time to elapse, the race being under the Mark Fog system. The course was from Clyde Quay wharf round Point Jerningham to a dolphin off the Patent Slip, thence round Point Halswell to the Falcon Shoal buoy and home to the starting line

The wind was nor'-west, light and flukey, and the race was a procession in the order of starting until a short distance from home, when "White Heather" displaced "Kotiri" in the lead and eventually won with about a minute to spare, with "Rona" some seven minutes behind "Kotiri."

The "White Heather" and "Kotiri" were thus equal in points. The result was the race described on page 729, "White Heather" winning by five minutes.

I mentioned a while ago that Mr. Miles Hamill was about to purchase in Auckland a new first-class boat for ocean racing. I received a wire from him as we went last to press saying that he has bought the "Ailsa," a similar boat to Mr. Bucholz's "Wairere." She has arrived (see page 729).

The Marine Department has intimated that any breach of the Harbour By-laws by small craft will in future result in prosecution of the offender. This is not a hasty decision, but is the result of numerous complaints by masters of vessels of the utter disregard of the rule of the road by some of those in charge of small sailing and motor boats. The majority of boat owners are careful enough, but it is the small careless minority that is getting us into disrepute with the authorities and the men on the bridge. Only the other day the master of a ship stopped me and asked the name of the owner of a boat which he described to me, saying that he intended to report the man for cutting across his bows in the inner harbour. Fortunately the description he gave me was common to several small craft in this harbour, so I was able to truthfully state that I didn't know. Another instance! The turbine steamer "Maori" was coming up the harbour a few weeks ago at high speed, when a well-known small craft, with some ladies aboard, cut right across her bows, and the captain had to go full speed astern to escape cutting her down.

Now, this sort of thing should never occur. It is so easy to get out of a steamer's way that in fairness to the master, if not with any regard to safety, it should be done. Remember that although you may be willing to risk your lives and property, it is unfair to jeopardise an honest sailorman's certificate and his living, upon which, perhaps, a wife and family depend.

Please think of this, boys, next time, and every time you see a vessel coming down the harbour. It is only a fair thing. Business before pleasure, you know. I'm sure the sailormen will appreciate your efforts not to render their trying calling more irksome than it is.

Wellington Cruising Club's Races.

The sail-off between the "White Heather" and "Kotiri" took place on Saturday, June 3rd, and resulted in placing the former at the head of the list for the season. The "Kotiri" received 11½min. start, and with the strong south-east breeze that was blowing, she was nearly half-way across Evans Bay before "White Heather" started. The course was the same as in the last race, and "White Heather" made good use of the eastern shore of Evans Bay, pulling up quite a lot of the handicap beating up to the "Dolphin." Off the wind, from the "Dolphin" to Point Haswell, she pulled up some more, and "Kotiri" was only 2½min. ahead turning the point. A good race ensued to Falcon Shoal, both boats making it in two boards, "White Heather" rounding 2½min. ahead. On the run home "White Heather" increased her lead and eventually finished 5min. ahead of "Kotiri," which had split her jib at Point Jerningham. This, however, in no wise affected the result. The win was a very popular one, as the "Heather" is probably the best-handled boat in Wellington, and her crew are fair-minded sportsmen, who win *or* lose with equanimity.

We show two good pictures of this fine craft, that on the right being taken when she was ready for launching at the beginning of the season. The other was taken on Opening Day.

Results of Season 1910-11.

December 10th—1st, "White Heather," 4 points; 2nd, "Kotiri," 3 points; 3rd, "Rona," 2 points; 4th, "Ngaira," 1 point.

February 18th—1st, "White Heather," 4 points; 2nd, "Kotiri," 3 points; 3rd, "Rona," 2 points; 4th, "Ngaira," 1 point.

March 18th—1st, "Rona," 4 points; 2nd, "White Heather," 3 points; 3rd, "Kotiri," 2 points. Ngaira did not start.

March 19th—Ladies' Race: "Ngaira" 1, "Rona" 2, "White Heather" 3, "Kotiri" 4. Prize to each lady skipper.

April 8th—1st, "Rona," 4 points; 2nd, "Kotiri," 3 points; 3rd, "White Heather," 2 points. "Ngaira" did not start.

April 14th, to Port Underwood—1st, "Ngaira," 4 points; 2nd, "Kotiri," 3 points; 3rd, "Rona," 2 points. "White Heather" did not start.

April 17th—From Port Underwood—1st, "Kotiri," 4 points; 2nd, "White Heather," 3 points; 3rd, "Ngaira," 2 points. "Rona" did not finish.

May 21st—1st, "White Heather," 3 points; 2nd, "Kotiri," 2 points; 3rd, "Rona," 1 point. "Ngaira" did not enter.

May 27th—1st, "White Heather," 3 points; 2nd, "Kotiri," 2 points; 3rd, "Rona," 1 point. "Ngaira" did not enter.

Total number of points gained—"White Heather" 22. "Kotiri" 22, "Rona" 16, "Ngaira" 8.

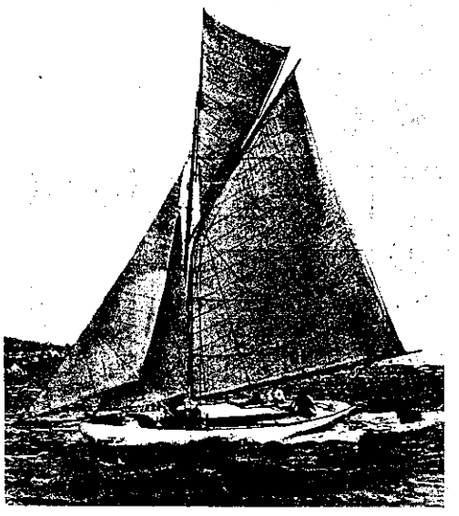
June 3rd—"White Heather" and "Kotiri" sailed off, "White Heather" winning aggregate prize.

"White Heather"—4 firsts, 2 seconds, 2 thirds, 1 did not start.

"Kotiri"—1 first, 6 seconds, 1 third, 1 fourth.

"Rona"—2 firsts, 1 second, 5 thirds, 1 did not finish.

"Ngaira"—2 firsts, 1 third, 2 fourths, twice did not start, twice did not enter.



"AILSA." Mr. Hamill's new Ocean Racer.

NOTES.

The above is a picture of Mr. Miles Hamill's "Ailsa," which arrived on Tuesday, 27th June, from Auckland, on board the "Tarawera." She was built by S. E. Le Huquet, of North Shore, some eighteen months ago for Feltham Bros., from whom she was purchased by Mr. Hamill, who intends to use her for general cruising and ocean racing. Some smart work was done in rigging "Ailsa." She arrived in the boat harbour at noon, and by four o'clock her mast was stepped, standing rigging set up, running gear rove and sails bent; in fact, quite ready to go out for a spin. I think this takes some beating, and if the "Ailsa" crew are as keen and smart when the racing starts, all hands will have to look to their laurels. "Ailsa" is 36ft. 10in. over all, and 26ft. on the waterline, 8ft. 6in beam, and about 5ft. 9in. draught. She is ballasted with about 3 tons outside and 12cwt. inside. Below decks she is roomy and comfortable, the galley, which is just inside the companion way, is separated from the rest of the cabin by a bulkhead. There is the usual arrangement of sofa berths, lockers, table, etc., which makes her thoroughly comfortable.

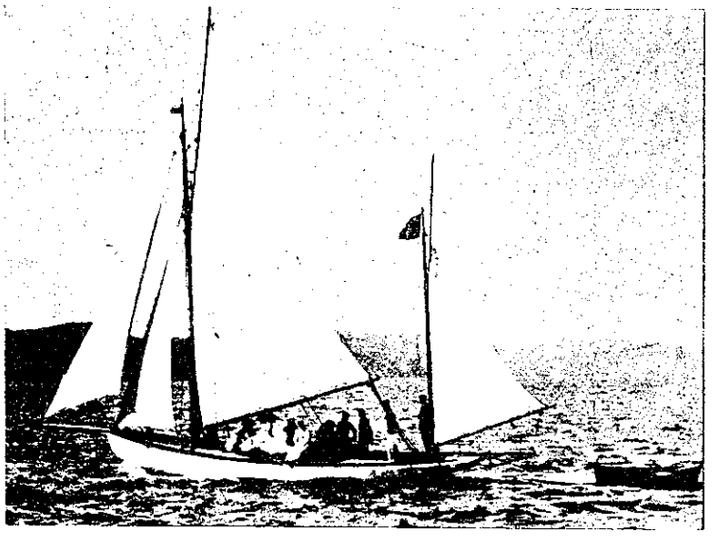
* * *

The yawl "Pandora," 9 tons, from Bunbury, Western Australia, on a cruise round the world, arrived at St. Helena on the 22nd April. Since leaving Bunbury she has called at Melbourne, Sydney, Auckland, Easter Island, and the Falkland Islands, and has, to date, sailed a distance of 15,142 knots.

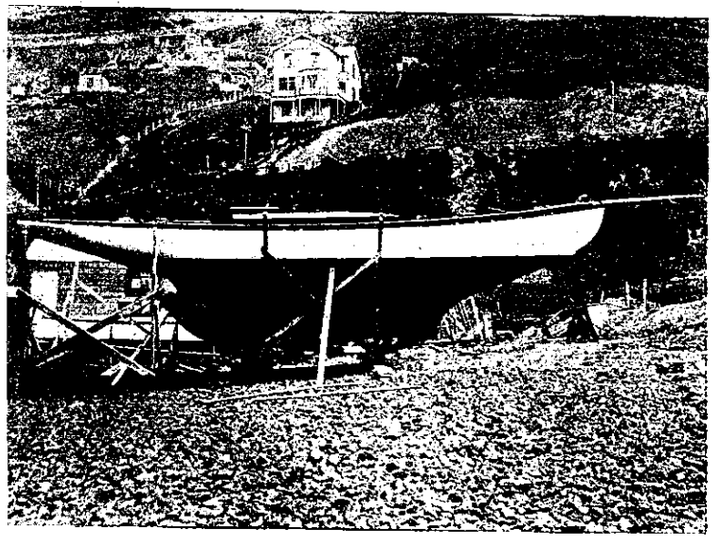
* * *

Mr. L. O. Tattle has disposed of his third-class yacht "May" to Mr. R. Craig, and will, in all probability, buy a larger boat in Auckland for next season.

