

(Continued from page 794.)

SHIP.	OPERATOR.
Koromiko	I. B. Gibson
Kowarra	—
Kurou	—
Lamerou	J. Elmore
Levuka	A. W. Watt
Loongana	C. F. Green
Macedon	G. Poole
Mackarra	S. L. Filer
Macumba	W. J. Washbourne
Maheno	G. H. Hugman
Maindy Lodge	H. S. Chown
Makambo	M. A. Prudence
Makura	F. A. Hunter (s) N. W. Leeder (2nd) P. J. Banney (3rd)
Malayan	—
Mallina	A. G. Dixon
Manuka	J. A. Heavey
Maori	—
Mapourika	C. F. G. Taylor
Marama	C. F. Griffiths (s) O. Ling (2nd)
Mararoua	G. Illingworth
Marella	W. H. Harris (s) H. W. Barnfield (2nd) G. J. Flynn (3rd)
Marawah	J. L. Skinner
Marsina	A. Cuthill
Mataram	C. H. A. Kidman
Maunganui	—
Melbourne	A. B. Monks
Melusia	E. J. Giles
Merriva	J. H. Pullen
Milluna	J. Overbury
Minderoo	J. G. C. Higgins (s) A. F. Plowman (2nd) S. Kings (3rd)
Mindini	R. Jordon
Moana	—
Moeraki	—
Moira	S. V. Blight
Mokota	—
Monaro	G. H. Hore
Monowai	—
Montoro	A. L. Dixon (s) W. S. Ringrose (2nd) F. B. Harris (3rd)
Mortnda	F. C. Davies
Nairana	—
Nardoo	R. McNamara
Navua	D. N. Quinn
Ngakuta	—
Niagara	W. J. Martin (s) E. W. Coldwell (2nd) R. G. Wright (3rd)
Omana	A. J. Sawyer
Ooma	A. E. Sheppherd
Oonah	F. G. Forrest
Paloona	G. M. Whiteside
Parattah	K. L. Simpson (s) E. C. Bouel (3rd) E. Pollard (3rd)
Period	H. Wormwell
Rakanoa	—
Riverina	L. G. Devonport
Rotomahana	—
Saros	H. Warner
South Africa	F. G. Lewis
St. Albans	T. Bannister
St. George	S. G. Jones

SHIP.	OPERATOR.
Suva	L. S. Lane
Tahiti	F. E. Duggan (s) L. H. Jones (2nd) C. Drew (3rd)
Taiyuan	J. H. Wilkin
Talawa	—
Talune	—
Tarawera	—
Taroola	A. D. R. Davis
Time	T. J. O'Leary
Tofua	L. R. Dickson
Toromeo	J. A. Guy
Umaroa	H. Tuson
Urilla	N. W. Marshall
Victoria	H. Fullerton (s) G. B. Fullwood (2nd) F. M. Barsden (3rd)
Wahemo	C. Williamson
Wahine	R. S. Taylor
Waihora	E. A. Hunter
Waikawa	V. P. Nevins
Waikouiti	J. A. Cooper
Waimarino	F. L. Dawes
Waiotapu	T. H. McWilliams
Waipori	N. W. G. Scott
Wairuna	F. N. Davidson
Waitemata	K. J. Dines
Wattomo	E. M. Bain
Wanaka	J. G. Henderson
Warspray	R. E. Robinson
Wear	L. F. O'Donnell
Werrabee	R. J. Inglis
Westralia	—
Whangape	A. O. Sutherland
Waingatul	A. E. Laurence
Wodonga	G. Pow
Woolgar	J. Glennie
Wyandra	T. Chalmers
Wyreema	—
Yankallia	W. C. Lucas
Zealandia	B. Boni

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"SEA, LAND and AIR"

THE AUSTRALIAN NATIONAL MONTHLY

— OF —

TOPICAL INTEREST

Edited by S. E. TATHAM.

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The Editor will be pleased to receive, for consideration, contributions on Aviation, Wireless, the Navy, Mercantile Marine or other subjects within the scope of *Sea, Land and Air*. All MSS., photographs, drawings, etc., submitted must bear the sender's name on back and be accompanied by postage stamps for return if unsuitable. Although every care will be taken of all contributions received, no responsibility is accepted.

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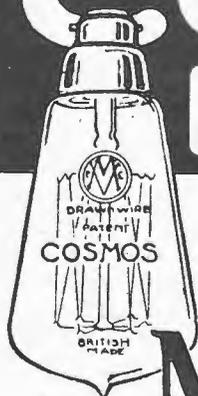


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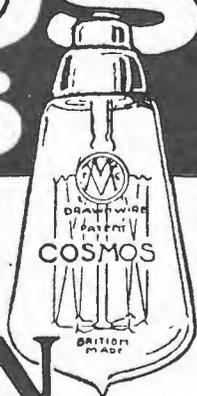
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NATIONAL
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VOL. IV.

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No. 47

TOPICS OF THE MONTH

WHITE AUSTRALIA POLICY

THE question of the possibility of maintaining inviolate the policy of a "White Australia," to which this country is definitely pledged, will ever remain a debatable one while critics of our attitude are able to point to the unsettled state of the Northern Territory.

Unfortunately, the remedy which many of those outside Australia prescribe for filling our empty spaces is not one we can seriously contemplate accepting, for two reasons. Not only do we hate the thought of mingling our high ideals and Christian civilisation with those of another race, but also we realise that once the barrier is broken down the ultimate strangling of our dreams of nationhood will follow just as surely as if we were forced to bend the knee before a victorious foe. Experience has proved that just as it is possible to undermine a nation's prosperity by the peaceful weapons of trade and commerce, so also is it possible to sap away a country's ideals and aspirations by the apparently expedient plan of handing over to others that which we are either powerless or too indifferent to utilise ourselves.

So many divergent views have been expressed regarding the suitability of the Northern Territory for white settlement that the average Australian does not know

what to believe. It is time, therefore, that a definite pronouncement was made by some authority of standing, deputed to investigate the matter by the only body competent to deal with such a vital problem—our National Parliament.

It can hardly be said that as far as words go Australian legislators and people are backward in supporting the principle of keeping this country white. Unfortunately, however, words lack the weight of deeds, and while we go on reiterating our adherence to a policy which most other countries would imitate if they could, we are gaining nothing in the way of moral or material support from other nations, simply because we are doing little or nothing to work out our own salvation.

At the present moment, and probably for some years to come, Australia will have more than enough land to offer white settlers, who will come each year in increasing numbers; but unquestionably the time will arrive when every acre of land will be needed to accommodate a population a score of times greater than it is now. It is to that time that the legislators of to-day must look, and while we follow out the policy of passing on to posterity burdens of taxation which rightly belong to it, we would be guilty

of a gross breach of faith if we allowed, by short-sightedness or indifference, the lofty civilisation and boundless opportunity of to-day to be sullied and destroyed for those who will come after us.

The principle of a White Australia must be preserved inviolate for the sake of our future race. We want no more of the scenes which occurred at the time of the Kanaka deportation in Queensland some years ago; of white women, holding half-caste children in their arms, crowding the piers and waving broken-hearted farewells to their coloured husbands. All this, and worse, would be repeated if we allowed the coloured hordes of the East to mingle freely with those of our own race. It is

no slur on the Asiatics to speak of them in this manner, for however great their industry and high their sense of commercial probity, there is a barrier between the two races which neither heredity nor environment will ever destroy. To mingle two such elements, therefore, is to inevitably drag down the standard of high ideals and racial purity, which by social reform we are continually endeavouring to improve. Every true Australian will accept this as a basis upon which, it is hoped, the future progress of this country will be founded. Possibly its operation will call for determination and statesmanship of a high order, but what better evidence could we have of its need and worth!

WOMAN'S PLACE IN THE WORLD

THE past few years have wrought a great change in woman's outlook on life. This change has not been confined to women alone, for in the process of evolution man has come under the influence of the new order of things, and has to a great extent altered his viewpoint of what is, and is not, woman's rightful place in the world.

It is a comparatively short period since the mere suggestion of a woman filling a position such as many of them occupy to-day was received with open expressions of horror. Man constituted himself the sole judge of how far the so-termed "weaker" sex should be allowed to invade the sacred domain he regarded as exclusively his own. Then came the war, and evolution became almost revolution, so rapidly did women forge to the front. In almost every avenue where previously only men's services had been utilised women were welcomed as benefactors of the nation. Not only did they shoulder the lighter burdens of men, but the rougher tasks daunted them not; and in munition factories and hospitals they showed a spirit of resource, endurance and self-sacrifice which stamped them indelibly as being worthy of a nation's homage.

With the advent of peace came a realisation that man's conservatism had to a great extent vanished; his estimate of woman's value in the industrial and

commercial fields of life appreciably broader, and his willingness to admit that the "weaker" sex were quite capable of holding their own in the battle of life almost won. The result is that to-day the war of the sexes is not nearly so pronounced as a few years ago, and wherever inclination and opportunity have fallen to woman's lot she has risen to the occasion, and the country is the better for her counsel and efforts.

Much of the opposition to women launching out into world affairs springs from a sincere, and quite understandable, feeling that our home interests and future race must necessarily suffer. Happily, there are good grounds for dismissing this fear, chiefly because the human race is so constituted that no matter how wide the opportunities for women, there will always be a sufficient number who will cling to the old ideals to ensure the preservation of all the best features of our home life.

"Variety is the spice of life," wrote an eminent philosopher, and it is equally true that unrestricted opportunity is the greatest panacea for the restless desire to go out into the world and do something, which has long been burning in the feminine breast. Few will deny that there are honours to be won even in the narrow circle of the home, for the woman who chooses to apply her best efforts in that

direction, provided she receives the consideration and assistance she is entitled to from her life partner. Therefore, it would seem that the destiny of the race is almost as largely in the hands of men as women.

The history of distinctions won by women in the fields of science, literature, music, art and countless other avenues, is almost as old as life itself. It was a

woman, Madame Curie, who figured largely in the discovery of the most wonderful mineral in the world, radium. In practical philanthropy we have had Florence Nightingale; in music, Dame Melba; in art, Lady Elizabeth Butler; in science, Lady Huggins; in poetry, Ella Wheeler Wilcox, and so the list could go on almost indefinitely.

A BIG AUSTRALIAN

ALTHOUGH a comparatively young country, Australia can proudly claim as her own a number of men of outstanding intellect and ability who are applying their services in work of a truly national character. In a democratic country like ours the community is always prepared to give honour to a man, who can be trusted to do the right thing at all times, according to his conscience.

Such a man is Sir Denison Miller, K.C.M.G., Governor of the Commonwealth Bank of Australia, whose photograph and biography appear in this issue. Sir Deni-

son is an example for all ambitious young Australians to follow. Like most men who attain to something really worth while, he has found that the royal road to success lies in constant study and hard work.

In his capacity as head of the great financial institution with which he has been associated since its inception, Sir Denison Miller has exerted a big influence on Australian affairs. He has won the confidence not only of the people of Australia, but of financiers the world over, and it is fitting that he should occupy the high position in public estimation to which his sterling services justly entitle him.

THE CALL OF THE BEACH

AUSTRALIA is, practically speaking, now in the middle of the surfing season—a summer recreation which each year strengthens its claim to be regarded as almost one of the essentials of life in a climate like ours. Of the thousands who enjoy themselves in the flashing waves, how many stop to consider the risks, which in their thoughtlessness, they frequently impose upon the fearless band of life-savers who patrol the beaches, ever on the alert to render assistance, even by placing their own lives in jeopardy, to those whom the waves would claim for a watery grave? It is beyond question that all who participate in the pastime owe a deep debt of gratitude to the members of the various life-saving clubs along the

coast who perform such valuable voluntary service. It is up to the community to see that they are equipped with the most effective means of carrying out their work. Life lines are good enough as far as they go, and in the hands of strong swimmers have been responsible for saving many lives, but surf boats ensure a measure of effectiveness and safety which makes their presence on every beach a vital necessity. In the two directions indicated those who patronise our beaches can assist in safeguarding the lives of all concerned. They can avoid taking needless risks, and they can combine for the purpose of subscribing the funds necessary to place the life-saving equipment on the most effective basis.



SIR DENISON MILLER, K.C.M.G.,

Governor of the Commonwealth Bank of Australia.

SIR DENISON MILLER, K.C.M.G.

OUTSTANDING FIGURE IN AUSTRALIAN FINANCIAL LIFE

SIR DENISON MILLER, Governor of the Commonwealth Bank of Australia, is to-day an outstanding figure in the financial life of this country. The history of his association with the institution of which he is now the head, is one of unbroken success and high achievement.

When, in June, 1920, His Majesty the King conferred the honour of knighthood upon Sir Denison, it is safe to say that not only was there none in the community who considered our greatest banker disentitled to such a high distinction, but there was a unanimous feeling that the honour was in every way more than merited by the outstanding ability displayed by the recipient in his conduct of the many important matters which come under his hand.

Sir Denison Miller being an Australian, a brief history of his career is of more than ordinary interest. He was born at Fairy Meadow, near Wollongong, New South Wales, on March 8, 1860. His father was headmaster of the Deniliquin Public School for many years, and the man who was destined to be head of the Commonwealth Bank was educated under his careful tutorship, and at the age of sixteen he entered the service of the local branch of the Bank of New South Wales. As might be imagined, Mr. Miller made the most of every opportunity for widening his knowledge of the intricacies of the profession he had chosen.

In 1882 Mr. Miller, coming under the notice of the general manager, was transferred to the head office of the Bank, where he gained experience in every department of banking. When the crisis of 1893 came he had risen to the position of assistant accountant, and under his superior officers had charge of the "lightning issue" of special notes under the famous Act of Sir George Dibbs.