Previous to her despatch for the Monaco races, Mackay Edgar's British International racer, "Maple Leaf III," attained the marvellous speed of 49½ knots. This was not officially timed, nor was it the mean of six runs, but, excepting a slight error there may have been through inexperienced timing, this figure represents the capabilities of the boat. It remains to be seen how the motors stand up to this work, but as there are four clear months to elapse before the boat need be shipped to the United States, there will be ample time for correcting any deficiencies that may be left in the engines. Of course, the last race for the B.I. Trophy illustrated the old story of the hare and the tortoise, but something better than a tortoise will be required by America this year to keep the cup, unless singularly bad fortune dogs the British team. For, in addition to "Maple Leaf III," there will almost surely be a representative of the Duke of Westminster, whether an improved "Pioneer" or a more powerful boat has not been settled yet.—"Motor Boat."



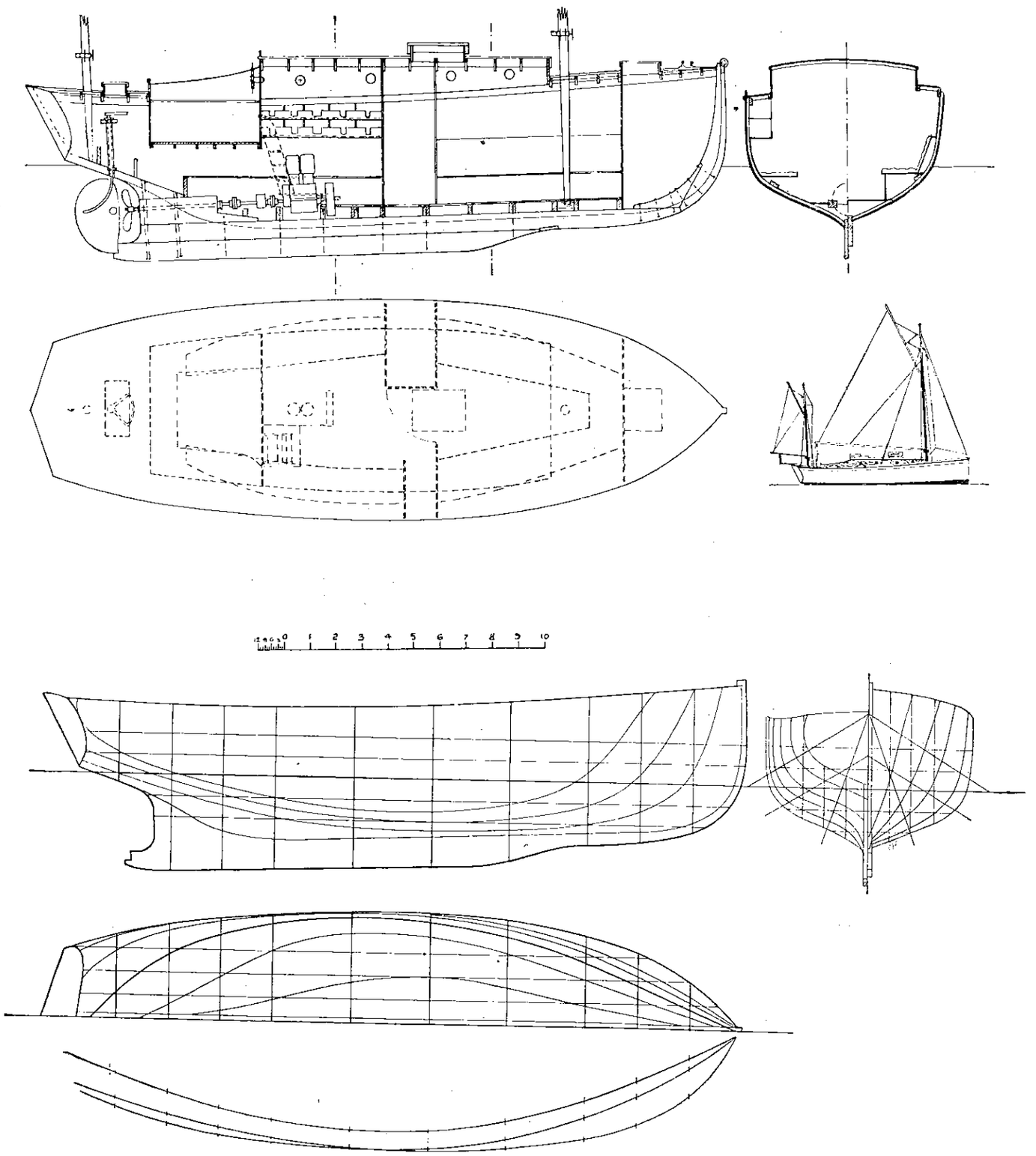
"WHITE HEATHER" on Opening Day, Season 1910-11.



"WHITE HEATHER" on the Slip.

TWENTY-SEVEN FOOT AUXILIARY CRUISER.

Designed by S. T. Silver, Structural Engineer, Woodward Street, Wellington.



In the last issue of Yachting Notes I promised plans of Messrs. Silver Bros.' auxiliary cruiser. The above is a reproduction of the plans prepared by Mr. S. Silver, from which she has been built. The principal construction details are as follows: Keel, jarrah sided, 4in.; Stem, jarrah sided, 3in.; Ribs, 1½in. by 1¼in. black birch, spaced 10in.; Planking, 1in. dressed kauri; Floors, 2in. and 3in. dressed kauri; Gunwales, Clamps, and Bilge Stringers, 3½in. by 1½in. kauri, tapered fore and aft; Deck Beams, 2½in. by 1¼in. kauri; Deck Planking laid in narrow strips of 1in. kauri.—"O. F."

Photography Simplified

Continued from May Issue

With Notes on Pinhole Photography.

(By Barclay Hector.)

Exposure.

It is generally supposed that the exposure in pinhole photography is harder to estimate than in ordinary photography. But when it is remembered that a pinhole is equivalent to a very small-stopped lens, it will be easy to calculate the exposure. Supposing the diameter of the pinhole is 1-40in., and it is being used at five inches from the plate (*i.e.*, focal length of 5 inches), the aperture will be equal to 5in. ÷1-40in., or F. 200. And the exposure for F.-200 for any specific subject will be that found from any exposure calculator at F.-8, multiplied by about 750; the exposure at F.-200 being about 750 times that required at F.-8. But it has been found that if we assign to specific sized holes specific factors, it will be only necessary to find out the distance from the pinhole to the plate, and multiply this distance by the factor, which will give the F.-No. After finding the exposure (*in seconds*) from a calculator, give an exposure *in minutes* instead of seconds. Now, the factor for the pinhole I recommend is 6. Therefore, by way of example, supposing we are using the pinhole at 8 inches from the plate, we multiply this by 6, the factor, and get F.-48. If we then find from our calculator that the exposure at F.-48 is 3 seconds, then we give 3 minutes.

The following rough guide to pinhole exposure may be found useful for the purpose of first experiments:—

SUBJECT (Middle of Summer. Bright Sunlight, W.P. 6 Pinhole).	EXPOSURE (IN SECONDS), using Imperial Special Rapid Plates.					
	At 5 in	At 8 in	At 11 in	At 14 in	At 17 in	At 20 in
Open Sea	4	9	16	27	40	57
Distant Landscape Open Beach Ships in Open	8	18	32	54	80	114
Light Foregrounds, no near shadows	16	36	64	108	160	228
Strong Foregrounds Average Street Scenes	32	72	128	216	320	456
Very heavy Foregrounds Narrow Streets	64	144	256	432	640	912

I also give the following list of the proportionate values of the F.-Nos., taking F.-8 as the standard:—

F.-No.	Exposure Proportionate
8	1
11	2
16	4
22	8
32	16
45	32
64	64
90	128
128	256
180	512
256	1024
360	2048

Development.

As there is an appreciable loss of definition in the image formed by a pinhole, and also the masses of light and shade being more or less merged into one another, it follows that we must use some developer which will to some extent accentuate contrasts and minimise the fog-veiling present in all pinhole negatives. I have tried various developers, and have come to the conclusion that there is none better than Pyro-Soda (Imperial Formula), but with half as much again of the Pyro. The addition of extra Pyro tends to slow the action of the developer, but it produces greater density in the high lights, and consequently greater contrast. Do not be alarmed if, when developing your first pinhole, you find it attains an all-over-greyish appearance, known as fog-veiling. This is peculiar to pinhole pictures, and will scarcely affect the resulting print.

Fixing.

To remove some of the fog-veiling, it is a good plan to add to each ounce of Hypo solution (4 in 20) 2 or 3 grs. of potassium ferricyanide (not ferro), and after fixation is apparently complete examine the negative in daylight. If the fog-veiling is not sufficiently removed (it cannot be completely removed without ruining the negative), replace the negative in the solution for as long as it is necessary.

Suitable Subjects.

LANDSCAPE.—The most suitable landscape subjects for pinhole work are those in which perspective is well marked, *i.e.*, those with strong foregrounds, well-filled middle distances, and hazy distances. Wind is the chief bugbear in landscape work, and it is often necessary to close the aperture during a heavy gust, keeping a note of the time. In any case, the tripod legs should be firmly fixed in the ground, and it is a good plan to hang a heavy weight from below the camera. We need not be so afraid of bright sunlight as we are in lens work. That strong sunlight which in a lens photograph would give an unpleasant stiffness, adds brilliancy to a pinhole photograph. In fact, sunlight greatly adds to the charm of a pinhole picture. It should be easy to imagine a scene where the composition and light and shade alone would form a picture without the introduction of any detail whatever; such is a very suitable pinhole subject.

Another suitable landscape subject is one containing rapidly running water. It is, I think, generally imagined that running water requires a very short exposure; but it is not so. Water ripples constantly and regularly repeat themselves at certain points. Therefore, if we give a long exposure, a general average is secured which will give a most natural appearance, and a far better suggestion of movement.

STILL LIFE, ETC.—For this class of work the pinhole is pre-eminently suitable, giving, as it does, such perfect perspective and a solidity not easily expressed with a lens. In photographing flowers with a pinhole, just so much haziness of definition is given as to make pictorial that which might be quite commonplace when taken with a lens. Let any of my readers photograph a daffodil with a lens and with a pinhole; on comparing the two results I feel sure he will admit that the one taken with the pinhole will possess far greater pictorial quality, and will give a far truer representation than the one taken with the lens.

COPYING AND ENLARGING.—In copying same size, it is only necessary to place the pinhole half-way between the object to be photographed and the plate. In copying paintings and engravings the brush-marks in the former and the line-markings in the latter will be so diffused as to be almost unnoticeable in the finished print. In enlarging, the distances of pinhole to plate and pinhole to object can be readily ascertained from the tables given in the British Journal Almanac, and the exposure necessary can be calculated from any meter or calculator. The following table may be useful:—

Enlarging, Reducing, and Copying.

ENLARGEMENT	Distance from Pinhole		Relative Exposures	
	to the Subject	to the Plate	Enlargement	Reduction
Same Size ...	1·00	2·00	1·00	1·00
Double (Half)	1·48	3·00	2·25	·56
Three times	1·31	4·00	4·00	·44
Four times...	1·25	5·00	6·25	·39
Five times ...	1·20	6·00	9·00	·36
Six times ...	1·17	7·00	12·25	·34
Seven times	1·14	8·00	16·00	·32
Eight times	1·12	9·00	20·25	·31
Nine times...	1·11	10·00	25·00	·30
Ten times ...	1·10	11·00	30·25	·29
REDUCTION	to the Plate	to the Subject	Enlargement	Reduction
	Distance from Pinhole		Relative Exposures	

BUILDINGS AND STREET SCENES.—As an unlimited angle of view can be had with a pin-hole, it follows that the pinhole is most suitable for photographing street scenes, especially those containing tall or wide buildings. No special instructions are called for, except to remember to keep the back of the camera vertical. Great care should be taken about this.

In taking street scenes (with a long exposure), the people and vehicles passing need not be considered. If the exposure be more than three minutes the street will appear as blank as if no one had passed along it—that is, provided all the people, etc., keep on the move for most of the time.

PORTRAITURE.—Owing to the long exposure necessary, portraiture is not very suitable for the pinhole, but with a steady sitter in a good light, out of doors, some very fair results can be got. Using extra rapid plates, the exposures should not be any longer than were very frequently given in the days of the "wet-plate."

Conclusion.

In concluding these notes, I would suggest that every artistically inclined photographer should provide himself with a pinhole, to be used as occasion demands. I feel sure that sooner or later he will find that it is not a useless part of his kit, but that at some time or another he will find a use for it, and will wonder how he has managed so long to do without it.

Architecture and Building.

The English Home.

(By C. F. A. Voysey, in *British Architect*.)

"I come not to bring peace, but a sword," to cut down a popular idol, and win allegiance to an older, a more healthy, and more universal principle.

First, we must clear our minds of all conceptions of symmetrical elevations, made after the likeness of temples, and return once more to the Gothic principle of evolving our homes out of local conditions and requirements, once more paying due regard and respect to natural conditions, both climatic and geological, and, above all, to a love, reverence and obedience to the laws of fitness, fitness to our aspirations and needs. Let us give up masquerading as Greeks, and sincerely express our natural characteristics. The classical idol has reigned long enough; it must be cast out, because it is a false expression of our climate and character. It was a glorification of ceremonial, and in its earliest forms confined to the Temple. Man's habits, customs, conditions and ideas have entirely changed, and we have many practical problems of domestic economy to engage our attention. We must approach such problems with open minds ready for all healthy development, and be prepared to accept conditions which we cannot alter, such as the advent of the machine, and the improved conditions of transit and commerce. We must be prepared, if need be, to use marble from Italy, if our country cannot produce material equally suitable for our needs. But we need not feign Italian sentiments or cloak ourselves with the airs and graces of foreigners. We must shake off the fashionable convention of obedience to style, and dare to be sincerely ourselves, and recognise our limitations.

The great artist Wren, with his exquisite sense of proportion, has made us believe that classical expression in architecture will suit any climate; in other words, that quality and quantity of light and natural climatic and geographical conditions have nothing whatever to do with fine architecture. Because he was an artist he has pleased us with his buildings; his qualities have led us astray, and we are now building all our town halls after the manner of St. Paul's, because the country and town councillor thinks that is the finest example of what modern architecture should be. He recognises the Renaissance style, and finds that if he advocates it, his electors are less likely to condemn his judgment than if he sought for fitness of purpose, and condition, regardless of style.

The clamouring for style is merely a cloak to hide our want of discrimination, and many think that the establishment of a national style would make it easy for them to be in the fashion; most people wish to be in the fashion as to taste. The discernment of fitness needs careful consideration of many subjects, and a wise, brave judgment, which the average man finds beyond his power or inclination. The architectural profession has done its best to encourage the adoption of the style called English Renaissance, because it is possible for the average man to obtain a degree of proficiency in it; it is easily crammed, and is a sure crutch for the halt and the lame. The term English, as applied to Renaissance, is inaccurate, and a dishonest attempt to make an entirely foreign style appear national; but I do not wish to quarrel over the little difference there may be between what is called Italian and English Renaissance. All we need here to make clear is that all Renaissance architecture is conceived on a definite classical principle, diametrically opposed to the principle of Gothic. The former is deductive, while the latter is inductive. In other words, Renaissance is a process by which plans and requirements are more or less made to fit a conception of a more or less symmetrical elevation, or group of elevations. The design is conceived from the outside of the building and worked inwards. Windows are made of a size necessary to the pleasant massing of the elevations, rather than to fit the size and shape of rooms.

The Gothic process is the exact opposite; outside appearances are evolved from internal fundamental conditions; staircases and windows come where most convenient for use. All openings are proportioned to the various parts to which they apply, and the creation of a beautiful Gothic building instead of being a conception based on a temple made with hands, is based on the temple of a human soul. The Baron or peasant planned his house to express his daily aspirations, customs and needs. It is quite true that architecture has progressed much more in domestic than in public building. We set to work in the one case to study the conditions and requirements, and make a good plan, and from it evolve a good elevation—that is, when we are engaged on domestic work. But for the alderman and councillor we conceive a mighty elevation, a true aldermanic corporation, a fatness and display, behind which we hope to accommodate the policeman.

The finest architecture the world has ever seen has always been the honest expression of human needs and aspirations. And this is equally true of the noblest classic buildings. If we lived and thought and felt as Greeks, Greek architecture would be a true expression for us. This principle applies to every country throughout the habitable world. Why, then, should England turn her back on her own country and pretend that as she is such a born mongrel she can have no truly national architecture? Has she no national climate? Are her geological and geographical conditions the same as all other countries? Is there no difference between English or Italian men? The absurdity of the suggestion is irritating. No one denies strong national character to the British people. Why, then, do we so persistently try to ape the manners of foreigners? Why, because we have learnt how to travel abroad, should we despise our own country and its limitations? Why have we lost our patriotism, and adopted a foreign child to inherit and record our unfaithfulness? Surely a national style would be both possible and desirable, as it was in the Tudor period, if allowed to develop out of natural conditions and requirements. It is the ingrafting of a foreign style, or manner of buildings, which is so poisonous and utterly subversive of any natural growth.

Do we not all desire peace, repose, protection, warmth, cheerfulness and sincerity, open, frank expression and freedom from chafing convention in our homes? Surely, then, the Gothic principle can help us to attain all these qualities. It sets the mind free to consider all the moral sentiments and mental and physical emotions which, when properly classified and controlled, will form—as they have done in the past—the only sure foundation for our design. It is the craving for repose that leads us to make our houses long and low, and to avoid the multiplication of angles and divergent planes. Forked lightning is Nature's expression of unrest and disturbance; complexity of angles and planes is our forked lightning, and conveys unrest and disturbance. In like manner multitudinous mixtures of various materials, textures, colours and forms all disturb the sense of repose. All observant people will tell you how very tiring they find museums. The constant calls made by the various objects on the senses is very fatiguing. And yet it is sadly common to find drawing-rooms and whole houses more like museums than homes of grace and rest. People with such places show a keener love of display or sentimental regard for associations than a love of repose, and by this we are reminded once more of the fact that it takes many different kinds of minds to make a world, and that it is really a great blessing that we do not all think alike. Therefore, in laying down the qualities we suppose necessary to make an ideal home, we must remember that when finished it cannot fit all men. All objects possess intrinsic qualities, having a direct influence on our minds and emotions, but, in addition, we invest them with associations. It is therefore necessary in arriving at a

just valuation of anything, to enquire as to which of these operates the most forcibly. The useless ornament or grotesque may charm us by its associations, and be valued on that account. We all incline to the reverence of family heirlooms, when we know their history, and many ugly atrocities are thus sanctified. But to the uninitiated such objects can have no charm apart from their intrinsic worth. Therefore, we have to be on our guard, to see that all objects should charm by reason of those intrinsic qualities which appeal to all men.

(To be continued.)

Building in New Zealand.

Remarkable Progress in Auckland.

The opening of the new Sacred Heart Convent at Remuera on June 25th was but the forerunner of many similar public ceremonies which, we are informed, will be performed in Auckland during the next eight months. The large and stately public edifices (we learn from our esteemed contemporary the "N.Z. Herald") which have been in course of erection for the past two years or more, are now rapidly approaching completion, and the first of these, the Auckland Technical College, will be opened within the next three months. This will be followed in November by the opening of the Town Hall, and it is more than probable that the new chief Post Office and the new Ferry Buildings will be brought into public use by February. When this is done, the reproach frequently levelled at Auckland, that it possessed few, if any, public buildings worthy of the name, will have been removed.