At the age of thirty-five, Mr. Miller was appointed to the position of accountant at the Head Office of the Bank, and while holding that position he gained experience on the inspecting staff, carrying out special inspection duties in Victoria and South Australia. He also took charge of the

West Australian branch of the business during the temporary absence of the manager, Mr. Salmon. In 1900 Mr. Miller was promoted to the important position of assistant to the general manager, Mr. Russell (afterwards Sir Russell) French, under whose guidance the bank had grown rapidly. In due course Mr. Miller's official designation was altered to that of "general manager's inspector," and later to that of "metropolitan inspector." In spite of the extra burden which these duties entailed, he still remained his chief's trusted "right hand man," a position for which his loyalty and ability eminently fitted him.

One of the founders of the Institute of Bankers of New South Wales, and its honorary treasurer from the beginning, Mr. Miller displayed the keenest interest in the welfare of the institute.

When the Commonwealth Bank was established about ten years ago the choice of a man to control its destinies fell upon Mr. Denison S. K. Miller. It was a happy choice, for it has been proved beyond doubt that the success of the institution is due, in a very great measure, to the outstanding ability of its governor. In the hands of the wrong man the Commonwealth Bank might easily have been as outstanding in failure as it has been in success. The history of the great part played by the bank in upholding the country's financial prestige during the dark days of the war is well known, and on many occasions the groundless fears of those who foresaw ruin for this young country have been quietened by the sound, expert testimony of Sir Denison Miller. Not the least of the avenues in which Sir Denison has scored a success has been the manner in which he has won the whole-hearted assistance of his staff. Many a man who would otherwise achieve success in business life fails utterly because he lacks that kindly sympathy and personal magnetism which win the loyalty and co-operation of those around him. The ability to do this is one of Sir Denison Miller's strongest features, and it has extended far beyond the confines of that circle who know him in the everyday financial life of the country.

KEEP AUSTRALIA WHITE

"RACIAL AND ECONOMIC NECESSITY!"

WHAT LEADING PUBLIC MEN THINK

(Exclusive interviews to "Sea, Land and Air")

SIR ARTHUR RICKARD,

President of the Millions Club of New South Wales, when interviewed, said:

"I am more firmly convinced than ever after my recent observations abroad, that it is worth any sacrifice to keep Australia 'white.'

"In Honolulu, out of a population of about two hundred and seventy-five thousand, nearly half are Japanese, who are increasing at the rate of about five to one over the whites. In California there are only about one hundred and twenty thousand Japanese, but judging by the outcry of the Press and people, the number might really be one million. There, too, the coloured race is increasing to an alarming degree over the whites. The State legislative authorities are alive to the situation, but as yet the National Parliament has not taken a very serious view of the matter, contending that the number of Japanese is as yet too small to constitute a menace. One thing is certain—the two races can never assimilate—they are too widely apart in customs, ideals and standards of living. The coloured men will always accept lower wages and tolerate conditions of living which are not considered desirable by the white race.

"At the same time it seems almost an immoral thing to keep Australia to ourselves, and leave it in its present empty state. We have been enabled to do this in the past by the might of the British Navy, but we must solve the problem for ourselves in course of time by pursuing a sane policy of immigration. We must prepare land and bring the people here. Preferably they should be British people, for at the present time Australia is the most British country in the world—fully ninety-seven per cent. of the population being of that descent.

"Regarding the Northern Territory, I do not think it will ever be developed to any great extent by white people. That will not matter very much, however, if the rest of Australia is populated and worked as it should be. To allow the coloured races to enter there and at the same time

to attempt to curtail their privileges and opportunities, would, in my opinion, only be inviting trouble. This is essentially a case in which 'prevention is better than cure.'"

MR. MARK SHELDON,

late Australian Trade Commissioner in America, voiced his opinion as follows:

"I am at a loss to understand what the present controversy is about, because in my opinion, if the present policy of Australia as to immigration is departed from, it is the end of Australia as a people and a nation.

"When I was in the United States I pointed out on countless occasions that the question was as a closed door in Australia, the principle of maintaining racial purity being as momentous to the Commonwealth as the Monroe Doctrine is to America.

"Having been absent now for such a considerable time from Australia, I cannot approach this subject with any knowledge as to why this question has been raised at this particular moment, as if I sense Australian opinion at all, ninety-five per cent., or even a greater percentage, of the people are in favour of the policy existing at the present moment regarding restrictions on coloured immigration."

MR. WILLIAM BROOKS, M.L.C.,

President of the Federal Capital League, spoke in no uncertain terms:

"I do not consider that there is any possibility of failure in inducing the right class of immigrants to come to Australia, if the people of Australia will recognise that more population is necessary for the development and safety of the Commonwealth.

"An influx of coloured races is neither necessary nor desirable. 'Purity of race' is of profound social and economic importance to this country. We can offer boundless opportunity to millions of our own race and colour, and only a suicidal policy of exclusion of white people, could render an ultimate influx of coloured people possible."

THE SYDNEY HARBOUR BRIDGE

WORLD'S HEAVIEST STEEL STRUCTURE

HOW IT WILL APPEAR WHEN COMPLETED

By J. J. C. BRADFIELD, M.E., M.Inst.C.E.,

Chief Engineer, Sydney Harbour Bridge

(Special to "Sea, Land and Air." All rights reserved.)

THE first suggestion for a bridge from Sydney to North Sydney was made in 1815 by Francis H. Greenway, Government Architect, in a report to Governor Macquarie. In letters to *The Australian* in 1825 dated April 14 and 28, Greenway wrote:

"Whenever the Bridge as proposed is carried across to the North Shore, the roads will be made to communicate with the different farms, and a grand road to the Hawkesbury, etc., making the land, which is now good for little, at some not far distant period, of immense value, and would answer the private speculation of a private individual upon certain conditions proposed.

"Thus in the event of the bridge being thrown across from Dawes Battery to the North Shore, a town would be built on that shore, and would have formed with these buildings a grand whole, that would have indeed surprised anyone on entering the Harbour, and have given an idea of strength and magnificence that would have reflected credit and glory on the colony and the Mother Country."

The earliest recorded drawing of a bridge to North Sydney was made in 1857 by a Sydney engineer, Mr. Peter Henderson, for a bridge from near Dawes Point, Sydney, to near Milson's Point, North Sydney.

Mr. Henderson came to Sydney in the early fifties and lived at Miller's Point, then a choice residential district. He had served his time in the shops of George Stephenson, the inventor of the railway locomotive, and was associated in various works with the famous Brunel, who built the Saltash Bridge.

From 1857 to 1900 various proposals were made for connection by bridge or tunnel, but none of them would have met present day requirements.

To the Hon. E. W. O'Sullivan belongs the credit of making the first real move towards the construction of the bridge. Mr. O'Sullivan almost brought the work to fruition, but before the Advisory Board appointed by him had submitted their final

report on November 25, 1903, the Cabinet in which he was the Minister for Works went out of office. The incoming Government did not accept the tender recommended. The bridge was located in the wrong place; it had two piers in the fairway, and would have been a menace to navigation, but the location was fixed by the Advisory Board, not by the tenderers.

The next move was made in 1908 when a Royal Commission was appointed to report on the best practical method of establishing communication between Sydney and North Sydney. The Commission reported in favour of separate subways for railway, tramway and vehicular traffic based on a depth of water of forty feet above the subways at low water.*

In 1911 the Hon. Arthur Griffith referred the question of connecting Sydney to North Sydney by bridge or subway to the Parliamentary Standing Committee on Public Works. The late Mr. Storey was then Chairman of the Public Works Committee, and after full inquiry into the merits of the bridge recommended by the Advisory Board, the subways recommended by the Royal Commission in 1909, and the bridge proposed by the author, *viz.*, a one-span cantilever bridge from Dawes Point to Milson's Point to carry four lines of railway, a main roadway for heavy vehicular traffic, a separate motor roadway for fast moving automobile traffic and a footway, the Parliamentary Standing Committee unanimously recommended the author's design.

The then Chief Commissioner, Mr. T. R. Johnston, was opposed to the tramway subway recommended, holding that North Sydney should be connected to the city by means of a fast electric railway service. Anyone

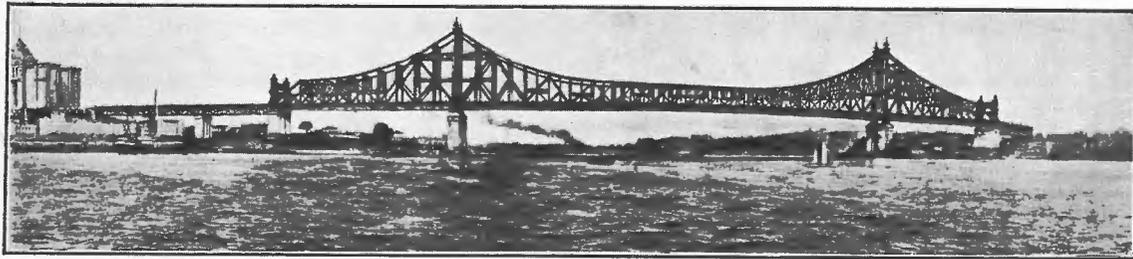
* The Harbour Trust now require for shipping and for the future development of the port a depth of at least fifty-five feet of water at low water above the top of any subway.

who travels to the eastern suburbs or to Central Station during the morning and evening rush hours will appreciate Mr. Johnson's objections. Mr. Johnson urged connection by bridge providing for four lines of electric railway.

The roadway subway provided just sufficient width for two lines of vehicular traffic; one to, and one from North Sydney. Under the Harbour the roadway would have been sixty-six feet below high-water level, with a grade of one in seventeen for over half a mile on the North Sydney approach.

There would be no possibility of a fast motor vehicle passing another vehicle in the subway, and, consequently, the slowest vehicle in the line would limit the speed of all traffic, and a single breakdown would quickly block all motion.

Anyone who gives the subject any thought must quickly arrive at the conclusion that the motion of traffic in any roadway-subway must be restricted to one



direction only, and the subway must be sufficiently wide to provide for two lines of traffic in the same direction, which would enable the fast traffic to pass the slower-moving traffic, so that in the event of a breakdown all traffic would not be blocked.

Many scientists and engineers hold that it is absolutely unsafe to run motor traffic through a long tunnel because of the exceedingly poisonous carbon-monoxide given forth during combustion.

It is a difficult and costly matter to even partially ventilate subways with steep grades on either side. Medical men of the highest standing state that the action of carbon-monoxide upon the human system is cumulative, and it may prove difficult, expensive and, quoting Professor J. A. L. Waddell, even totally impracticable to dilute the poison to such an extent as to make the atmosphere in a tube perfectly safe for breathing, especially by people of

feeble constitution. All normal people desire fresh air and sunlight, and when crossing the Harbour by motor or other vehicle, would certainly prefer to make the journey by the bridge than tunnel. Everyone is aware that a walk through a tunnel is an unpleasant experience, so that it would not be worth while to make provision for pedestrian traffic in a subway.

Another aspect, *viz.*, the vulnerability of bridge and subway will briefly be considered. It is sometimes affirmed by those who have no conception whatever of the details of construction, that the bridge could readily be destroyed by hostile aircraft or gunfire, whereas subways would be immune. Owing to that well-known property of water, its incompressibility, a subway would be more liable to destruction by explosive force than a bridge. The subways proposed would have had little or no side stiffness, and every subway yet constructed under water pres-

sure leaks, more particularly at the joints.

A direct hit would not be needed to render the subway useless, as a depth bomb dropped many feet away would, owing to the incompressibility of water, displace any subway above the bed of the Harbour and put it out of action, opening the joints and allowing it to fill with water. That such would be as the result of an explosion deep down in the water was proved time and again during the war, when depth bombs were successfully used to combat the submarine menace, direct hits were not necessary either to disable a submarine or destroy the morale of its crew.

Scores of bombs could explode on the bridge without doing it any material injury; they would certainly make holes in the deck, but these could readily be repaired. The vital portions, such as the upper chords, could be protected with sandbags.

The Forth Bridge was not even injured

during the war; had it been, the Naval base at Rosyth would have been rendered useless for a time. Could the Allies have destroyed the bridges across the Rhine, the enemy's very efficient railway communications would have been broken and made ineffective.

The bridge will now be described. The main bridge consists of steel cantilevers spaced ninety-eight feet six inches apart, centre to centre, with shore and harbour arms each five hundred feet long; the harbour arms supporting a central span six hundred feet long. The clear span from centre to centre of main piers is one thousand six hundred feet; the three approach spans on either side of the main span are each about two hundred feet long; the remainder of the approaches will consist of concrete arches masonry faced.

The main piers, located on Dawes Point and Milson's Point will be founded on solid rock about twenty feet below mean sea level, the Harbour being crossed in one clear span without any pier in the fairway, so that for all time navigation will be as free and unrestricted as at present.

A headway for shipping of one hundred and seventy feet above high water is provided under the centre six hundred feet of bridge; this headway is twelve feet less at the piers. The headway is twenty feet greater than that provided by the Forth Bridge or the Quebec Bridge, and thirty-five feet greater than that provided under the four bridges across the East River, New York, and is ample to meet present and future requirements.

The main piers, each carrying a load of fifty-four thousand eight hundred tons, will be prominent features in the seascape of Sydney Harbour. They will be constructed of concrete with granite masonry facing, and every effort has been made to secure a design which, in its massive ruggedness, will be simple and dignified.