The following table is of special interest as showing the total expenditure involved in the erection of public buildings just completed and now approaching completion in Auckland:—

Town Hall	£121,000
New Chief Post Office	100,000
New Ferry Buildings	55,077
New City Electric Power Station ..	31,000
Auckland Technical College	25,000
Extension Nurses' Home	17,250
Sacred Heart Convent, Remuera ..	15,000
New City Reservoir, Mount Eden ..	7,397
Lyric Theatre, Symonds Street ..	5,200
Masonic Hall, Upper Queen Street ..	4,830
Presbyterian Orphanage, Remuera ..	3,400
Brick Buildings, Costley Home ..	2,465
Additions, Children's Home, Grey Lynn	2,274
Epsom Methodist Church	1,727
Total	£391,620

As the figures given only represent the contract prices for the different structures, it will be seen that when extras are added the grand total might easily be swelled into over £400,000.

To those not conversant with Auckland's building programme these figures may appear somewhat startling, but it is important to note that the erection of a still larger number of public buildings in Auckland is projected for the next decade, involving a still greater expenditure. These contemplated buildings include new University buildings, railway station, Boys' Grammar School, King's College, Dilworth Institute, Y.M.C.A. building, Public Trust Office, Law Courts, new auxiliary Post Office in Wellesley Street, Municipal Depot, new Cool Stores, the Naval Stores, Knox Home for Incurables, Trades Hall in Hobson Street, rebuilding of the City Market, completion of the Hospital and Charitable Aid Board's building programme, enlargement of St. Paul's Church, Municipal Baths, public schools, etc.

Quite a large number of the bigger suburban estates are to be cut up into suitable building allotments shortly, ready to be placed on the market during the coming summer.

Among the larger of these properties is that belonging to Messrs. R. and W. Hellaby, at Richmond. This property, which comprises some 33½ acres, much of it having a water frontage, is now being surveyed, and tenders will be called for shortly for constructing roads through it

Another property, comprising 20 acres fronting the Point Chevalier Beach, has been purchased by a small syndicate, and is now being cut up into 79 building allotments.

Steady progress is being made by the Grey Lynn Borough Council with the construction of roads through the Surrey Hills Estate, and it is expected that the whole of it will be properly roaded within three years' time. The construction of Selborne and Owen Streets and Williamson Avenue has now been practically completed, thus opening up a large number of allotments.

General Post Office, Wellington.

Wellington's new General Post Office, to cost over £90,000, is well advanced, but we regret to learn is not likely to be in use for many months. The walls have reached roof-height, but an enormous amount of work has to be done, and the flat roof has yet to be constructed. According to a paragraph, which obtained currency this week, there is delay because the Government officials are uncertain whether they will strengthen the roof. The facades are looking very handsome.

The Minister of Public Works said the other day, *apropos* of delay:—"The kind of roof required was fully detailed on the contract plans, and there is no intention whatever of making any alteration in the design." This firmly. He added: "It is understood, however, that the contractors, without consulting the officers of the Public Works Department, ordered expanded metal different from the kind specified in the contract. No doubt they found some trouble in getting this material in the length required, unless it is specially made. There has been no hesitancy whatever about the Public Works Department. The statement that the contractors put in a price for strengthening the roof some time ago, but have been delayed because no decision was arrived at, is absolutely contrary to fact. Messrs M. and A. Wilson have been negotiating with the Resident Engineer to be allowed to substitute some other material for the No. 10 expanded metal which was provided in the contract. They ordered No. 8 metal, which could not be allowed. A clause in the contract provides for the use of steel reinforcing rods in lieu of expanded metal, and no doubt the contractor will be called upon to carry out the terms of his contract in its entirety without being asked to submit any price, as the contract already provides the terms on which the roof is to be constructed."

"If men are being discharged it cannot be because the roof is not being constructed, as it could not be proceeded with until the three big cranes and staging at present in use in connection with the masonry work are pulled down. This apparently cannot be done for a considerable time. Blaming the Government for this is only on a par with the usual daily misrepresentations having the same object. The Government is paying £5000 a year for accommodation for its postal officers in Wellington, so that it is not likely to unnecessarily delay the completion of its own building for postal use."

With reference to the above, we have nothing to say about "blaming the Government," for we are not politicians. But there is no reason, we are informed creditably, why the contractors should be blamed. As the Minister himself has pointed out, the cranes and staging still in use prevent further progress with the roof. It is possible that the only trouble is that there are still people in the world who believe that Rome was built in a day.

NOTES.

The frequent opening of new hotels in London sometimes gives rise to surprise that there should be a sufficient number of travelling people to make use of all the accommodation provided. But in the matter of hotel accommodation London, in proportion to its population, is far behind New York. The latest New York scheme is for the building of a twenty-five storey hotel at a cost of £3,000,000. The site alone cost £1,500,000. The new hotel is to have 1600 rooms, and among its attractions are a roof garden and a Turkish bath. The hotel will be a commercial house, and will have entrances on four leading thoroughfares. It will be the biggest hotel in the world.

* * *

The value of models in litigation has often been proved. Mr. Percy Collins, who writes in the "World's Work and Play" on the model-making of Mr. John B. Thorp, shows by many examples how useful a careful scale model may also prove in carrying out building operations. "All architects," he says, "at times experience a difficulty in explaining to their clients the actual significance of plans and working drawings, this difficulty being accentuated when alterations or additions to existing structures are under discussion. For instance, a gentleman may wish to build a new wing to his country house, and he naturally desires to see for himself exactly what the architect has in mind—and this before he commits himself to contracts."

* * *

The hatred of everything Gothic and Mediaeval which was very general in England during the eighteenth century forms a very curious chapter in architectural history. It often took the form of covering up work which, according to the ideas of the present day, was infinitely superior to that which replaced it. An example of this perverted taste has recently come to light at Farnham, Surrey. Alterations at the Goat's Head Tavern in that town have revealed the fact that the house possesses a fine Gothic facade. The front of the house was found to have two casings. Underneath some modern lath and plaster work was another covering of old roughcast, and when this was removed evidence was found of a much earlier framework, to which much of the present house has been added. The date of the earliest part is probably of the fourteenth or fifteenth century.

* * *

The "Ormrod" concrete Machine Company, of Knight St., Liverpool, has issued a neat booklet which gives particulars of their concrete block, brick and tile-making machines, moulds, mixers, etc. These machines contain some special improvements, which are protected by registration. They are worked entirely on the face-down principle. They are designed for hollow blocks 9in. or more on the bed, giving a perfect system of vertical and horizontal cavity, to ensure thoroughly dry walls, and also

"HARTHAN," A COUNTRY HOUSE OF LORD ISLINGTON, CORSHAM, WILTSHIRE.

for solid blocks, 9in. and 4½in. on bed, for the purpose of building walls with a complete cavity secured with iron ties, or for solid walls. The "Ormrod" concrete batch mixers are portable and easily worked.

* * *

What bad housing conditions mean in the way of injury to public health was vividly set forth by Dr. C. W. Milner, chairman of the Nottingham Housing Committee, in a recent lecture. Many people thought Nottingham a healthy town, he said, but they were mistaken. If the death rate of Nottingham during the last ten years had been no higher than the average for other towns, 367 lives would have been saved every year. The child death rate in Nottingham was higher, he said, than even in London; had it been equal to the average during the last ten years 2300 more children would have lived. Of course, Dr. Milner did not maintain that bad housing conditions were alone responsible for the high rate of mortality in the town. But it was not difficult for him to prove a close connection between the two facts.

* * *

One of the difficulties of Dr. Dudfield, London, is the very low moral and intellectual standard of the tenants in some of the houses with which he is concerned. He thinks the people require improving more than the dwellings require demolishing. The connection between good housing and good living is a very close and intimate one. But what is cause and which is effect? The answer is that they re-act upon each other. Some of the Paddington houses, with their dark basements and the utter inadequacy of facilities for cleanliness and comfort which always characterises the ordinary terrace house when inhabited by three, four, or five families, certainly do not tend to foster domestic and civic virtues. But in saying this we give full recognition to the other side of the matter. Religion and morality inevitably tend to cleanliness, neatness and order. Every movement making for the moral and intellectual improvement of the people is an indirect contribution to the solution of this difficult problem.

* * *

At a recent meeting of the London Association of Master Decorators, Mr. Dakin (of Messrs. H. Dakin & Co.) put forward a scheme for establishing scholarships for London students of the decorating and allied trades. Such scholarships already exist for students in other parts of the country, and Mr. Dakin pointed out that many young men in London never get the opportunities for learning the branches of decorating that they would in the provincial cities. London has in the past very largely drawn on provincial talent for the better class of workmen and artists. To remedy these unsatisfactory conditions in the London decorating trade, Mr. Dakin proposes that the London Association should hold periodical examinations of practical work done by young men, and should award as a result of these examinations, say, three scholarships, varying in value from £10 to £30, or perhaps £50. These are excellent proposals as far as they go, but they do not seem to us to go very far. They will doubtless stimulate the efforts of a few young decorators, and that is well; but the need of the trade seems to be a higher standard among the rank and file of its members, and this can only be obtained by some educational scheme applicable to all learners.

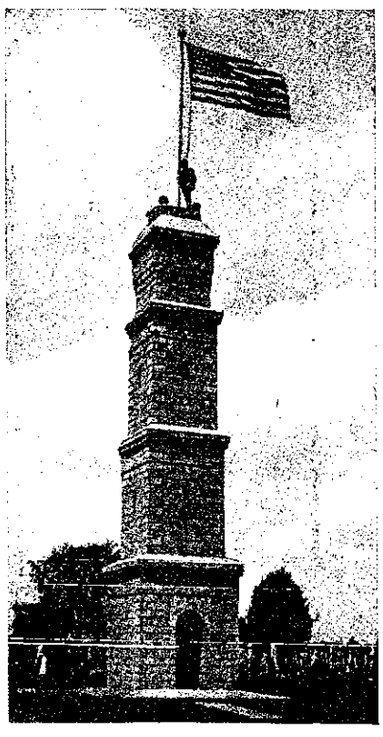
* * *

What the Chimney-stack said to the Vent-pipe.

A Soliloquy.

(By "Bob o' Brixton," in "Illustrated Builder.")

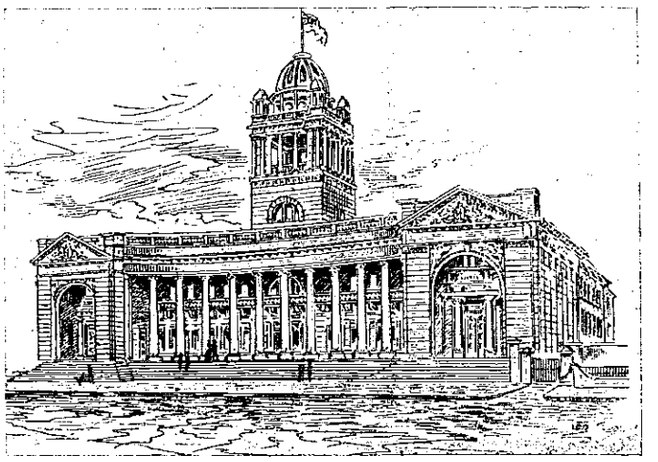
"Halloo, Vent Pipe! poking your nose into my face again. I can't stand having you for company. I put up with the ridge tiles, though they are rather stuck up, and have hobgoblins at their ends ugly enough to drive away all the evil spirits ever invented. But you, 'V.P.,' as I see you are called on the drawing, where is your pedigree. I came over with the Conqueror, and have remained ever since, always given a fine position in the design, and dressed up in all sorts of architectural 'frills and furbelows,' so that I'm no eye-sore like you. My boss, called an architect, I believe, gives quite a long description of me in that rigmarole of technical expressions, called a specification, or something of the kind, which the foreman kept looking at. I had too, quite a grand set of swaddling clothes, in the form of detail drawings, all to myself, but you were dismissed in two lines of typewriting, as if the boss was ashamed of having anything to do with you, and no wonder. You can't be called a beauty, even by accident. And then, that cap! It makes me laugh. Fancy wearing a wire thing like that in public! Then how you crawl up the house and wriggle over the roof—just like a cast-iron snake! Well, there, I must not keep on like this, or you will think I'm jealous. I'm in a bad mood to-day, owing to the wind, perhaps, and do feel a bit thick in the "throat," besides fancying I have several "gatherings" in my "breast," and, to crown all, those tin cans on the top of my "head" don't improve my temper at all. Take my advice, old 'V.P.,' and get your boss, and mine, to give you, as he has me in times gone by, a bit of his kind attention, so as to improve you into a presentable addition to our select family of features, then we'll all chum up together and help on appearances all round!"



CONCRETE TOWER, OHIO, U.S.A.

Sand-Lime Bricks.

Both in the United States and in Canada sand-lime bricks have acquired an extensive vogue. An article in the November number of "Construction," the Canadian architectural journal, gives some particulars relating to their manufacture and structural possibilities, which will doubtless interest many architects and builders in this country as well as in America.



DESIGN FOR STATE PARLIAMENT HOUSE, SYDNEY, N.S.W.

One of the most modern, most economical, and most practical of all bricks, says the writer, is the sand-lime brick. We find buildings constructed of these bricks in almost every portion of the Dominion. Their pleasing, warm grey tone, resembles very closely Indiana limestone. Architects often complain that colour schemes are impossible with sand-lime bricks. This is not so, for by the aid of artificial colouring materials, an unlimited range of colouring shades can easily be produced. These colours are numerous and are proof against climatic changes. More than this, they are uniform, thus rendering it unnecessary to sort them in order to obtain a sufficient quantity of a particular shade. In this manner, architects are enabled to obtain colour effects not possible with any other building material.

As the name denotes, sand-lime brick is made from a mixture of sand and lime. This mixture was used in even the most remote ages for mortar. As a material for the production of an artificial stone, it, however, found very little use.

It was not until the beginning of the nineteenth century that the town of Postum, in Germany, which is surrounded by large sand hills, utilized sand with a mixture of lime in the production of bricks. These German bricks were made by moulding the mixture of sand and hydraulic lime. The green bricks were allowed to weather for a period of about six months, at the end of which they were ready to be erected into walls. It was discovered by Dr. Michaelias, of Berlin, that at the time of curing it could be very much accelerated by subjecting the fresh bricks to the action of steam. This experiment proved successful, and the number of sand-lime brick plants in Germany increased with great rapidity. One of the oldest and yet the most enduring and dignified edifice built of sand-lime brick or "mortar brick" was the Howard University at Washington, D.C., constructed by General Howard in 1867. When the crude method of manufacturing these bricks is considered, together with the permanency of the building which they composed, the admixture of sand and lime into a composite brick, especially under the advanced modern conditions by which it is produced, most assuredly justifies their adoption by present-day architects. The steam hardening process under high pressure was introduced in America in 1910, but the lime at that time became an aggregate in a raw state, and was stored in silo or bin to slack with the sand. This did not prove satisfactory, but it was discovered that by hydrating the lime through a steam process before mixing with the sand the hydrate product is made possible, and that it has proven itself a commercial success.

Sand-lime brick plants have been established in various portions of almost every province in the Dominion, and in some sections they have proven more successful than in others. In those communities where there is not to be found a good brick clay that can be burned at a reasonable cost, sand-lime brick has done much to relieve the situation, but even in the city of Toronto, where there are in close proximity possibly the finest clay beds in Canada, we find residences, warehouses, and churches built of sand-lime bricks. In the West, where good common clay brick is very hard to obtain, we find sand-lime brick very much in use. All of Winnipeg's recent school buildings have been built of this material, together with a large number of warehouses and residences in the same city. Port Arthur and Fort William also have a number of most noteworthy structures constructed of this material. It should be of considerable interest to architects and contractors, as well as brick manufacturers, to know something about the process of manufacture, raw materials, the method of treatment, mixture, time and cost of manufacturing, and the margin of profit in connection with the merits of this exceedingly important building material.

With regard to the process of manufacture, of this particular brick, sand and lime constitute the raw material. The lime is hydrated; it is then mixed in the proper proportions with dry sand and the required amount of water is added. The mass is then thoroughly pressed into the form of bricks, and these bricks are hardened by the action of steam and high pressure. There are two kinds of sand that may be used in the manufacture of sand-lime bricks, one kind inferior to the other. One occurs as fine round particles; the latter in the form of sharp and irregular grains. For the purpose of sand-lime brick manufacturers, the latter kind is preferable, although the former kind of sand may be used to fair advantage. The presence of clay in sand is most injurious; it will not make a strong brick. The lime used in the manufacture of sand-lime bricks must be a high calcium lime, and thoroughly hydrated. The mixture used for the manufacture of sand-lime bricks is variable, and according to the quality of sand and lime the usual proportion is about six per cent. by weight of hydrated lime to ninety-four per cent. dry sand. Excess of lime is very injurious to the strength of bricks.

Time and cost of manufacture of any building material are very important features in connection with their production. It is maintained by the sand-lime brick interests that their system of brick making produces a perfect product in very much less time than is possible in the manufactue of ordinary clay bricks. Another contention of these manufacturers is the cheapness of manufacture. Raw materials are plentiful and cheap in most localities, and it is maintained that through this particular process of manufacture of bricks there is a great saving in time, labour, and fuel.

Building Notes.

AUCKLAND.

Messrs. Wade & Wade report:—

Convent at Remuera, opened June 25th last, also contract for factory for Dominion Laundry Co., Hobson Street; £3800.

In hand—Clark's old warehouse to subdivide; tenders about first week July. Five-storied building, Queen Street, near Mutual Life. R.C. Church, Hamilton (about to start building); £6000. Preparing plans for two-storied brick building, Bank N.Z., Pukekohe. Residence for headmaster, Dilworth Institute, Re-

muera, nearing completion. Do. for secretary same. Residence, Ponsonby, approaching completion. R.C. Orphanage, Lake Takapuna, one wing approaching completion.

Loan and Mercantile Co.

The New Zealand Loan and Mercantile Agency Company, Ltd., has decided to make adequate provision locally for the future by erecting one of the biggest wool stores in the Dominion in the King's Drive, Mechanics Bay.

The plans prepared by Messrs Edward Mahoney and Sons, architects, show that the new building will have a frontage of 288ft. 8in. to the King's Drive by an average depth of 184ft. It will be built in brick, and for the present will be two storeys high, allowance being made for the addition of a further one or two storeys as required. Each floor will contain slightly over an acre of space. The roof will be of the ridge and furrow type with rows of skylights running from end to end, thus providing an excellent light for the display of wool. The building will be fitted up with a number of up-to-date lifts and all modern machinery necessary for a first-class wool store. Tenders are now being called for the building.

Tender Notes.

In Auckland the following tenders were accepted on or before June 25th:—

By the Public Works Department: For a new Post Office at Te Awamutu; for the construction of Panuatairi Steam bridge at Miranda Beach.

By Messrs. Edw. Mahoney and Son (architects): For new wool store on the King's Drive, for the New Zealand Loan and Mercantile Agency Co., Ltd.

By Mr. B. C. Chilwell (architect): For house in Liverpool Street, Epsom.

By Mr. Jas. Slator (architect): For house in brick.

By Mr. E. Ernest Smith (architect): For offices (partly in brick) in Ward Street, Hamilton.

By Mr. L. C. A. Potter (architect): For shops and offices at Ngaruawahia.

The following tenders were received by Mr. T. W. May, architect, for a two-storeyed residence to be erected at Stanley Bay:—Anderson and Co., £1197; J. Worsnop, £1359 15s.; J. A. Penman, £1394; T. F. Blomfield, £1400; J. Meech, £1455; C. H. and C. Frankham, £1486; Patterson and Brookes, £1525; S. C. Judge, £1573; W. Massey, £1687. The lowest tender was accepted.