As it will be the year 1931 at the very earliest before the bridge can be opened for traffic, the Chief Commissioner has asked for four railway tracks to be provided.

In addition to the four railway tracks, there will be a main roadway thirty-five feet wide, a motor roadway eighteen feet wide, and a footway fifteen feet wide. The wearing surface of the roadways will be the best natural rock asphalt.

The main roadway will accommodate four lines of vehicular traffic; every part of the deck will be strong enough to carry a motor lorry, or other loaded vehicle weighing twenty-four tons, with axle loads of eight tons and sixteen tons.

The motor roadway will accommodate two lines of fast motor traffic, and will provide for vehicles similar to, but somewhat heavier, than the latest London "S" type bus, which weighs eight tons when loaded and seats fifty-seven passengers. The footway will allow some thirty-six thousand people to walk over the bridge hourly, and, allowing free but slow passenger movement, there might be ten thousand pedestrians on the bridge at the same time.

The railway connects with the Milson's Point railway on the south-eastern side of Bay Road station immediately after leaving that station, and, passing under the Church of England Grammar School grounds, and Blue's Point Road by tunnel, will reach the first station, North Sydney, between Miller Street and Walker Street, where there will be a large passenger and goods station. After passing North Sydney station the railway will be carried on viaduct from Walker Street to the main bridge. There will be a second station—Kirribilli—in front of the Town Hall, North Sydney, with subway access from Burton Street. The four lines of railway then traverse the bridge, and junction with the City Railway at Wynyard Square station.

All the trains which arrive at the upper level of Wynyard Station *via* Strathfield, or from the Illawarra and Bankstown railways, will be taken across the bridge to North Sydney station, and either terminate there, or serve the Milson's Point railway or the railways projected to Mosman, Manly, Narrabeen, etc.

Plan 2 shows the proposed main station at North Sydney and its surroundings. The station will extend from Walker Street to Blue's Point Road, parallel to Blue Street. There will be three island platforms each five hundred and twenty feet and a goods siding twenty chains long. Goods traffic will be provided for between Blue's Point Road and Alfred Street, and shops will be provided under the goods siding—which will be on a viaduct—and it will be possible to unload direct from

the trucks to the shops below. All rail borne produce will be delivered here at the centre of North Sydney one hundred and fifty feet above the present terminus, obviating the haul up from Milson's Point. The arch at the bottom of the picture is over Alfred Street—the one higher up is over Arthur Street.

As the railways open up to serve Mosman, Cremorne, Athol, Manly, Narrabeen, Pittwater, etc., there will be similar goods stations in suitable centres, and passenger transit and the distribution of goods will be revolutionised, expedited, and cheapened.

The roadway approaches begin at Grosvenor Street on the city side, and a fine avenue one hundred and twenty feet wide will be constructed up to the bridge, necessitating the re-

modelling of Princes Street and Upper Fort Street. Between the eastern side of the arched viaduct and York Street North there is an area of ground where the high bank now is, which will be trimmed off and formed into a park. An area of land about half an acre will be added to the



North Sydney Station.

Girl's High School grounds, the Observatory Park being kept intact. Watson Road will be continued to the main avenue, thus affording direct access for vehicular and pedestrian traffic from Miller's Point to the Bridge. Between the railway viaduct and Trinity Avenue there is a piece of land forty-eight feet below the railway and twenty-seven feet above the street level in area one acre, including the space under the arches. Access will be given to this area by steps and it will be converted into a children's playground.

After traversing the Bridge, the roadway approaches will be continued to the corner of Blue Street and Walker Street, the existing surface being reached at Alfred Street. The footway will reach the

existing surface at Burton Street. As on the southern side, remodelling will take place, and the whole character of this district will be changed from a residential to a business area.

The avenue to the Bridge on the city side will commence at Grosvenor Street, where Grosvenor Square will be formed. The feature in the Square will be an electric fountain, at night brilliant with ever changing colours.

From Grosvenor Street across the Bridge to Junction Street, the slow and semi-slow vehicular traffic will be kept separate from the fast motor car and motor-bus traffic, which will have an unimpeded run of nearly two miles.

The Harbour foreshores from the Lavender Bay tunnel to Milson's Point, now used for railway purposes, should eventually become a park, and no more beautiful or suitable site can be found in North Sydney.

Grassed lawns, with a little statuary on the water front, the cliffs covered with creepers, bouganvillia, and shrubs, to provide masses of colour as a background, would

transform the present wilderness into beautiful gardens in the style maybe of the celebrated Italian Gardens, The Boboli, The Pamphilj, The Doria, or the Villa de Medici.

The area above the ornamented cliffs, made rich by masses of green and garden bloom, could also be entirely remodelled; residential flats and other buildings in Italian renaissance to harmonise with the garden below, could be constructed here in charming surroundings, with fine arcaded walks on the edge of the cliffs overlooking the waters of the Harbour. Treated broadly these walks could be made most picturesque spots, and most delightful resorts for the residents during the long summer evenings.

Portions of the walks could be covered

in with pergola roofs supported by dark hardwood timbers and plain white rough-cast arches to harmonise with the buildings in the background and in keeping with the scheme of ornamentation in the gardens below.

This is not a visionary scheme for the beautification of the northern shores of the Harbour, but a practical proposal which the North Sydney Council or other authority could well carry out with substantial profit to the promoters of the enterprise.

The Sydney Harbour Bridge has now been talked of for so many years—one hundred and six to be precise—that its construction is generally looked upon either in the light of a joke, or an election promise to be brought to fruition at the Greek Kalends. By people in the country who do not know the circumstances it is looked upon as a work quite unwarranted, a luxury for the people of Sydney for which the country as a whole will be taxed; whilst few recognising its necessity have a very faint conception of the magnitude of the undertaking and the many engineering problems to be solved.

The Sydney Harbour Bridge will be the heaviest fabricated steel structure yet undertaken, and when completed the world's knowledge of long-span bridge design and construction will have advanced another stage.

When required one hundred and twenty trains per hour can cross the bridge in either direction, having a capacity in the rush hours of at least 1,500 passengers per train, *i.e.*, 180,000 passengers per hour

in or out of the city. The average daily passenger traffic in or out of the city would then be 1,200,000, and would represent a population of about 1,250,000 residing in the shires and municipalities on the northern side of the Harbour, or eight times the present population.

On account of the location and levels adopted, and quite the reverse of popular expectation, the bridge will serve the population adjacent to Milson's Point and Lavender Bay much better than any system of subways could, and in general somewhat more conveniently than the

ferries. The travelling time from Burton Street, opposite the Town Hall, North Sydney, to Wynyard Square should be less than three minutes, whilst from Walker Street and Miller Street, one hundred and fifty feet above the water at Lavender Bay, should not exceed four and a half minutes. All passengers to and from railway-served suburbs of North Sydney will not have to change as at present from the train to the ferry and from the ferry to the tram.



Grosvenor Square.

The estimated cost of the Bridge and approaches is £6,000,000 sterling, of which £4,000,000 is to be added to the railway capital debt. The Chief Commissioner estimates that after paying interest at five and a half per cent. and all working expenses, there will be a profit of upwards of £250,000 the first year the Bridge can be opened for traffic, if construction commences next year. The balance of the cost, £2,000,000 is to be charged against the City of Sydney, the municipalities of North Sydney, Mosman, Manly, Willoughby, and Lane Cove, the Shires of Warringah and Kuringgai and portion of the Shire of Hornsby.

NEW ZEALAND AFFAIRS

By HENRY BATESON

Special New Zealand Correspondent to "Sea, Land and Air"

Aviation Notes.

THE aviation world in New Zealand during the last couple of months has been very busy, but, with one or two exceptions, the trips have been short, and in the majority of cases confined to joy-riding. At time of writing a 'plane is operating at Gisborne and the Waikanae Beach, piloted by Captain L. H. Brake. Wanganui has been visited by two 'planes—Captain Upham's from the New Zealand Flying School (Auckland), and the other in charge of Mr. Mercer, of the New Zealand Aero Transport Company (Timaru). Competition between the two is very keen and both are operating from Castlecliff, making numerous joy-rides.

The Air Board has issued a return of civilian flying for the eight months ended November 30. During this period the aviation companies of the Dominion carried 5,706 passengers and covered 45,601 miles.

A few days ago an *Avro* flew from Wanganui to Lyall Bay, and in alighting at the latter place dropped into an air pocket just prior to reaching the aerodrome boundary, with the result that the under-carriage struck a fence and carried away. The pilot and passengers escaped injury.

Naval Activities.

The H.M.S. *Chatham* is, at time of writing, in Auckland, but she will commence her summer cruise towards the end of January. She will visit Gisborne, Kaitiaki, Lyttelton, Oamaru, Dunedin, Paterson's Inlet, Bluff, Sounds, Greymouth and Westport, New Plymouth, Wanganui and Wellington, and is due back at Auckland on March 12.

The lazier the man, the more he will have to say about great things genius has done.

Don't mistake the stubbornness of your prejudices for the courage of your convictions.

The training ship *Amokura*, for many years a familiar sight in Wellington, has been taken out of commission. For a number of years now the vessel has been unable to proceed to sea, and the boys have been trained as well as possible in the harbour. Many of them have made trips on the H.M.S. *Chatham* and some have joined that vessel permanently. The reason for dismantling the *Amokura* is that the stringent financial position compels economy. The *Hinemoa* or *Turakina*, both Government boats, will also be done away with, and only one kept in commission.

Lieutenant G. H. P. Muhlhauser, R.N.R., who is making a lengthy cruise in the yawl-rigged yacht *Amaryllis*, has arrived in Auckland from Sydney, after a passage of fifteen days. Lieutenant Muhlhauser expects to remain in New Zealand waters until about April.

Motoring.

Several motor cycling clubs have been holding meetings of late. The Wanganui club's meeting proved a great success, and the races very interesting. The Open Ten Miles fell to G. H. Jones ($3\frac{1}{2}$ *Royal Ruby*), 12min. 57sec., with L. Mangham, scratch man ($3\frac{1}{2}$ *Harley*), second. One of the open five miles went to A. L. Thompson (*A.B.C.*) and the other to L. J. Fromont. L. Mangham (*A.B.C.*) captured the five miles championship in 6min. 19sec. F. Smith ($4\frac{1}{2}$ *Triumph*) finished second, just ahead of G. H. Jones ($3\frac{1}{2}$ *Royal Ruby*). The big event at the Gisborne meeting, the President's Handicap, was won by P. Coleman, who was giving away substantial handicaps. Coleman appears to be riding in better form since his visit to America.

How many people have bartered all the joy of living for the doubtful pleasure of snipping coupons!

Fools will turn out fools whether they go to college or not.

ROADS OF OTHER LANDS

By WILLIAM BROOKS, M.L.C.

EXAMPLES FOR AUSTRALIA TO FOLLOW

Mr. William Brooks, M.L.C., an alderman of the City Council of Sydney, and one of the leading public men of the metropolis, recently returned from a tour abroad. During his travels, Mr. Brooks studied closely the methods of road building and repairing adopted in leading cities of England, and in the following article he gives the result of his observations for the public good.—Ed.

THE traveller abroad who is interested in the question of good roads will find much that is new and instructive in the methods adopted by the engineers of such big cities as London and Westminster, to give the residents thereof good roads and streets.

It is proved beyond all question that in employing such scientific, and (in the first instance) costly methods of road building the authorities of other countries have learned the immense value of good thoroughfares. Undoubtedly it has taken them many years to do so, but once having discovered the fact they have called science to their aid, the result being that in and around many of the big cities of England one may journey over hundreds of miles of streets and roads, that are really a delight to travel on. And not only are they appreciated by the tourist, but by contractors and business men as well, to whom the

smooth and lasting surfaces mean the saving of many thousands of pounds annually.

It will be at once realised that the traffic in the main London streets is much more voluminous and much heavier than the traffic in any of the streets of Sydney or any other Australian city. The city engineers of the great world metropolis have necessarily given close study to the question of road making, both for city streets and residential areas. The conclusions they have arrived at are, firstly, that wood blocks still take first place for city streets. Secondly, that failing wood blocks (owing mainly to their cost) the best road is a bituminous asphalt laid on a concrete foundation, similar to foundation for wood blocks. It is interesting to note the statement of the City Engineer of the City of Westminster, that they lay all softwood blocks—hardwood being



Mr. William Brooks, M.L.C.

scarcely used now. The laying of these wood blocks is certainly done in the most scientific manner, and there are methods of binding same, and making the roadway waterproof, which do not seem to have been used in the wood paving of the streets in our Australian cities.

The tar spraying of both wood paved roads and macadamised roads has been reduced to a fine art in Great Britain. The Roads Department of the Ministry of Transport issue special publications, and the component parts of the various kinds of tar are laid down, together with instructions for using same. The fine screenings used when tarring a wood paved street after some years of wear, give a road surface as good as new.

Asphalt Roads.

Asphalt roads are being very largely used in Great Britain, and are taking the place of wood blocks. In fact, not only are some of the main city thoroughfares constructed of bituminous asphalt laid on concrete foundations, but residential areas are treated with an asphalt surface to macadamised roads, which give a result equal to anything that might be desired.

Dustless Thoroughfares.

In residential areas, roads are being rendered dustless, with a smooth wearable sur-

face, by the process of topping with a bituminous asphalt mixture of about one inch in thickness. The road is first slightly scarified, and the asphalt laid on the surface under approved directions.

Tar-surfacing with screenings is also used for residential areas and country roads, with good results. When sand is used in tar-surfacing roads, it must be *absolutely free from dust.*

Will Australia Follow Suit?

Australia has a long way to go yet before her roads and streets can compare with those of the old country. But the incentive and opportunity are here, and if the authorities take the proper course, and send responsible officers abroad to study the latest developments in road making, there is no reason why the capital cities of the different States should not boast of dustless roads in a few years. Good roads are an economy in the long run, for they play a big part in developing the interior of the country by cheapening transport costs, and so to speak, annihilating great distances. For big cities they are an absolute necessity, and the saving in scavenging, watering, and repairs would go a long way towards paying interest on the capital expenditure involved.

TRIBUTE TO OSWALD WATT

A FEW of the many friends of the late Lieutenant-Colonel Oswald Watt, A.F.C., O.B.E., L.d'H., C. de G., have published a tastefully bound volume as a tribute to his memory.

The late distinguished airman was known as the "Father of Australian Aviation," and enjoyed a really brilliant flying career. At the height of his fame he was tragically drowned near Palm Beach on May 21, 1921.

The volume, which has just been issued, is a fine example of the printer's art. It contains a foreword by Mr. A. Consett Stephen, a brief biography of the deceased airman by his brother (Mr. Ernest A. S. Watt) and a number of tributes by men prominent in the naval, military and civil life of the country.

The publication is profusely illustrated with fine photographs, prominent

amongst them being many of those of early airmen and machines, of which the deceased airman had a great collection.

Not only those who knew the late Oswald Watt, but all who appreciate the many sterling qualities which are to be found in the make-up of a thorough gentleman, will welcome the appearance of this well deserved tribute to the memory of a brilliant airman.

* * *

The following is a copy of a memo. received by a Melbourne merchant:

"We received your invoice, dated the 4th November, for goods ordered a few days previously, and thought—How prompt!"

"To-day we received your statement for goods, and thought—How very prompt!"

"The only thing we have not received is the goods."

COCOANUT INDUSTRY IN THE SOUTH PACIFIC

ITS GROWTH AND POSSIBILITIES

By THOS. J. McMAHON, F.R.G.S.

A QUARTER of a century ago coconut plantations were by no means numerous in the islands of the South Pacific. To-day there are many thousands of acres given up to this tropic product of multitudinous uses. Coconut plantations are being developed by scientific, business-like methods, which mean ample profits.

demand for it is so universal. In the last ten years the coconut plantations and trade of the South Pacific have in size, quantity and quality excelled the rest of the tropic world, and the islands have come to be recognised as the centre of the vastest coconut industry of the universe. This important fact should naturally have a



Cocoanut and cotton plantation, Epi Island, New Hebrides.

The coconut is a commercial commodity these days of the utmost importance to the food and industries of man. Affected at present by the general slump in trade all the world over, the coconut, or copra as it is commercially termed, now forms the chief ingredient of so many necessary things that it can never come to a state of glut in the markets of the world. It will always command prices fair to high, the

bearing on the commercial progress of Australia. It remains to be seen, however, if Australia, America or Japan will eventually secure the bulk of the South Pacific islands trade.

Of all tropical products copra (dried coconut) is king. The ramifications of the copra trade are perhaps the most interesting of any industry by reason of the necessary dealings with the natives. The

average person who uses soap or other domestic commodities made from cocoanut oil, little comprehends the efforts and intricacies involved in producing and buying the wonderful cocoanut. Every country of the world is calling for copra for one purpose or another. The latest demand is from India, with its four hundred millions of people. An American enterprise is at the moment preparing to supply with cocoanut oil the teeming millions, whose religion will not allow them to use animal oils. Such a detail as this brings a realisation of the commercial possibilities ahead of the cultivation of the cocoanut.

The natives who in former days grew the cocoanut in haphazard fashion, are today being taught the most successful and profitable methods of cultivation. Twenty years ago plantations were irregular, unfenced areas, unattractive to buyer or investor. In these days millions of pounds have been invested by large companies in South Pacific plantations. These are fenced, improved and scientifically laid out. Plantations are constantly changing hands, and at prices undreamed of ten years back. Twenty-five years ago a crude plantation, native owned, was bought in German New Guinea for a box of trade tobacco, valued at about £3. To-day the same plantation, improved and profitable, is estimated to be worth from £70,000 to £100,000. The whole islands are now one mass of plantations, not only along the shore lands, but away back into the hills; where once it was thought the cocoanut could not grow.

The modern cocoanut plantation manager is a walking encyclopedia of cocoanut information. He makes a hundred palms grow where once barely a dozen would have come to maturity. Modern management is strictly scientific and systematic. A manager must be able to tell at a glance how cocoanuts may be grown to the best advantage, and to gauge the powers of cocoanut lands. He must understand the art of proper draining, and be fully conversant with the latest means of successfully combating ravages of insects and other pests, and how to nurse and heal cocoanut diseases.

The cocoanut is a very human thing; it thrives or languishes according to the care and food it receives. Every tree on an up-to-date plantation is recorded in a book, and every detail of its life noted. Every

day, in a sense, it must have its pulse felt, its tongue examined. If it fails to show health and vigour, fresh green leaves, a stem plump and juicy, it is sick and must be doctored and tonicked. Maybe a beetle is gnawing at its heart, a tiny and mischievous weevil is piercing and killing its flower and leaves; it is perhaps pining away, anaemic. If so it must be fed, strengthened, almost petted. A daily injection of some tonic is administered, exactly as a human being would be treated. Under this care the palm revives, it shows life and activity, the leaves no longer droop, the flowers with clusters of nuts begin to show fullness and strength, the palm becomes healthy and profitable. It has been rescued from an early grave and in its gratitude lives for seventy to eighty years shedding abundant cocoanuts. Cocoanut plantations in the South Pacific islands have homesteads like villages. There is the manager's residence, and the cottages for assistant managers, married and single. There are workshops, stores, and great sheds for storing copra. There is the office and the chemist's laboratory, the magician ever busily engaged watching, studying, and checking cocoanut diseases, warding off the rapacious attacks of the elephant beetle, and other insidious insects. A plantation usually has its playground for the whites, and its dancing ground for the native workers. Wharves, and a fleet of steamers or sailing luggers, complete the present day needs of a cocoanut plantation. Hundreds of natives are employed clearing land, and draining and planting. There are seedling nurseries to be tended, weeding goes on and a small army runs round picking up fallen nuts. Crowds of boys are constantly employed opening nuts and slicing the white flesh or pulp within, which is either set out on shallow trays to be sun-dried, or is carried on trays to buildings where it is steam-dried, the latest and quickest process for preparing copra. Sun-dried copra, however, is still the more popular, and undoubtedly is oil-saving. The dried, oil-sodden pieces of cocoanut, with pungent odour, is the copra of commerce, and in this state it is dumped into the holds of ships and sent to the markets of the world. A few years back every ounce of copra came to Australia, and the buyers of the world made their bids for lots at Sydney wharves. Australia might easily have been

the great distributor of copra, the one or chief agent for the vast copra industry of the South Pacific islands. Neither the Australian Government nor the Australian people, unfortunately, were interested in the islands, and the copra trade, now worth millions a year (ten years ago it was considerably less than a million) is mainly in the hands of Americans.

Bees play an important part in modern cocoanut plantations. Pollenization, according to modern managers, was too slow in action when left to the wind, and sometimes ants, and so bees were introduced

Another enterprise consists in utilising the long-neglected cocoanut fibre which covers the nut. The Japanese are busy in the Marshall Islands turning this fibre into string and rope, which is remarkable for toughness, and cannot be rotted by salt water.

An interesting feature in connection with the cocoanut industry lies in the fact that it can claim the protection of a patron saint, or at least an "apostle." Quite recently there died on the tiny island of Kabakon, of German New Guinea, Herr August Englehardt, well known in the



Visitors calling upon the "Apostle of the Cocoanut," Kabakon Island, German New Guinea. The "Apostle" is the half-robed figure standing on the right.

with prompt and wonderful results. There is a hundred per cent. increase of nuts on plantations where the bee is busy.

With the attainment of modern knowledge, subsidiary enterprises are coming into vogue. The most interesting is the fact that a cocoanut plantation, after its third or fourth year, that is when palms have reached a height of six to eight feet, makes an excellent grazing area for cattle. Plantations now-a-days are kept clean of weeds and grasses by herds of cattle, they fatten well and are sold as beef, thus making a profit while saving the expense of maintaining native labour which once did all the cleaning, grassing and weeding.

South Pacific as the "Apostle of the Cocoanut." This man, preached the doctrine that the cocoanut was the original food of man, and the only one he should subsist upon. The "apostle" places man's evil passions and desires to eating animal food. Did man live entirely upon the cocoanut as food, and the cocoanut milk as drink, the world would become a heaven upon earth. Anger would not be a part of human nature, the anger that is engendered by hot blood, the hot blood that is made by unnatural foods. August Englehardt lived on the cocoanut, and had a cookery book showing seventy different palatable dishes to be made from the cocoa-

nut. He was an exceedingly handsome man, with the most charming manners, and a scholar speaking many languages quite fluently. He wore only a lava-lava, or loin cloth, exactly like the natives; but when receiving visitors, which he often did, in his beautiful and well stocked library, he completed his dress by a wrist-let watch and a walking stick.

The cocoanut industry of the South Pacific islands is increasing every year, and in another decade the copra trade will

possibly have reached a value equal to £50,000,000 a year. Why should not Australia make a bid for much of this trade? Let Australians remember that the copra industry is mainly in the possession of their own men. Given sympathetic treatment they naturally could do much to divert trade to the Commonwealth. The matter is worth the consideration of Australians, and particularly the Federal Government. Undoubtedly a great future lies before the South Pacific islands.

OCEAN SECRETS

Notwithstanding modern inventions, which have added materially to the science of navigation, the many new faculties for safety of life at sea, including ability to keep in touch with shore and other vessels by radio, no less than fourteen ships were recorded by underwriters to have been lost at sea through unknown causes during the year 1920. It is significant that of this total, ten were steamships and only four sailing vessels.

In spite of everything that man has accomplished to date, the sea continues to envelop many of her tragedies in mystery.

A total of two hundred and seventy-seven vessels have been reported lost during the last year. There were one thousand and seven hundred and eighty-eight collisions which sent down thirty ships. An equal number were destroyed by fire and explosion, while grounding claimed the greatest toll of one hundred and nine vessels.

"Success" is spelled with seven letters. Of the seven, only one is found in "fame" and one in "money," but three are found in "happiness."

* * *

If a good face is a letter of recommendation, a good heart is a letter of credit.

* * *

The nerve that never relaxes, the eye that never blanches, the thought that never wanders—these are the masters of victory.

* * *

Some men make more noise doing a day's work than other men do in organising a billion-dollar trust.

The element of mystery regarding those ships which are recorded lost through unknown causes compels conjecture. Perhaps a stray floating mine, broken away during the war, has been run down during the dark hours of night. An unseen iceberg, or hidden derelict may have torn the bottom out of another. Two vessels may have collided with such impact as to rip the vitals out of each or caused boiler explosions of immediate destructive force. Combustible or explosive cargo could have accounted for other accidents by spontaneous combustion.

Out in the vast stretches of the Atlantic or Pacific oceans there may have occurred sudden seismic tidal waves large and sweeping enough to engulf the finest vessel afloat. There are hundreds of possibilities, and when we review only a few of them realisation of the limitations of man before the forces of Nature becomes strikingly apparent.

During Lord Leverhulme's recent visit to the United States, a certain journalist, while chatting with him, happened to drop the remark, "A rich man like you—"

"What do you mean by rich?" Lord Leverhulme interrupted. The famous British manufacturer and philanthropist then gave a little dissertation emphasising that money did not make a man rich, but that riches and success consisted of what a man was and what he accomplished of helpfulness to his fellowmen.

ADVENTURES IN THE INTERIOR

DAILY LIFE OF AN EXPLORER

By FRANCIS BIRTLES

In the following article Mr. Birtles continues his interesting story of the experiences which befel him when crossing the continent by motor car. He draws a striking picture of life in the interior of Australia, and readers will be deeply absorbed by the first-hand information which he gives of the habits and customs of the aborigines and wild animals which are practically the only inhabitants of the regions he traversed.—Ed.

ON Sturt's Stony Desert many phases of plant and animal life were met with. In the crevices between the boulders green shoots of scrub showed out. Kangaroos, turkeys, and rabbits were to be seen. In the queer, distorted ways of the Never-Never, I would see a kangaroo gazing at the moving car. On looking more closely I would discover my prospective meal to be a rabbit squatting on his haunches twenty yards away. One meets with all kinds of dream tricks in this Land of Distortion. Under a hot sun the closely packed boulders, over an area of thousands of square miles, absorb and radiate a great amount of heat, which a northerly wind carries down towards the south of the continent, and thus creates the hot northerlies which sweep over South Australia and Victoria. The city of Melbourne especially suffers from this cause. In the distance, and up to windward, smoke clouds appear drifting towards me. It is not smoke, however, but a plague of grasshoppers. From underneath the bounding car they arise in millions. Hawks following and flying straight overhead, grab the insects in their talons and devour them in mid-air. Then I receive a sudden smart blow in the eye, followed by others in quick succession. Insects fall on to the hot exhaust pipe with a consequent vile smell of fried grasshopper. By now it is raining grasshoppers, millions and millions of the winged pests.

Turkeys and Grasshoppers.

Whatever inconvenience they may be to me, they bring delight to the turkeys, who run about and obtain a fill of their favourite diet. The wild turkey, or bustard, is a grey coloured bird standing about three feet high, weighing up to about

twenty pounds, and is excellent for table use. The old cock is very dignified and aggressive—which leads to his undoing. Every evening towards sundown, I would load up my little 22-repeater, drive the car along steadily, and keep a look-out for the next day's rations. Turkey was now the main item on the menu, and I used to boil the bird whole in a benzine tin (feathers and all if in a hurry) and take it out the next morning, cutting legs and breast off, and giving the remainder to "Wowser."