WELLINGTON.

Contract No. II.

Tenders are invited, and will be received not later than noon on July 6 by the Town Clerk, for the supply and delivery of stoneware pipes in connection with the above scheme. Specifications may be seen and schedules obtained at the Office of the Council, King's Chambers, Harbour Street, and at the office of the Consulting Engineer, R. L. Mestayer, M.Inst., C.E., 288 Lambton Quay, Wellington.

Mr. Schwartz is calling for tenders for the erection of shops and offices in Manners Street; latest date, noon, July 6th. Plans and specifications at his office, 360 Lambton Quay.

MASTERTON.

Tenders are invited, to close at 12 noon on Wednesday, July 5, for the erection of

business premises, Queen Street, in brick and reinforced concrete, for the Masterton Trust Lands Trust.

Plans and specifications and conditions of contract are to be seen at the office of Herbert A. Jones, Architect, Trust Buildings, Queen Street, Masterton.

Mr. Herbert A. Jones, of Masterton, invites tenders for the erection of business premises, Queen Street, in brick and reinforced concrete for the Masterton Trust Lands Trust; latest date, July 5. Plans and specifications at Trust Buildings, Queen Street, Masterton.

Tenders are invited for erection of 10-roomed house in Nelson Street, Invercargill. Plans and specifications at Mr. R. J. Cumming's office, Esk Street, until Saturday, July 8, at 5 p.m.

Tenders are invited until 4 p.m. on Thursday, July 6, for erection at Invercargill of a cottage at Gladstone (Invercargill). Plans and specifications at the office of Edmund R. Wilson, architect, Esk Street.

Tenders were let to-day for the erection of a hall and shops in brick or concrete at Riverton for Mr. Thos. More. Plans and specifications were shown at Messrs. McDonald and Meek's, Invercargill, and Messrs. More and Sons, Riverton.

Tenders were let (July 1) for the subdivision of first floor in Messrs. J. Rattray and Son's premises, Spey Street, for Messrs. Ansell and Co., tailors.

Building Trade in Wellington.

The following building permits have been received and approved by the City Engineer, Wellington:—

From 17/4/11 to 31/4/11—30 applications for permission to erect.

City District	£1889
Melrose District	4095
Northland District	432
Onslow District	325
	£9741

From 1/5/11 to 13/5/11—32 applications for permission to erect.

City District	£5,552
Melrose District	£2,382
	£7,934

From 14/5/11 to 28/5/11—22 applications for permission to erect.

City District	£10,429
Melrose District	3,868
Northland District ..	510
	£14,807

From 11/6/11 to 26/6/11—23 applications for permission to erect.

City District	6,842
Melrose District	22,904
Northland District	515
Total	£30,261

The last of these shows a somewhat sudden increase, indicating a very fair prospect, considering that this is the dead time of the year. It gives some reason for the conclusion that in prosperous cities like Wellington, there is no "dead season of the year." Be that as it may, the rise is a good thing in itself, and gives some reason for believing in the soundness of the country.

Town Planning.

It is understood that the Parliamentary draftsmen have received orders to draft a Town Planning Bill for the Government. This is right at any rate, because a measure of such far-reaching character as a Town Planning Bill ought to be in the hands of the Government. This may be said without any disrespect at all for Mr. Myers, M.P. for Auckland, who has such a measure in hand, and has been pushing it with much vigour all over the electorate. Mr. Myers has, it is true, seen some of the newest things in town planning during his last extensive European and Continental tour. It is, on the other hand, likewise true that the Government are in a far better position than any private member to obtain a comprehensive view of the past and present of town planning, Governments having powers to which private members cannot hope to aspire. Governments, in fact, work for one another by utilising the services of numerous officers expert in their several departments. It is believed that unfortunately the Bill will have no chance, owing to the shortness of the session and the largeness of the work to be done during it. If that be so, the drafting will be nothing more than an electioneering dodge. At best, however, town planning is a somewhat belated pastime in these parts.

New Zealand Petroleum.

(To the Editor.)

Sir,—Noticing that your paper always takes a keen interest in all New Zealand oilfields, I take it on myself to give you an account of a new field at Waipatiki. It has just been discovered about 18 months, and a company, which has boring rights here, are going to start operations shortly. It was discovered by Mr. E. Wiley, who came upon a natural gas spring in a small creek. Noticing the water bubbling in a quiet pool, and also smelling a strange odour, his curiosity was aroused as to what it might be. Then, thinking it must be gas, he threw a lighted match on the water and it immediately ignited the gas. The gas burns well, with a bright red flame and is of intense heat. At night the lower part of the flame (which is invisible in day) burns with a blue light. Since the discovery oil companies have brought experts here to look at the spring, and they say that there is oil here. Dr. Warner was one of them. One company, who have the boring rights of a large area of the surrounding country, say that they are prepared to spend a large amount of money on it, and, as I stated before, they will start boring shortly. The country is of papa formation, with patches of sandstone and limestone. This being a new field (and even the old settlers had no idea that oil was in the district), there may be a bright future before it. I am, etc., J. R. McLEAN.

Coronation Exhibition.

Never did the public patronage come better up to expectation than on this famous occasion. The interesting show has been full every day of people really anxious for information, and altogether appreciative of the handsome scale on which it was afforded. The place became, in addition, a pleasant lounge for citizens to unbend after a day's work. That it proved so strong a "draw' is evidence not only of its own merit, but of the commonsense of the citizens.

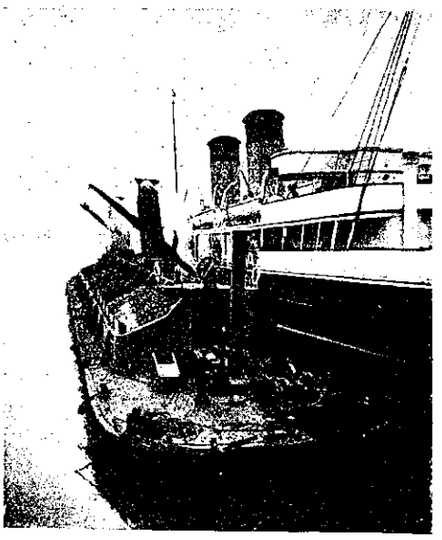
* * *

In G. Wilton & Co.'s exhibit special notice is due to their preparation "Sydal," not "Sydol," as unfortunately misprinted in our last issue. It is, we feel bound to repeat, a preparation invaluable, particularly to the ladies, for cleaning the hands, and keeping face and hands soft and white.

As Others See Us.

The following is an extract from the "Feilding Star," under date Friday, June 16, 1911:—

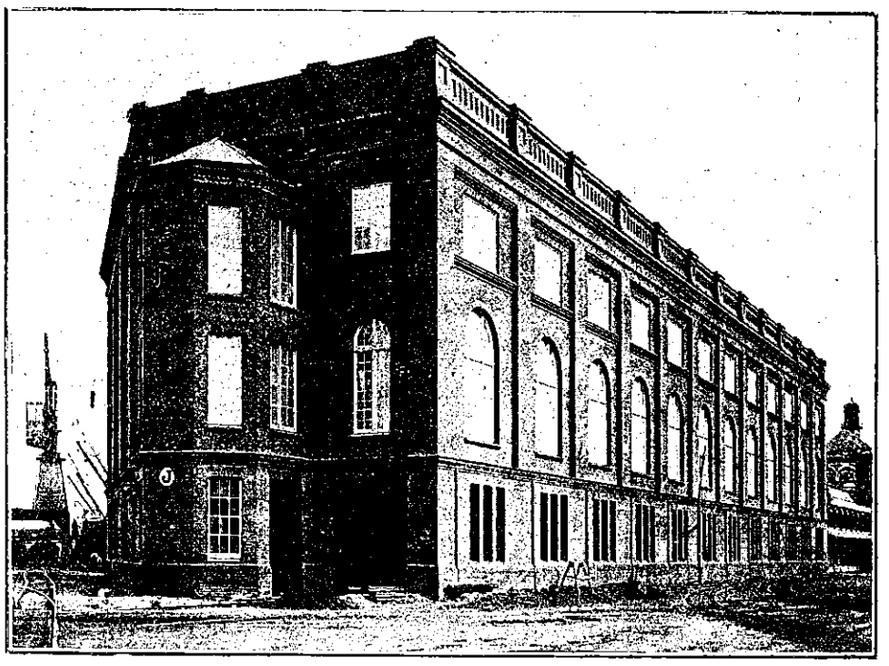
"June's PROGRESS is a Coronation Exhibition souvenir number. The management has taken great pains to give an adequate presentment of Wellington, and has succeeded in a manner that deserves to be called impressive. Consequently it brings before the reader the actual state of our Dominion and of their extent and range. There is an introductory article reviewing the progress of manufactures for many years past which is informative. Reference is made to the side shows, which are unique, the best of them being the tennis court and the bowling green (in the top story), both of them very much appreciated and patronised by reason of the systematic catering for the wants of the numerous patrons of these sports. In addition, there are the regular features of the paper, and the local progress of aviation in Auckland is described, and there is a list of the most prominent of the new styles of air craft.



COALING THE "EAST ANGLIA" WITH TWO ELEVATORS.

the only delay with this method will be at the final trimming in the top of the bunkers, which must always be a slow operation.

The elevators are driven by a very ingenious multiple gear in the top pentagon drum; the small engine necessary for the purpose being contained at the head of the elevator between the top and bottom trunks. The exhaust steam from this engine is admitted into the head of the elevator in a suitable position, and is directed along the shoots into the vessel's bunker doors. It was found by experience that coal dust is unable to rise through the steam, and therefore coal and dust is carried straight into the vessel's bunkers with the steam, thus ensuring an extremely cleanly method of coaling steamers. The steam does not in any way wet the coal, as may be seen on any vessel by stirring the coal about in the bunkers after it has been delivered thereinto by the "Herald."