More Favoured Regions.

Trees and game now indicate that I am approaching better country. Pink galahs and white corella cockatoos make a beautiful setting to the green landscape, their harsh voices mingling with the roar of the engine and strong following breeze. Somewhere, a few miles away to the left, is Cooper's Creek, which means water and fish. I feel hungry at the idea, and also remember and feel that I have been in the ranks of the "Great Unwashed" for over a week. "Wowser" jumps overboard, and races alongside. A dejected looking emu, lying in the shade of a coolibah tree, staggers to its feet, stumbles, and lies over, its legs kicking weakly. I drew up alongside, and filling a four-quart billycan with water from the water canteens, opened the poor bird's beak and poured the contents in slowly. After waiting half an hour I repeated this performance. The desert roamer arises, and with unsteady gait makes away towards the creek.

Evening soon comes, and through the two twisted branches of box-trees appears a gleam of silver, tinged with the blood-red and orange tints of a desert sunset. Permanent waters! My car stops dead in a

wash-out sand-drift. I run down and in "full marching order," dive head first from a claybank into the pea-soup, luke-warm surface waters. My rapid movements create an undercurrent, which brings to the top icy cold waters. I hasten out and in primitive attire, arrange my household utensils. Then on bended knee I worship the god of the overlander—making a damper. Flour and water is made into a stiff dough, placed under a fiery ordeal of hot ashes, and cooked until it looks like, and is as hard as, a tombstone. Then there is salt beef, dried in the sun until it looks like a piece of fossilised wood, and tastes like rocksalt. Salt beef is sometimes salt goat, to which an odour of "old Billy" still clings. The billy tea alone is "civilised."

A Welcome Rest.

A cold breeze arises, so grabbing my quart-pot of hot tea, I crawl into my low-lying bunk, and there chew heartily at the before-mentioned case-hardened morsels. Soon I become sleepy and my heavy eyelids close. Emus grunt amongst the darkened timber, a crane croaks hoarsely, fish splash in the shallow pools, the fire burns brightly—the old car looms up big alongside, overhead stars blink—and below, men snore. I awake before the dawn, frozen out. The atmosphere and surroundings are deadly silent, and it is bitterly cold. I rake the embers together, and soon get a warm glow. The dingoes start howling and snivelling all around, black swan flying straight ahead, high up in the heavens, give out their peculiar musical note, trees are silhouetted darkly against the pale green dawn. Getting out my fishing line and small carbide lamps, I go down to the water's edge. Lighting the lamp, and hastily turning over the slate rocks, I find some small frogs, which I promptly put in my pocket to be used as bait. There are black bream in these waters, I know. It is, however, too cold yet. Here, when the sun is shining warmly, swarms of shrimps are to be caught in the following manner, *viz.*, blackfellow style. Wading out waist deep, the bait-seeker hooks his arms under the floating weeds, runs rapidly towards the shore, and with a twist and twirl, heaves an armful out on to the land. Entangled in the mass will be found numerous shrimps, which used fresh as bait, the local fishes cannot resist. Anyhow, contenting myself with froggie as a floating bait, I

silently cast out. Down goes the bait, sinking under with the weight of hook and line. Suddenly with a swish and rush, the line is pulled out of my hand. A hasty grab, and hand over hand the quivering silken cord is drawn in. A three-pound black bream! Then some sluggish nibbles and the bait is gone—probably a water tortoise. The line goes out again—a few vicious tugs and a big swirl, and snap! Good-bye to a big breakfast! The sun is now rising. Some white seagulls clamour harshly overhead—strange visitors nearly eight hundred miles inland. I shoot one to investigate, and find a familiar inhabitant of the Great Barrier Reef, East Queensland. Thousands of years ago here was a great inland sea. Does the primeval instincts of former ages still exist in these birds, whose forefathers came here to their nesting rookeries? Hence the migration to this, the old-time breeding grounds, as guano deposits and fossil remains prove to have been the case.

A Strange Process.

A strange process happens to surface fresh waters outback. When not replenished, still waters will become bad smelling and tasting weedy for a few weeks. Then it changes to good drinking water again. The moon is supposed to have some effect on this latter phenomena, but this supposition I have not, as yet, been able to verify. Natives who live mostly on a fish diet are prone to leprosy. On the northern shores of Australia, where fish are plentiful, cases of this disease are common, while in the interior of the continent local aboriginal tribes are free from this malady.

A Two Days' Camp.

In this pleasant spot I camped for two days, developing photographs, washing clothes, housekeeping and making mechanical adjustments to the car. I also replenished my larder from Nature's storehouse. Kangaroos, wallabys, wild pigeons, ducks, swans, and cranes are plentiful here, and there are edible fishes, mussels, ground and tree seeds in abundance. The interesting Nardoo Seed, of which the aboriginal here is very fond, is plentiful. It grows on the floodwater flats and edges of the sandhills. The plant is somewhat in appearance like a shamrock, and grows very close to the ground. When it dies or withers up, it leaves behind numbers of small, hard cased black seeds. These are

swept up with brushes by the natives, taken to their camps, and ground into a fine powder between a roller stone and a flat rock. This "flour" is then made into cakes. The resulting loaf keeps indefinitely. Burke, Wills and King starved on this diet—they evidently tried to eat the seeds without any preparation. Nourishing fresh water mussels they could have got by simply wading into the permanent pools and feeling about with bare hands and feet. They could not have known of this fact or they would not have died from starvation.

On these series of waterholes the lonely explorers enacted the final tragedies of what up till that time had been a successful, but ill-organised journey. Food was everywhere, but they had no means of catching game owing to a series of mishaps, which left them stranded through no fault of their own.

A little way down the river I came across an old man standing sorrowfully and silently on guard over a six-foot high mound of earth and logs. The old aborigine was painted white, and in his whiskers and hair white clay hung in heavy lumps. He was keeping watch, day and night, over the grave of his only son, who when alive had been a tribal rain-maker. Rain had fallen all around amongst the outlying tribes, but none locally. This dead man was blamed for having kept the rain away, his spirit having been seen in indecent postures mocking the rain clouds up in the sky. Thus the version of the new rain-maker to this tribe, who, having tried all his ancient rites in vain, declared that the body must be pounded up and cast into the waterhole. The faithful old father, club in hand, now stood guard to keep away the desecrators.

Signalling to the Blacks.

Footprints of the Cooper's Creek natives were to be seen along the edge of the waterhole. Wanting to get some cinematograph pictures, I made several smoke signals by burning lignum bushes. The black smudge rose in a great spiral which I broke every few minutes by smothering it with a green bush. Then from the top of a big sandhill I waited and watched. A whirling column arose from over a far distant purple ridge and hung mushroom shaped in the hot, stifling glare of the afternoon sun. No luck! Back to the waterhole for a swim, a read from the

pages of a comedy, and then to sleep. When leading an adventurous life, one's craving for books of travel or dramas departs. One inclines to comic or instructive and constructive literature.

My First Goal.

Leaving camp early on the second day, and ploughing a passage through flat, sandy plains, with patches of desert oak and box trees, I came out on to the Innamincka Road. A cloud of dust became visible miles away, which on coming nearer turned out to be the Innamincka mail express—two dignified drought-starved camels, harnessed side by side to a well-built four wheeled buggy, and on the box seat, a young white-shirted driver, spick and span as any "counterjumper" from a ladies' emporium. So, at least, it seemed to me, who had not seen a boiled shirt for weeks. We halted, camel and car, and chatted and exchanged views and news—three weeks old, but the very latest. Innamincka was but six miles away, so bidding him good-bye I opened the throttle "all out." Perched high up on what seemed to be a hill, a few white houses became visible—a couple of miles of red-coloured boulders were left behind, and suddenly I found myself in the main street of Innamincka, a township which consists of a galvanised iron store, a tin police depot, one mud and stone built hotel, and one broken-down hut, all surrounded by goats, broken bottles and empty tins. As an overflow from the hotel there were thousands of empty bottles stretching, or rather lying, out from the doorways for a distance of over a mile.

This hotel must have done great trade in the past. Each one of the bottles represented a sum of three shillings, and had been carried by camels a distance of two hundred and forty miles from the railway siding. It was now dinner time. For the sum of two shillings the world's products were laid before me, but what a sample of Australia's lack of self-help! Tinned beef, from a thousand miles away; although cattle were walking past the back door. Tinned fish from America, and fish could be caught in the river a few hundred yards distant; salt from Liverpool, England—a few days ago I crossed thousands of tons of it. Pickles and vinegar from London, tinned vegetables from France, sugar from East Australia, tea from India, and crockery-ware from Germany. The biscuits were

from Australian wheat, which had been made into flour in an overseas country and sent back again ready for the table.

Explorers' Landmarks.

Some twelve miles up the river are some trees standing on the edge of a little stony plain. One of these has been marked in capital letters "DIG," with an arrow mark underneath; nearby is the remains of an old stockade. This is one of the historic spots of Australia, being the main depot of the Burke and Wills Expedition whilst on the exploration journey to the Gulf of Carpentaria, and it was to this spot the famished and exhausted men returned after a three thousand miles trip only to find that the relief party which had been waiting for them for months, and believing them dead, had left but that same morning to go back to the south. Too ill and exhausted to follow up, the three, probably four, members decided to camp for a few days, having dug up a small supply of provisions near the base of this tree. These men were most likely suffering from the effects of malaria fever, judging from the few remaining leaves of poor Wills's diary. Unprepared, they must have made many a forced march in the northern tropical wet season. Some of the camels perished through becoming bogged, others from eating poison-bush, so we find the party returning on foot with but two camels left. Except for some pages of a diary there is nothing to show in the way of written accounts made whilst *en route*. The few natives still living who remember seeing the survivors tell approximately the following story, which tallies well with Wills's diary and King's (the sole survivor). Possibly this fourth member of the party may have been a strange white man, who, I believe, was wandering about in South-west Queensland in the early sixties, and may have accompanied the expedition as far as Cooper's Creek. Told in broken English, and in disjointed fragments covering a period of some days, the story of the tragic end of the expedition runs thus: Four men, Burke, Wills, King and Gray, leading two camels arrived at the depot in an exhausted condition and rested some days. Burke, as leader, had evidently decided to try and reach Blanchewater cattle station in South Australia. This place was but half as far as the main base, to which the relief party were now returning. In their weakened condition, this move was

correct, but they made a mistake in that instead of following the Strezlecki Channel they kept on the northerly bank of Cooper's Creek, missed the headwater of Strezlecki Channel, and followed the creek down. Here one of the camels became bogged, so the party killed it, taking some of the meat. A few days later the remaining camel, fully loaded, took fright and bolted away into the desert. This left the party stranded without food or firearms. Getting farther west they got into floodwater channels, and realising their mistake tried to make due south. The waterless stages made them go back again to the Cooper, in the neighbourhood of which one of the party, probably Gray, died and was buried. Wills died on the Cooper. Burke and King, trying to exist on nardoo seeds, set out back over their tracks to reach the depot. Within a few miles of this, on the edge of a deep waterhole, the former lay down and died. King reached the depot, where some stores had been left, of which he gave some to the wild natives, who, not knowing their use, buried them. (The old Innamineka chief regards this as a great joke.) King, discovering the right road, followed the Strezlecki down, but became dismayed at the appearance of the country ahead, as the "river" bed flattens out and becomes waterless. Somewhere about twenty-two miles from Blanchewater station, not being aware that help was so close at hand, he turned north and tried to reach the Cooper. Here the aborigines found him exhausted. They helped him to the river, and fed him on fresh water mussels. He lived amongst this tribe (who treated him kindly) until rescued by a relief expedition sent out from Melbourne, some three months later. Burke's body was found still lying at the foot of a tree, with a pistol in his hand. Meanwhile, another relief expedition had set out from Adelaide, and the leader, MacKinley, travelling northwards up the Strezlecki, states that the natives informed him that a white man lay buried away out on the plains. This body he dug up and recognised as one of the members of Burke's party. MacKinley, in his diary, also states that he found fresh camel tracks, probably belonging to the camel which broke away on the Cooper.

I believe that Burke must have buried his diary or records whilst at their most northerly camp, as King, the sole survivor,

was called upon after arrival in Melbourne, to give evidence before a commission of enquiry, and his descriptions of the various kinds of country traversed show that his statements in this respect were correct. I believe that some private individuals have some leaves of the diaries concerned, and would wish to see these handed over to one of our national museums. Also the historic marked trees (standing out in lands where no person ever sees them) should be cut down and portions placed in the museums. The white ants are eating these trees, and in a few years they will disappear. I recommend our local geographic or historic societies to make some move in this direction. The old native identities in connection with this pioneer expedition should also be interviewed and photographs taken of them, as well as all the old-time landmarks.

A Lonely Land.

Leaving Innamineka I headed northwards, bound for the south-west corner of Queensland. On the borders of the cattle lands I found cattle, mere skin and bone, feeding on the scanty, scraggy bushes thirty miles away out from water, to which about every second or third day they had to return and slake their thirst, until too weak to come out again they bogged in the muddy waters and died. The car was now heading up for the dreaded Mulligan Sandhill country, over which even pack-camels had to be lightly laden, and could not be taken straight over the tops, but driven upwards in a sloping direction. Late one evening I arrived at a clay-pan where rain waters had collected and then dried up. Here the next morning I counted seven hundred dead kangaroos, and underneath some deserted blackfellows' huts, pink cockatoos were lying dead in heaps three feet high, where they had gone to get away from the intense mid-day heat. Some butcher birds and a species of minah were the only inhabitants living in this waterless region. How they exist has always been a puzzle to me, for I had met these on other dry stages. The crow, supposed to be a drought-bird, is never really very far from water, and finches, Java sparrows, and pee-wees are a sure indication of water.