CORONATION EXHIBITION, WELLINGTON. Shed J. kindly lent by the Harbour Board for the purpose.

Rapid and Dustless Coaling.

The Holland-Johnston System.

(From Paper read by Mr. Higby before the Institution of Mining Engineers.)

The "Herald," a twin-screw coaling vessel, is fitted with two Elevators, and has an output of 200 tons per hour. The pictures show her bunkering the L. & N. W. Co.'s steamer "Anglia," and also two vessels at once. A larger vessel fitted in the same way might have three, four or five elevators, and each of these elevators having an output of 100 tons per hour, it would be possible for such a vessel to discharge herself at the rate of 500 tons per hour. Large ocean liners being coaled by large vessels of the "Herald" type with one of these on either side of the liner, such as the "Mauretania" or "Lusitania," and the big vessels of the White Star Line, could be coaled at 1000 tons per hour.

In this system, different shoots are put through the side bunker doors in different parts of the vessel and coaling is thus going on simultaneously in practically all parts of the vessel's bunkers, consequently the crew, of seven men and the master, are sufficient for everything. The advantages are: Flexibility as regards the shoots, cleanliness, rapidity and economy, all of which points will, I am sure, appeal to those who have anything to do with the bunkering of our large ocean liners.

BUNKERING TWO BOATS AT ONCE.

Miscellaneous.

Science.

Transfer.

(By "Leibnitz II.")

"What a piece of work is man! how noble in reason! how infinite in faculties! in form and moving how express and admirable! in action how like an angel! in apprehension how like a god! the beauty of the world, the paragon of animals."

In the last four words of the above magnificent eulogy man is assigned his true place in the hierarchy of nature. He is the paragon of animals, the most powerful, wonderful, and complex of terrestrial beings. He can descend deep down into the bowels of the earth and ascend far above it. Along the land and through the air he can career at the rate of more than a mile a minute, and across the storm-tossed waters of the ocean swiftly carry thousands of tons. Not only can he speak, but for hundreds of miles transmit his voice. Not only can he think, but almost in a few moments make known his thoughts all over the world. So vast in his physical power that he is not to be deterred by any configuration of the globe—the highest mountains and the deepest seas are powerless to restrain his onward march. And year by year, day by day, his mastery over mind and matter is being augmented, making him increasingly conscious of his own possibilities, sublimating his mortality, and yet at the same time forcing him to, more and more, realise that in a universe immutable in its mutableness —

The windy ways of men
Are but dust, which rises up
And is lightly laid again.

It is clearly manifest that the great physical deeds of man are not accomplished by his own bodily strength; for in this respect he is, when compared with many other animals, an almost despicable creature. In fact, man is a paradox. He is "a soft, pathetic thing of flesh and blood," which an elephant can toss into the air as a child would toss a toy, a boa constrictor swallow whole, a tiger maul to death as a cat mauls a mouse, strutting about, like an upstart on the stilts of a legacy, lording it over "fowl and beast." And verily the conceit of this organic particle is liable to be a great deal more boundless than the compass of his power, and was once so inordinate that he was immodest enough to contend that not only the solar system, but every system, the illimitable cosmos itself, was designed with the specific object of subserving his needs and functions. But slowly and surely science has brought him to his bearings, and forced him to step down from the pedestal of angelic action and "god-like apprehenison," and to acknowledge his relations, from the hairy ape down to the microscopic moneron.

Man is the highest of the mammals, the paragon of animals, no more, no less, and the secret of his superiority lies in the fact that he is, by virtue of his reason and its greatest product, Science, invested with a grand sovereignty over the forces of nature. The power of man has been very sapiently compared to that of a monarch; and a monarch's power rests in the exercise of certain prerogatives, which enable him to summon into action the strength of the body politic. Likewise man, by exercising one single personal power as Science directs is able to call forth and command nature's vast assemblage of energies. The power to which we refer is the power of "transfer"; a power so trivial in itself, and yet so competent to evoke tremendous displays of force, that it may be aptly termed "The Magic Wand." Seldom or never by the unreasoning majority is its import realised, and to not a few it will appear incredible that man's direct share in the multitudinous effects produced by him in the material world, is confined to the muscular transfer of matter from one position to another. Yet on enquiry, such is found to be the case. What Science does is to teach that the forces of nature are manifested under certain conditions, and under those conditions always in the same way. What man does is "to bring the conditions about" by transferring things into certain relative positions.

Take, for instance, the familiar example of rending rocks by explosive force. When analysed, we find the whole operation to consist, as far as human agency is concerned, of a series of transfers. In the first place, the chemist takes a mixture of nitric and sulphuric acids and transfers it to portions of the animal oil, known as glycerine; chemical forces immediately leap into play and the formation of nitro-glycerine, a substance which violently explodes on percussion, is the result; the nitro-glycerine, in its turn, is transferred to quantities of a siliceous earth called Rieselguhr, by which it is readily absorbed, and is then termed dynamite; the dynamite in the form of plugs is transferred to the hill-side; a cap is transferred to the end of a fuse; the end of the fuse into a plug; the plug into a hole in the rock; lastly, to the fuse is transferred a light, and man's share in the work is exhausted. The rock is riven not by him, but by the pressure of rapidly evolved gases.

Take machinery. Take the steam engine. From the time the iron of which it is composed is unearthed until the engine is complete man's share solely consists of transferring matter by divers motions. To cause the engine to act he transfers water and coal into certain relative positions; transfers ignited matter to the coal; transfers a lever from one point to another, thus allowing the steam to expand into the cylinders, and a vast amount of work is accomplished, not by his strength, but by the forces of nature; by the transformation of the potential energy in the fuel into kinetic energy in the engine.

Take agriculture. Of what does the farmer's share consist in the bringing about of the harvest? Exclusively of transferring seed, manure, and earth into certain relative positions. The work of growth is not the farmer's work, but that of the mysterious power which the seed possesses of transmitting lifeless into living matter.

As with the material so with the mental world. The action of mind upon mind is confined to the transfer of ideas and feelings by means of signs and sounds; which are analogous to the hands of the farmer as he scatters seed. The passions of a vast audience may be excited into fury or soothed into calm by the ideas conveyed by an orator's words. The writer by his works can influence for generations to come the moral and intellectual lives of men. For instance, in the 19th century several philosophers embodied their views in the form of an all-embracing cosmic doctrine, known as the doctrine of Evolution. By speaking and by writing this doctrine has been transferred far and wide, profoundly affecting every department of human thought and action, and widening immeasurably man's cosmological perspective. Speakers and writers are the sowers; recipient minds are the soil; but neither speakers nor writers can foretell what the harvest will bring forth.

Science and the power of transfer render man's possibilities practically illimitable; but whilst saying with as deep a fervour as Tennyson himself—

Men, my brother, men the workers ever
reaping something new,
That which they have done but the earnest
of the things which they shall do.

we should ever remember that it is the acme of folly to apotheosize the human organism; for although we have risen from the darkness of palaeolithic savagery to the garish heights of civilisation, although we have accomplished much and will still accomplish more in the domains of space, time, matter, energy, life, we are far from being creatures of infinite faculties. Our thoughts may embrace the stars, our feelings be as deep as inter-stellar spaces, and amid the ceaseless changes of the universe we may be able to perceive an eternal and invariable order; but nevertheless the range of the human mind is conterminous with the realm of "secondary causes," it is utterly beyond its capability to comprehend the nature of that Primal Cause of all phenomena, that Ultimate and Everlasting Fact of Facts, which philosophers call the Unknowable and religionists call God.

Science on the Screen.

(By Ernest G. Osborn.)

There can be no doubt whatever that the kinematograph will shortly play an important part in science, especially in medicine. We have heard recently of very successful experiments having been carried out in bacteriology with its aid, and, indeed, the moving picture has been the means of the discovery of a possible cure for sleeping sickness, the dreaded disease of the tropics. With the assistance of a machine which is in reality a combination of microscope and kinematograph, it has been found possible to trace the action of various bacteria inoculated into the blood of animals like the rat and dog, and by watching the miniature battles which are fought within the blood vessels between healthy and disease germs, bacteria of the antidote type have been discovered.

A very important decision has been come to by the Russian Agriculture Department, this being to avail itself of the kinematograph in order to educate the peasantry to the newest methods of agriculture. A transportable plant has been purchased, and this is to be taken from village to village, accompanied by efficient lecturers. Excellent results are anticipated, and should the scheme prove a success, the Agricultural Department will send plants all through the agricultural districts of the vast empire.

A Paris correspondent comments on the latest achievement of the French aviators. He states that the military experts agree that great use can be made of the kinematograph for mapping out the aspects and characteristics of the country in which it is possible hostilities may take place. He describes a flight at Vincennes in which Count Estienne, in a Farman machine, was accompanied by a kinematograph operator and a film 200 feet long, showing clear and complete survey of the country, was obtained. The French officials are satisfied that the moving picture will be invaluable in preparing maps and plans for geographical and military purposes.

The Educational Committee of the London County Council is now considering the advisability of introducing the kinematograph in geography, history, and science lessons.

Solid Petrol.

A Roumanian chemist is responsible for "solid' petrol for which he claims many advantages. No doubt there are great possibilities about solidified petrol if it can be produced in really practical form. From the particulars to hand, the petrol, which is not solidified, but takes the form of a stiff jelly, does not lose its efficiency in the process, and has not to be liquified before using, although it probably would when passing through into a mixing chamber. The extra cost is said to be about three halfpence per gallon in excess of the liquid spirit. In solidified form, petrol would, no doubt, be safer, far more portable, more economical, for a great amount of liquid is spilt and wasted, and, last but not least, greater evenness in the supply of gas to the engine, owing to the jelly not being influenced by road inequalities.

36,000 H.P. Petrol Power.