In the distance some big yellow clouds loom up. Coming closer, they appear as sand mountains, their sloping sides steep as roof tops, and scooped out hollows made by the howling winds. I walk ahead, but

am blinded and stifled by the drift, so I return to the car and make camp. Fortunately I have forty gallons of water aboard, so I can wait for weeks if necessary. After food and rest, I take my rifle and camera and follow the giant sandhills, prospecting for a crossing. Late in the evening I return unsuccessful. During the night the wind drops. The silence is so intense that the effort to try and hear some little noise makes my head ache. I am glad when dawn appears, and with it the winds. Taking a couple of days' supply of water and food, and accompanied by "Wowser," I set out in the opposite direction to that of yesterday, to again seek a place where the car could cross. Rounding a corner of this barrier I sighted a rocky ridge on the skyline, and after a rough walk through sand and prickly spinifex I camped for luncheon in a boulder-strewn gully. On top of the ridge and as far as the eye could see, a succession of yellow sandhills blocked my passage. At any rate, I cleared a track to the top of this, and then inspecting the northerly slopes of the first barrier found that it would be possible to charge down into the next gully. So I camped for the night, and next day went back and brought up the car. Twice the engine stalled and would not pull up the steep rocky ridge. I then found that the pressure was not sufficient to reach the carburettor, so drilling a hole into the cap of the petrol tank, I inserted a motor tube valve and pumped up slightly. Then going well back I charged, and bounding and jolting over the rocks, the car clambered to the summit. Here I camped again, just beyond the reach of the shifting sands. There was now a bit of moonlight at night, so I went out to look for a way through. "Wowser," walking a few yards ahead, suddenly growls and sidesteps. Peering down on to the ground, I saw a fat death-adder lying flattened out on the sand, evidently ready to strike. There were no sticks or stones nearby, so I did not interfere with the reptile. I decided, too, that it would be unhealthy to wander round at night, especially as I had no boots on. Looking at the sandhills next day I decided to make a do-or-die rush through. All that day was spent in tuning up the engine, tightening the steering, putting my spare covers alongside of the tyres on the wheels, and then roping them on. Also the heavy kit, such as tools, spare parts, water, etc., I

packed as low as possible to prevent cap-sizes. The sand belt was only about three miles wide in one place, and my starting point was the highest portion. The next morning I filled the radiator, gave the engine a fresh supply of lubricating oil and started at dawn, as the sand being slightly moist had a better surface and would not be so wind-blown. Summoning all my courage, and hanging grimly on to the steering wheel I "let her go." Down the slope we charged, shipping a sea of sand as we struck the drifts at the bottom, up the other slope, down again, the open exhaust giving out a steady thunder of flame underfoot, crackling and banging as I shut down wherever a chance to coast occurred. Choosing tussocks of spinifex, and depending on rapid acceleration, I swung the car up an enormous hill. To the summit she went, when suddenly out went the clutch and on went the brakes. At the same time

I slewed the car around on two wheels and stopped right on the edge of a thirty-foot drop, below which were ugly looking rocks. Getting out of the car, I allowed my knees the pleasure of having a good knock together. "Wowser" now came panting up, having toppled off somewhere along the way. Getting out my blankets I laid them behind the back wheels, and slowly began to work a passage backwards, until late in the afternoon I found that a rocky formation led down to the salt-bush plains below. Here there was good travelling—up to twenty miles per hour. As evening approached I caught the glitter of reflected sunset from away in the distance. Cattle and horse pads told me that I was now approaching an out station, which I reached just after dark, my headlights being reflected in the eyes of hundreds of cattle as I pulled up.

SCENE ON HAWKESBURY RIVER



The Hawkesbury River, thirty-six miles from Sydney, is a popular holiday resort and also a stepping-off place for tourists desirous of penetrating into the sylvan beauties of the Upper and Lower river.

NEW YORK RADIO CENTRAL

WORLD'S GREATEST STATION

A VISION AMPLIFIED

"—And how far do you think a despatch could thus be sent?"

"Twenty miles!" (replied M. Marconi).

"Why do you limit it to twenty miles?"

"I am speaking within practical limits, and thinking of the transmitter and receiver as thus far calculated. The distance depends simply upon the amount of the exciting energy and the dimensions of the two conductors from which the wave proceeds."

(Guglielmo Marconi, in an interview published in *McClure's Magazine*, March, 1897.)

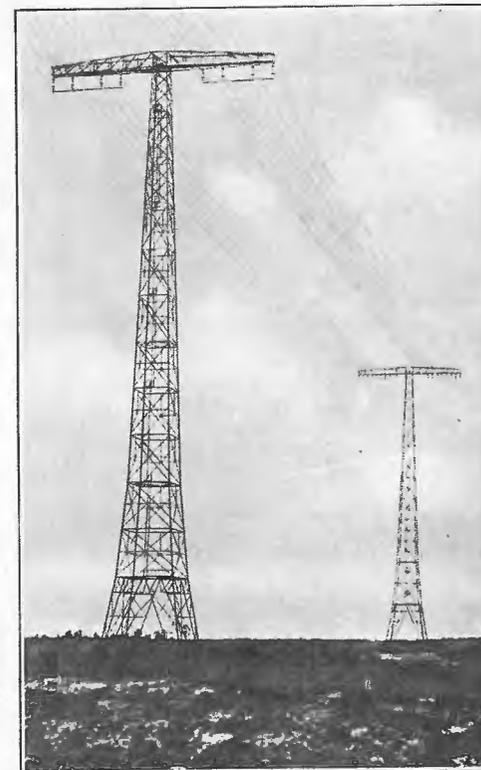
Formal Opening.

AT half-past nine on the morning of November 5 last, a special train on the New York-Long Island Railroad conveyed about two hundred and fifty guests of The Radio Corporation of America to Rocky Point, to participate in the opening of the world's latest and most powerful transmitting wireless station.

As Seen From Washington.

At 2.50 p.m. everything was in readiness at the executive offices of the White House for the formal opening of Radio Central at Rocky Point by President Harding.

During the morning apparatus was taken over and set up in the telegraph



Two of the twelve huge towers at New York Radio Central. Each are 410 feet in height and the cross arm 150 feet wide. Sixteen antenna wires form the aerial.

room, and after a preliminary test to ascertain that the land line was in good condition, all was ready for the big event.

Punctually at three o'clock President Harding arrived, followed by one of the Secretaries, who introduced Mr. W. Brown, representing The Radio Corporation of America, to the President. Mr. Brown explained briefly what the closing of a special switch would accomplish, and President Harding, who displayed great interest, then closed the switch marked "Start," and the automatic apparatus commenced transmitting his message.

President Harding then asked if his message was then being sent out direct from Radio Central,

and on being assured that such was the case he asked how it was that so many countries were able to receive the message from the one transmitter. It was explained that every station had been requested to tune their receivers to the wavelength used by Radio Central, thus enabling them to hear the message at the same time.

"Well," said President Harding, as he prepared to return, "there is a lesson in this for all of us. We should all be so tuned as to enable us to work one with another."



Operating Room.

Located in the heart of New York's financial district. Here radiograms are directly radioed to and from Europe through New York Radio Central and other Radio Corporation trans-Atlantic stations by means of special remote control.

At Radio Central.

At three o'clock, when President Harding closed the switch in the White House at Washington and started on its way his message to the world which was transmitted by automatic apparatus located at the White House and connected by direct control wire with the transmitter at Radio Central, simultaneously an automatic sign flashed out: "President Harding opens Radio Central"; a flag from the alternators was drawn aside, revealing a large portrait of President Harding, and numerous motor car horns were blown and air bombs

exploded outside, creating for the space of two minutes an ear-splitting pandemonium!

The President's message was received in all parts of the world, including Australia, where it was received by more than eight stations and published in *Sea, Land and Air* dated December 1, 1921 (page 670).

Chairman's Address.

Following the ceremony, Mr. Owen D. Young, Chairman of the Board of Directors of the Radio Corporation of America,

after being introduced to the guests by Mr. David Sarnoff, the General Manager, said:

"I am glad to welcome you in the name of the Radio Corporation of America, and to express our appreciation of the trouble you have taken to come down here to see us open the new station.

"If there be any thrill, and there is a very great thrill, in this occasion to me, it is not because of the great technical achievements which have made this station possible; it is not because of the work done, great as it is, by the constructors of the station, but it is that to-day America

is able to lay down in her name, in twenty-eight countries of the world, this message from the President of the United States.

"Just a word about the Radio Corporation of America: Some two years ago when it became evident that this new art of communication might become influential in the world's communications, an attempt was made to mobilise the resources, especially the technical resources of America. This attempt has been successful to the extent that the American Telephone and Telegraph Company, the Western Electric Company, the Westinghouse Electric and Manufacturing Company, the United Fruit

Company, and the General Electric Company, joined not only all the inventions which they then had, but undertook for twenty years to come in the radio field, to turn their inventions in to the Radio Corporation of America, in order that America might quickly develop the best radio communication in the world.

"Our new art heretofore has been suspended in its development by patent litigation by energetic claims of engineers, by the great clash of large concerns, and America could not wait for the duplication of the history of the Telephone Company, or the duplication of the electrical industry. She could not wait ten years while her people were fighting, because the communications of the world were at stake, and America's position in those communications was at stake.

"Now, as to the position of America: "England, because of her geographical

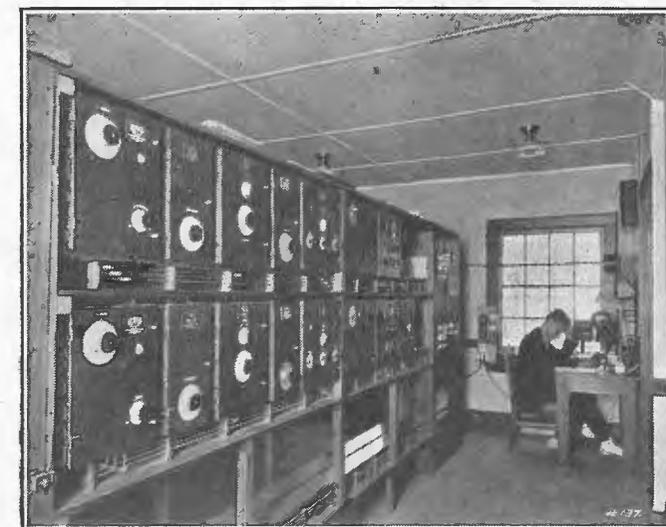
position, was the natural landing place of the cables of the world. Realising the importance of communications of the world, she took advantage, as she properly should, of that geographical location, until if you look at the maps of the communication systems of the world, you will see the great lines running to and radiating from London.

"In this new art of radio communications, America is the centre of the world. Why? Because every country in the world desires to get direct communication with America, and not to relay through a country on the coast where a cable may be landed.

"It is hardly worth while to develop radio merely for communication within Europe alone. The distances are relatively short, the means of communication—land communication—already developed. Radio is designed to reach out afar. Norway has already come, and we are in communication with her. England has already come, and we are in communication with her. Germany, with her cables cut, is yet in direct communication with America. Poland, whose Minister is here to-day, has already come in and contracted for a high-power station to reach out directly to America.

"Every country in Europe, seeking to build a radio station, makes one enquiry: 'Will this station communicate with the United States?' And the answer must be yes, or the station is not built.

"Now the question is, has America the courage, the far-sightedness, the skill, to take advantage of her geographical position in this great new art, as England took

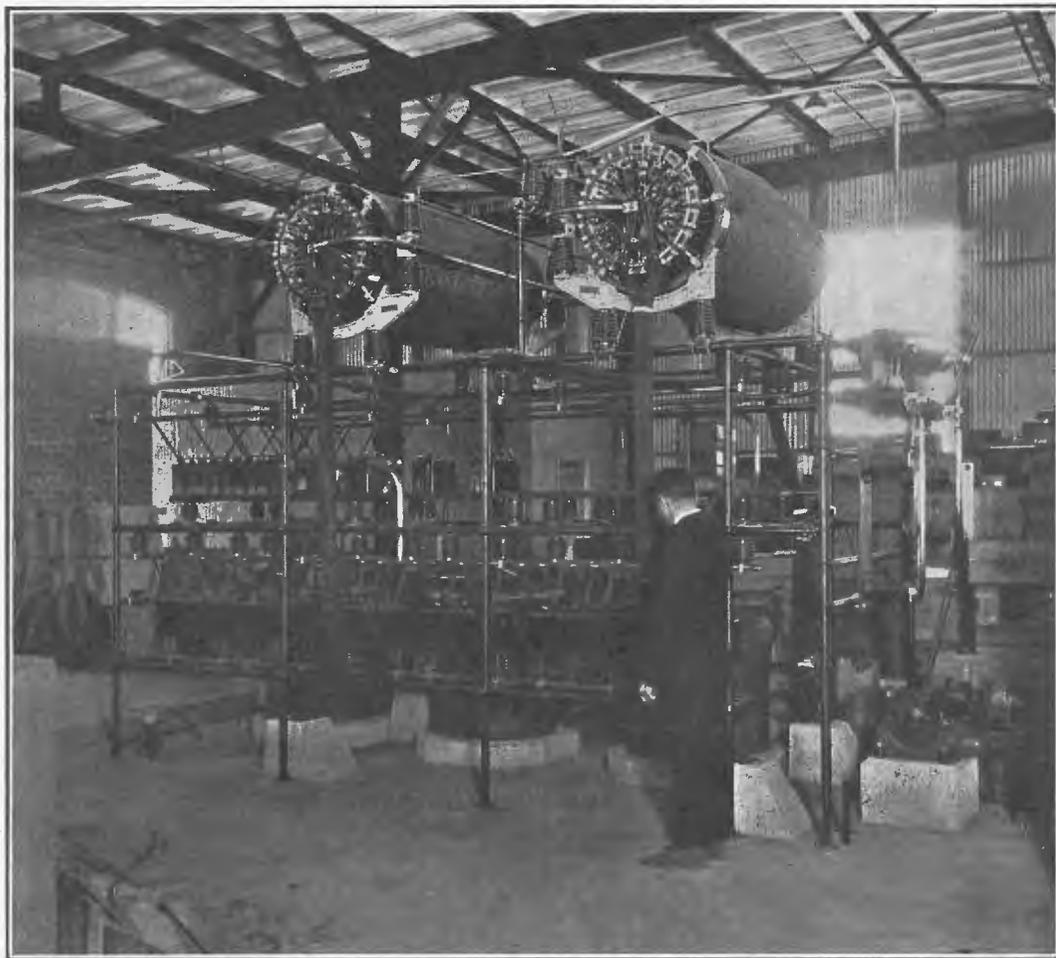


Receiver Section.

One section accommodates three receiver shelves, each shelf composed of all units necessary to receive from one European station. There are three of these sections—thus affording nine individual receiving circuits.

advantage of her position with reference to the cable? Is America ready to take advantage of this, not because she is grasping for something she is not entitled to, but because Nature has given her a position on which she ought to realise? Is she ready in this great art to take her place in the communication of the world? That means two things: It means that we must mobilise

mans, the English and the French regarding a co-operative development of wireless in South America; because Germany was starting to build a station in Argentine, the French were starting to build a station, the English were, and the Americans were—four stations to do the work of one. Great waste of capital, and that is not all. We know that the wavelengths in the world



Magnetic Amplifier and Transformer Rack.

Three magnetic amplifiers with their associated condensers are installed on this rack while two high-frequency transformers are shown mounted on the upper part of the structure.

our technical resources in America in a single unit. It means that we must mobilise back of that unit our financial resources, and back of that, we must have at least the moral support of the Government of the United States. Will America do it?

"I have just returned from Europe and I have come to an agreement with the Ger-

are limited and must therefore be conserved.

"And now even if these private companies could afford to waste capital for four stations where only one could be adequately do the job, we certainly could not afford to waste wavelengths on stations operating at only twenty-five per cent. of their capacity.

"Therefore, it became necessary, and I

am glad our friends abroad recognised it, for us to co-operate, and instead of having four stations in Argentina, we will have one, an international station, carrying messages from the Argentina to all parts of the world.

"We expect a similar station in Brazil, and such other countries of South America as may show need of these communications.

"I am very keen about this communication business. We have in Washington, just about to convene, a Disarmament Conference. When you can no longer appeal to the armies of the world, you must appeal to the public opinion of the world, and there can be no public opinion of the world unless there be cheap and adequate communication in the world. I venture this assertion; that underlying the success of any programme of disarmament is inevitably the development of adequate communications, and—this new art promises to be effective in making these communications available everywhere.

"We are greatly pleased that the President of the United States should so far favour us, by sending this message from his station.

"The Radio Corporation of America has had heretofore, by nomination of the President, a member of the Government sitting with its Board of Directors. I sincerely hope that policy may be continued in order that America may still go forward in developing these communications with the united support of the technicians,

of the capitalists, and of the Government."

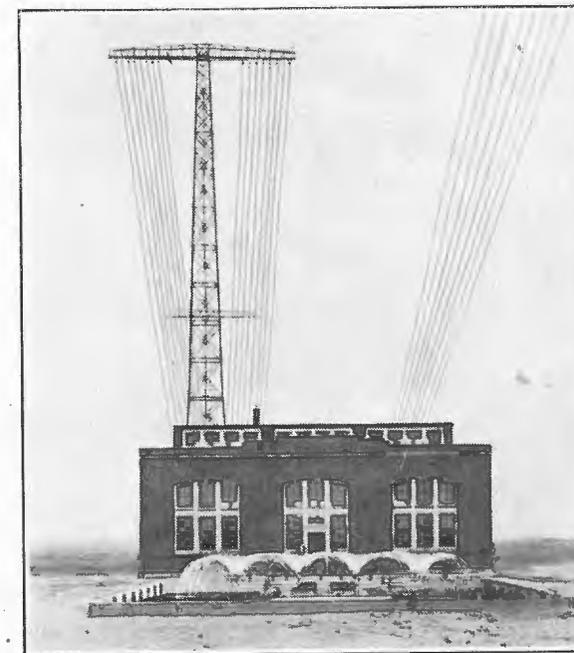
Location.

Seventy miles from New York, near Port Jefferson, L.I., is located Radio Central, designed and built for international wireless telegraph communication by the combined engineering skill of the Radio Corporation of America, the General Electric Co., and other specialists.

With the opening of Radio Central, New York becomes the focal point of world-wide wireless communication. This means that existing radio and cable facilities to such leading commercial nations as Great Britain, France, Norway and Germany are now supplemented by a direct radio telegraph service second to none in speed, accuracy and economy.

Commerce, as we know it today, depends upon complex and highly specialised factors for success. One of its most important agencies is communication, bringing as it does, the markets of the world within

easy reach of all. Indeed, without this vehicle world trade would fail utterly. Thus, it has come to pass that the art of radio communication has slowly but surely taken its place as a necessary supplement to present commercial circuits, and not only is Europe and the Orient covered by the *viâ* RCA system, but the new station just opened has been designed to eventually provide an additional and direct circuit to South America, thereby linking all commercial nations together.



Power House and Cooling Pond.

Front view of the power-house at New York Radio Central. In the foreground is shown the cooling pond for the water which circulates through the high-speed alternators, thereby permitting constant mechanical operation.

Radio Central: Its Purpose and How it Functions.

Unlike many industries, radio communication is essentially international in its operation and world-wide in its scope. For this reason, it has been the dream of communication engineers for several years to erect a huge transmitting station at a centrally located point in such wise as to command a world-wide field of activity. Radio Central is the realisation of this vision.

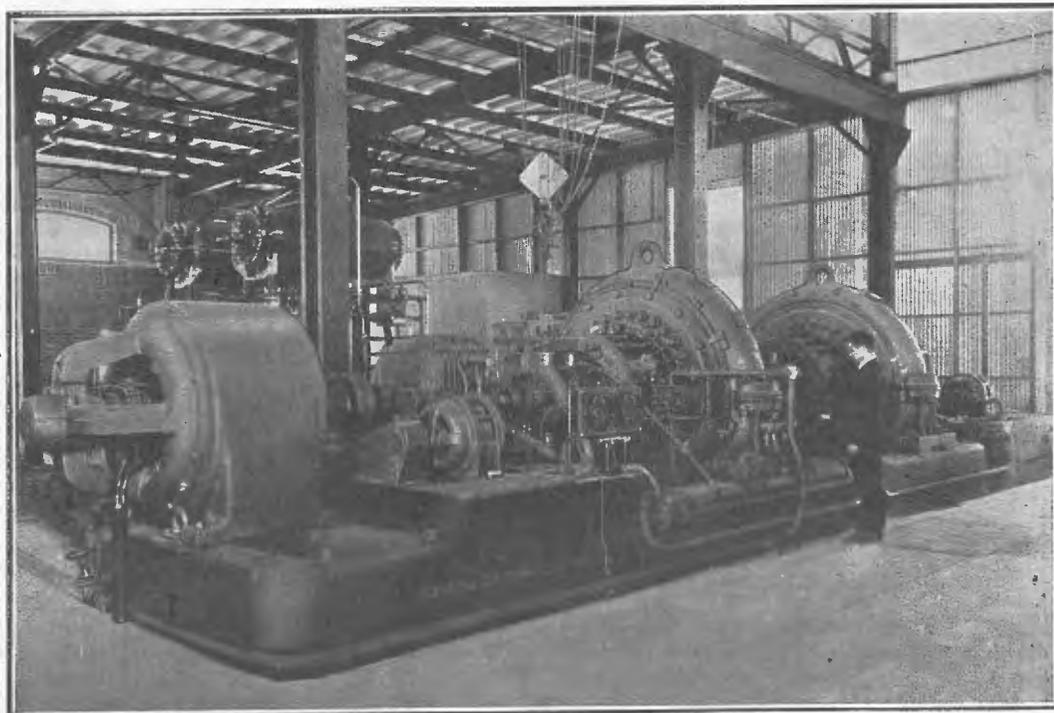
In the pioneer days of high-power radio

the business district of large cities.

The Radio Corporation has had this system in operation for some time, and having found it most effective, has incorporated it in the operation of Radio Central and other trans-Atlantic stations.

The new radio station, therefore, comprises these three units, which are:

RADIO CENTRAL.—A high-power multiplex transmitting station located on Long Island, some distance from New York City, planned to have several separate antennæ



Two 200 K.W. High-Frequency Alternators.

The two alternators used for transmission appear on the right, with their driving motors installed on each side. One alternator is capable of furnishing a continuous output of 200 Kilowatts at frequencies covering a wavelength band from 15,800 to 20,000 metres.

telegraphy, a station functioned alternately as a transmitter, a receiver and a telegraph office. This involved much loss of time and greatly reduced traffic facilities, for a station had to stop sending while it received and *vice versa*. It therefore became apparent that the ideal radio station should comprise three separate but closely connected units operating by remote control and employing a transmitting unit, a receiving unit and a central traffic office, the latter preferably in the heart of

systems, each designed to communicate with a given country with telegraphic control taking place at a remote distance, suitable to the handling of traffic.

RIVERHEAD, L.I.—A multiplex receiving station, also located some distance from New York, but separated by sixteen miles from the transmitter, and so planned and arranged as to simultaneously receive all radiograms destined to the United States from as many foreign countries as take part in the world-wide wireless system.

CENTRAL TRAFFIC OFFICE, NEW YORK CITY.—The traffic centre of the Radio Corporation system where all actual radio telegraph operating takes place. Here radiograms are gathered from various sources and directly radioed to foreign points through Radio Central and other high-power stations. This direct transmission is accomplished through the use of a special remote control system whereby operators at 64 Broad Street, New York City, do all necessary transmitting work.

In a like manner reception is accomplished with similar direct advantages where the incoming signals are made audible at Riverhead, L.I., and automatically transferred over land-lines to the Central Traffic Office, located in the heart of New York's financial district. These signals are interpreted and recorded on typewriters by skilled telegraph operators at high speed, or are automatically received by ink-recorders. Final delivery is then effected through a special messenger service from the Central Traffic Office, or its supplementary Branch Traffic Offices located at 233 Broadway, 933 Broadway, and 500 Fifth Avenue, or despatched by telegraph when the point of destination is other than New York City.

Outstanding Facts About Radio Central.

RADIO CENTRAL STATION is designed for world-wide wireless communication, which includes Europe, South America, the Far East and Australia.

THIS SUPER-STATION is situated at Rocky Point (seven miles east of Port Jefferson) on the northern shore of Long Island, seventy miles from New York City. The station site covers 6,400 acres, or ten square miles.

THE CONSTRUCTION of Radio Central began in July, 1920, and the first test signals were sent in October, 1921, or a little more than a year, a record in itself when one considers the great amount of work accomplished.

ONE THOUSAND EIGHT HUNDRED TONS of structural steel were used to erect the first twelve towers, each tower employing approximately one hundred and fifty tons.

EACH TOWER is four hundred and ten feet in overall height, and the cross arm, or bridge, supporting the antenna wires at the top is one hundred and fifty feet long.

EIGHT THOUSAND TWO HUNDRED TONS of concrete were employed for the foundations of twelve towers, the base of each

tower leg being sunk nine feet below the ground, with a total base area of three hundred and sixty square feet.

THE DISTANCE between two adjacent towers is one thousand two hundred and fifty feet, or nearly three miles from the first to the twelfth tower.

EACH ANTENNA consists of sixteen silicon bronze cables three-eighths of an inch in diameter stretched horizontally from tower to tower. In all, fifty miles of this cable has been used for the first two antenna systems.

THE GROUND SYSTEM for both antenna consist of four hundred and fifty miles of copper wire buried in the ground of the entire antenna system in starfish and grid-iron fashion.

THE FIRST POWER-HOUSE SECTION covers a space of one hundred and thirty feet by sixty feet, and accommodates two two hundred-K.W. high-frequency transmitting alternators with auxiliaries and equipment.

Two Hundred Words Per Minute.

A SENDING SPEED of one hundred words per minute is at present possible with the use of each transmitting unit at Radio Central. This means a combined sending capacity of two hundred words per minute for the two completed units.

THE ERECTION of additional antenna units forming the spokes of the huge wheel and further improvements which are being made, will correspondingly increase the transmitting capacity of the big station.

THE TRANSMITTING RANGE of Radio Central is practically world-wide, as demonstrated by preliminary tests when the station was heard in all parts of Europe, as well as Australia, South America and Japan.

THE COOLING POND for cooling the water after it has circulated through the high-speed alternators, covers a ground space of sixty-four feet by forty-two feet, and is seven feet deep. The pond is equipped with four spray heads which, when operating, present a beautiful and ornamental appearance.