The wonderful advance made in the construction of the petrol engine during recent years is told in the following accredited announcement from England: "One of this year's 'Dreadnoughts' is to be fitted with a 36,000 h.p. petrol installation." This news will surprise even those who have closely followed the wonderful strides made in the internal combustion engine. The installation will, it is said, consist of three sets of 8-cylinder engines, each set giving off 12,000 h.p., or a total of 36,000 h.p. The engines will be of the two-stroke Diesel pattern, single acting, using crude oil as fuel, and will run normally at 190 revolutions per minute. The overall dimensions of this "Dreadnought" engine will be 56 feet in length by 16 feet high and 8 feet in width. Some of the advantages of fitting this type of engine are absence of smoke, less space required, no stokers, greater fuel carrying capacity, giving the motor battleship at sea an enormous sea range, and last, but not least, the whole of the engines will be below the water line, thus rendering them practically invulnerable from gun fire. For years many of the technical experts have declared the petrol driven battleship impossible, but the news to hand makes it evident that the petrol engine has advanced more rapidly than some experts anticipated. Of course, it yet remains to be proved how the experiment will work, but there is little doubt that a few years will see a tremendous advance in this direction.

Patents.

The following list of applications for Patents, filed in New Zealand during the month ending June 19th, 1911, has been specially prepared for PROGRESS.

29393—Jeanneret, C. F., Leichhardt, N.S.W.: Concrete wall construction.
39394—Lever, S., Sydney, N.S.W.: Shirt, etc., neck band.
29395—Robinson, K. E., Maryborough, Vic.: Mineral disintegrator.
39396—Nicholas, W., Waimate: Hydraulic ram.
39397—Armstrong, E. J., and Armstrong, D. H., both of Hawera: Valve.
29398—Eggleton, W., Bunnythorpe: Spanner.
29399—Hudson, A., and Smith, F. S., both of Featherston: Flax treatment.
29400—Mays, F., Dunedin: Ladder bracket.
29401—Routley, M., and Routley, J., both of Wellington: Tag, label, etc., forming and printing machine.
29402—Vaile, E. B., Auckland: Door knob securing.
29403—Bagnall, H. N., Auckland: Knife powder.
29404—McPherson, W., Woodend: Spark arrester.
29405—Wattson, C. J., Dunedin: Delivery book.
29406—Datson, J. C., Auckland: Dentrifice.
29407—Owens, E. C., Williamstown, Vic.: Breeching-strap retention.
29408—Henning Process Sugar Extraction Company, San Francisco, U.S.A.: Sugar manufacture.
29409—Fraser, W. A., Melbourne, Vic.: Animal rug securing.
29410—Stock, W. F. K., Darlington, Eng.: Fertilizer, etc.
29411—Van Wart, I. R., London, Eng.: Cattle brand.
29412—Marino, P., London, Eng.: Electric battery separator.
29413—Raymond, F. V., Invercargill: Flax waste treatment.
29414—Donisthorpe, E. S., London, Eng.: Synchronizing working of machinery.
29415—United Shoe Machinery Company, Paterson, U.S.A.: Removing surplus material from stock.
29416—Shepperson, R. E., Enterprise, Queensland: Teat-cup.
29417—Watkins, Tyer, and Tolan, Limited, Wellington: Postal, etc., wrapper.
29418—Hunter, J. T., Wellington: Artificial rubber.
29419—Graaff, C., Berlin, Ger.: Fire extinguisher
29420—Eggleton, A. J. Ohakune: Timber seasoning.
29421—Wilfiden, H. P., Dunedin: Carburetter.
29422—Robertson, R. W. D., New Plymouth: Teat cup.
29423—Carter, A., Tauranga: Pipe coupling.
29424—Pierce, J., Dunedin: Kitchen-range.
29425—Annand, J., Dunedin: Concrete building.
29426—Treloar, J., Hamilton: Milking machine releaser.
29427—Armstrong, D. H., Hawera: Milking machine milk receiver, etc.
29428—Reid, A. W., Stratford: Teat cup.
29429—McGill, D., Petone: Flax treatment.
29430—McGill, D., Petone: Flax treatment apparatus.
29431—Strawbridge, E. L., Palmerston North: Gate hinge.
29432—Hughson, W., New Plymouth: Motor wheel.
29433—Hainsworth, A. J., Wellington: Water heater.
29434—Moody, S., Preston, Vic.: Cycle handlebar stem.
29435—Dallimore, J. T., Middle Park, Vic.: Closet attachment.
29436—Woolnough, A., Dunedin: Metal sash-bar jointing.
29437—W. R. Sykes Interlocking Signal Company, Limited, Sykes, W. R., Tarrant, R. W., of Clapham, Eng.: and McKenzie and Holland, Limited, London, Eng.: Railway signalling.
29438—Kennedy, H. C., Toronto, Can.: Wheel.
29439—Shone, I., London, Eng. Sewerage system.
29440—Cheyne, W. H., Brentford, and Mewburn, G. R., London, Eng.: Steam hammer.
29441—Davidson, J., Sydney, N.S.W.: Sheep-sheer joint.
29442—Rooke, F. W., Hawthorn, and Bristow, J. R., Carlton, Vic.: Hairpin.
29443—Parker, A. H. J., Christchurch: Music leaf turner.
29444—Nuttall, J. A., Marton, N.Z.: Washboard attachment.
29445—Birmingham Metal and Munitions Company, Limited, and Barker, J. H., both of Birmingham, Eng.: Explosive manufacture.
29446—Galbraith, J., Waihi: Roller skate.
29447—Coppell, E. A., Takaka: Flitching saw.
29448—James, H. W., Inglewood: Milk cooler.
29449—United Shoe Machinery Company, Paterson, U.S.A.: Boot and shoe manufacture.
29450—Baldwin, E. S., Wellington: Disc cultivator.
29451—Auto Road Chart, Limited, Sydney, N.S.W.: Vehicle route chart.
29452—Raymond, F. V., Rough, J. E., of Foxton, and Beere, W. O., Wellington: Flax treatment machine.
29453—Elliott, E., Richmond: Gramaphone.
29454—Phelps, W. E., Invercargill: Gate fastener
29455—Lister, M. J., Dunedin: Pick, crowbar, and rammer combined.
29456—Davis, A. V., Devonport: Railway signal apparatus.
29457—Whittome, J. T., Tavistock, Eng.: Road sweeper.
29458—Merrill, C. W., Berkeley, U.S.A.: Valuable material from solutions, recovering.
29459—Merrill, C. W., Berkeley, U.S.A.: Semi-solid material, treatment.
29460—Stone, E. G., Werrington, N.S.W.: Storage chamber.
29461—Caverhill F. J. S., Christchurch: Sheep-shearing machine driving-gear.
29462—Darlow, G. P., Wellington: Milk, etc., container.
29463—Ferguson, P. A., Dunedin: Printers' sheet drying.
29464—Browne, M. T., Malvern, Vic.: Cash storing and delivering.
29465—Ashton, S. A., Auckland: Tunnel driving.
29466—Cooper, C., Mangatoki: Sterilizer.
29467—Clark, G. A., Cambridge: Manure mixer.
29468—McLaughlin, A., Wellington: Cradle, wing frame.
29469—Sparks, W. J., Weston: Spreader chains attachment.
29470—Northcott, F. J., Christchurch: Milking machine receiving can.
29471—Burton, G. L., and O'Donnell, T. H., Christchurch: Pile surface forming device.
29472—Sanderson, C. J., Auckland. Gold saving from sand.
29473—Sanderson, C. J., Auckland: Plant protector.
29474—Hardie, R., Christchurch: Candle extinguisher.
29475—Lietz, W. F., Gisborne: Internal combustion engines, cooling cylinders and heating gas charges for.
29476—Livens, W. H., Auckland: Gas or oil engine.
29477—Berry, E. D., Palmerston North: Regenerative apparatus for utilizing heat.
29478—Clement, E. E., Washington, U.S.A.: Telephone exchange system.
29479—Miller, B., Adelaide, S. Aust.: Lime burning.
29480—McKellar, C. G., Christchurch: Cycle rear wheel fittings.
29481—Robinson, P., and Wankelyn, E., both of Foxton: Fibre tail clipper.
29482—Berry, E. D., Palmerston North: Pasteurizer.
29483—Johnstone, W. L., and Hosking, A., both of Palmerston North: Pasteurizer.
29484—Luks, H., Wellington: Ammeter and voltmeter.
29485—Fitchett, W. H., Shannon: Non-refillable bottle.
29486—Maunder, R. S., Hawera: Milking machine milk releaser.
29487—Player, C. E., Auckland: Gate fastener.
29488—Penny, G. W., Gore: Agricultural implement clasp-fitting.
29489—Morton, W., Dunedin: Hatpin guard point.
29490—McDermid, G. D., Dunedin: Hair ornament.
29491—Scott, J. D., New York, U.S.A.: Hydrocarbonaceous substances treatment.
29492—Hurle, J., and Robertson, A. B., both of New Plymouth: Motor and pump for elevating milk.
29493—Roberts, W. L., Toko: Drainpipe cleaner.
29494—Mander, H., and Sander, G., both of Westport: Tire inflater.
29495—Burton, J. C., and Burton, H. H., both of Leicester, Eng.: Jointing ropes of rubber for tires.
29496—Allen, R. W., Murrumbeena, Vic.: Castrating tool.
29497—Benicia Iron Works, Nevada, U.S.A.: Plough tongue.
29498—Muir-Vincent Smoke Consumer and Fuel Economizer Company, Limited, Sydney, Boiler furnace.
29499—Gitsham, J., Moonee Ponds, Vic., N.S.W.: Gold and silver recovery.
29500—Burdon, J., Burdon, W. M. and Burdon, M. M., all of Belshill, Scot.: Oil gas producing.
29501—Richardson, T., Alexandra: Hat shade or veil, fixing.
29502—Richardson, T., Alexandra: Skein winder.
29503—Symington, S., Invercargill: Electric line section-insulator.
29504—Gray, A. R., Wellington: Hatpin point protector.
29505—White, S., Mangatoki: Brush.
29506—Walker, J. A., Auckland: Window sash-cord, attaching.

For any particulars or copies of the drawings and specifications in connection with the above applications, which have been completed and accepted, apply to

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