THE COMMUNITY HOUSE for the staff is a low one-story building closely resembling an exclusive country club. It contains sixteen single rooms, an official suite, a large living room and dining room as well as quarters for servants.

THE ENGINEER IN CHARGE, with a staff of fifteen assistants, comprises the per-

sonnel necessary to maintain the huge station in operation at present.

THE MANUFACTURE AND INSTALLATION of the high-frequency alternators and their auxiliaries, switchboards, tuning coils, etc., were accomplished by the General Electric Company.

THE CONSTRUCTION CONTRACT for Radio Central was executed by the J. G. White Engineering Corporation of New York, under the direction of the engineers of the Radio Corporation of America. This involved the construction of the power-house, community building, cooling pond, all foundation works, antenna and ground systems, outdoor sub-station and the supervision of the construction of the towers.

THE TOWERS and all steel work incidental to the construction of this super-station were erected by the American Bridge Company as sub-contractors under the supervision of the J. G. White Engineering Corporation.

THE 23,000 VOLT TRANSMISSION LINE was built from Port Jefferson to the station, a distance of seven miles, by the Long Island Lighting Company; the electrical power being generated at that company's Northport plant.

THE CONTROL LINES between New York City, Riverhead, L.I., and Radio Central were erected by the forces of the New York Telephone Company.

THE CONSTRUCTION FORCE has varied day to day from one hundred to two hundred and fifty men.

THERE ARE NO RADIO OPERATORS at Radio Central; the actual transmission taking place by remote control from the Central Traffic Office, at 64 Broad Street, New York City.

THE RECEIVING STATION working in conjunction with Radio Central is located at Riverhead, L.I., sixteen miles away. No operators are located here for the distant signals are first received by radio, automatically transferred to land lines and received at audible tones at the Central Traffic Office, New York City. The action is simultaneous from the time the signals are transmitted abroad, picked up by the aerial, to the moment of actual transcribing by the receiving operators in New York.

CENTRALISED CONTROL, as accomplished by the Radio Corporation's transmitting station at Radio Central and receiving station at Riverhead, as well as at its other

high-power stations, has solved the problem of multiplex operation, and has made possible this practical communication service now at the disposal of the American business man.

THE FINAL INSTALLATION at Radio Central will comprise twelve antenna units supported by seventy-two towers, forming, so to speak, the spokes of a giant wheel nearly three miles in diameter. Ten high-frequency alternators will be employed which in total will give a power output of two thousand kilowatts, or two thousand seven hundred horsepower. The electrical force thus brought into play at Radio Central permits the realisation of the vision of communication engineers to transmit messages to all points of the world from a single centrally located source.

WORLD-WIDE WIRELESS, the accomplishment of the Radio Corporation of America, has been made possible through the financial, commercial, technical, engineering and research support of the following organisations:

General Electric Co.
American Telephone and Telegraph Co.
Western Electric Co.
United Fruit Co.
Westinghouse Electrical & Mfg. Co.
Radio Corporation of America.

TO MARCONI.

Master of Magic, thou whose hand hath wrought
The marvel of the century, and taught
The all-pervading ether at thy will
To tremble into utterance, or be still;
To bear the swift electrons to and fro,
Vibrant with human words of weal or woe;
The call for help that thrills the startled air,
The sigh of love, the sympathy, the prayer;
To bless, to warn, to save. What nobler aim
Than thine shall win a heritage of fame?
Thou who hast dared from Nature's hidden store
To pluck with fearless hand one secret more,
Widened the secret bounds of man's secure
domain
And given the world fresh heart and hope
again.

Take in return thy laurels far more fair
Than conquerors have wrung from foes' despair.
Death was their herald, Life thine own shall be,
Who reverent hast sought her mystery.
Till step by step the path thy feet have trod,
Shall lead man's spirit seeking still, to God.

(Written by a passenger on board the "Carronia," during her voyage from New York to Liverpool, October, 1909, with Senator Marconi on board.)

THROUGH THE STORM

A SHORT STORY

By M. A. P.

THE old night-watchman pulled the frayed collar of his shabby overcoat closer around his scraggy neck and gazed with dim, bleary eyes across the darkened wharves and docks of the city.

Through the misty drizzling rain, dim, ghostly shapes of deep-sea tramps, coal tips, cranes and low-lying sheds loomed out as one general mass of uncertain shape and aspect, pierced at intervals by the spluttering, sizzling blue flame of arc lamps.

For ten years, on and off, he had kept his nightly vigil in the little wooden shelter at the dock gates, with the solitude of the night and his thoughts as companions, not forgetting the old blackened briar pipe, which he now extracted from his pocket and stuck between his bloodless lips. An old man, nevertheless his wrinkled and weather-beaten features still retained a trace of the noble proportioning that had moulded them in youth. Once, too, his body had been lithe and strong; but now it was bent like a reed in a storm, only the knarled and sinewy hands showing the strength of long ago. From beneath a sadly worn felt hat wisps of snow-white hair straggled and peeped.

He took the pipe from his lips, and studied the bulky outline of a tramp steamer which lay close by.

"They calls 'em ships, these rusty old iron boxes, with their rattling engines; more like bath-tubs than ships. Huh!" He spat in the direction of the vessel with an intolerant gesture and continued smoking in silence.

Time passed, his white head sagged upon his breast; his memory crept back over the long years to just such another night as this. Gone were the grimy docks, all was dark, salt spray whipped his cheek, and the hiss of flying spume sounded in his ears.

A confusion of sounds filled his ears, the rattle and creak of blocks, hoarse voices

rising above the howling wind, the booming, flapping sound of great sails bellying high overhead.

The spirit of the "sixties" fired his soul again, once more he treads the deck of a windjammer, familiar faces surround him. There stands Jack Keene. Strange, he has been dead these twenty years. Ah! there is Slim, dear old Slim; many a watch below they had spent together in the creaking, groaning fo'c'stle seated before a bogie stove, striving to infuse some warmth into their frozen limbs; laughing and cursing in turn as they exchanged stories and reminiscences dear to the heart of every sailor.

Poor old Slim! He had been swept from the wheel when the ship had pooped a green sea—swept into the darkness and death.

They all crowd around him; half forgotten faces of a past decade. Once more he finds himself grasping a slippery rope and heaving with the rest. It is natural, he is one of their number.

The wind is shrieking through the cordage and stays, white capped waves hover above the ship one moment, and fall away beneath her cutwater the next, as she scuds along under reefed top-sails.

As the night wears on the gale howls with increased fury, the seas rise higher and higher; the stars disappear, obscured by flying black clouds. Ocean and sky meet in one dense pall of horror, while stout hearts stand by with anxious eyes cast aloft.

A sudden squall of hurricane force, a lull, then blows with increased violence from a fresh quarter; the ship trembles and shudders. Zip! Boom! The top-sails split and vanish into the darkness. All hands toil desperately as the vessel sloughs away into the trough of the towering seas that every moment threaten her with destruction; giant walls of water that sicken the very souls of the watchers.

Louder shrieks the gale, the drenched and half-drowned men cling to the rigging with the tenacity of despair as the foaming seas sweep across the waist of the ship with a booming roar. She staggers beneath the blows, but recovers herself with a magnificent effort; like a wounded animal rising again to face the would-be destroyer of its existence.

It is a battle royal with the elements, but the end is near. With a horrible ripping sound the furled sails are torn clean out of the gaskets and whirled around the rigging, lashing like whipcord. Someone screams, and a second later a body tumbles into the boiling sea. Men gaze into the whirling black void and read death there; not a few mumble broken prayers, perhaps for the first time.

Suddenly a solid mountain of water towers over the hapless vessel, a curling foaming crest of white lashed fiercely by

the wind. For a second the wave hangs poised in mid-air, but in that second men live their lives again; fear-stricken faces peer upward, imprisoned souls stand on the brink of eternity waiting to be free.

* * *

A neighbouring clock struck the hour of five as the first faint flush of dawn streaked the sky with tints of grey; a solitary cart rumbled over the cobbled road by the docks, the town was awakening to the birth of a new day. But the figure of the old night-watchman remained unmoved; and so they found him two hours later, his white head still sagging upon his breast, the blackened briar still clutched between his stiffened fingers. Casting off the shackles of life his spirit had fled on the wings of the night, fled, who knows, to the great wide waters he had loved and served so long.



DECIDE AND DO.

*The easiest thing in a world of things
Is to sit and wait until somebody brings
Complete instructions on what to do,
And how to do it, and when, to you.*

*It's easy then, to go straight ahead
And follow the facts just as "somebody said."
If they come out wrong and your work's in vain,
Why, that's for somebody else to explain!*

*Yes, it's easy to sidestep and pass the buck,
But the fellow who does it is out of luck;
Since the big success always seeks the man
Who can plan his work and work his plan.*

*The power of the man whom this world consults
Is based upon this, that he gets results;
If you'd follow his footsteps, you—yes, YOU!—
Must learn to DECIDE and decide to DO.*

* * *

SOME FAMILIAR LAST WORDS.

"Give me a light, I'll soon find that gas leak."—Any old householder.

"It's quite safe! It's not loaded."—Ex-service man.

"I wonder if this cable is alive."—Any young electrician.

"Where's a match, I think the petrol tank's empty."—Inexperienced motorist.

"And that's that."—George Robey.

"This correspondence is now closed."—Editor.

A MODERN "POOH BAH."

A Sydney merchant sold a quantity of piece goods to a storekeeper in a small town on the western plains. The storekeeper returned the goods, saying they were not up to sample. The merchant disagreed, and having drawn a Sight Draft on the buyer, endeavoured to collect through the local bank. The latter, however, returned the draft dishonoured.

An enquiry of the local postmaster as to the standing of the storekeeper brought the reply "O.K.," so the merchant promptly asked the postmaster to instruct the leading local lawyer to collect the bill. The reply was to the following effect:

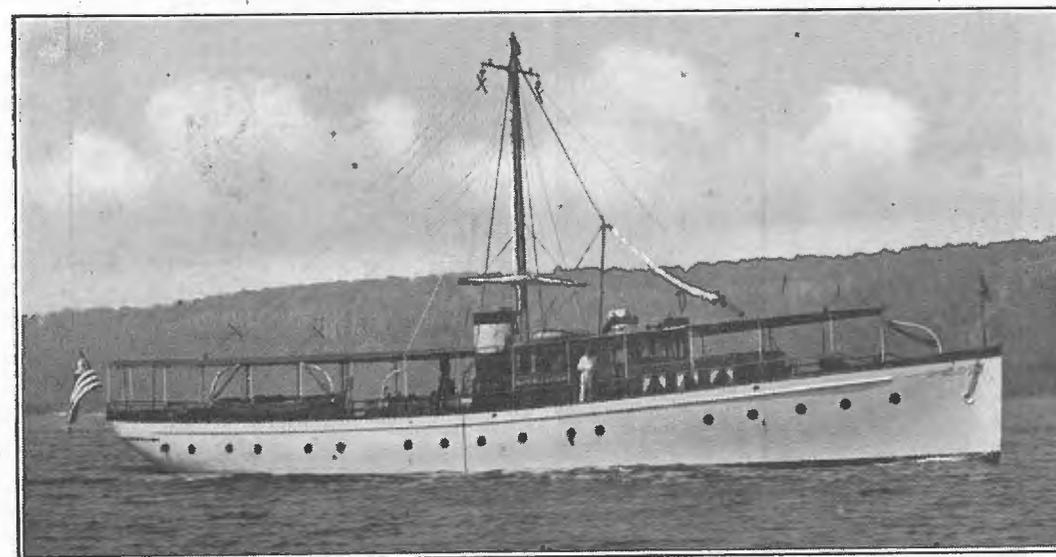
Sir,—The undersigned is the storekeeper on whom you attempted to foist your worthless merchandise, the undersigned is also the owner and president of the bank to which you sent your Sight Draft, the undersigned is the postmaster of this town, and also the lawyer whose services you sought to obtain. If the undersigned were not also the pastor of the local church he would tell you where to go.

—J.F.W.

AROUND THE WORLD IN A MOTOR YACHT

CRUISE OF THE "SPEEJACKS"

In the November issue of "Sea, Land and Air" appeared a detailed account of the early stages of the "Speejacks" cruise, the ninety-eight feet motor yacht on which Mr. Gowen, a young American millionaire, and his wife, together with a party of nine others, are journeying round the world. The yacht reached Sydney on January 14, and the following first-hand story of the party's recent experiences is now given to our readers, illustrated with photographs exclusive to "Sea, Land and Air."—Ed.



The "Speejacks," the most luxuriously equipped motor yacht in the world. Fitted with every convenience and latest devices, including electric light, fans, heaters, and wireless, the "Speejacks" cost almost a quarter of a million dollars, equivalent to £50,000.

ALMOST a lifetime of experience has been crowded into the five months which have elapsed since the *Speejacks* left New York on August 21, 1921. Many trying experiences have been endured, and numbers of risks taken, but the members of the party are still eager to continue the programme which was originally mapped out, and their keenness and enthusiasm are sufficient evidence that, barring unforeseen happenings, they will carry their project through.

One of the most interesting personages on the boat is the sole lady passenger, Mrs. Gowen, wife of the promoter of the great enterprise. She is young and enthusiastic, and has not shirked her share of the work. She is in every sense a splendid life part-

ner for Mr. Gowen, who is a typical American gentleman, possessing an intense love of sport and adventure. Two other interesting members of the party are Messrs. Bernard F. Rogers, Jun., and Mr. I. J. Ingraham. The former has long been a close personal friend of Mr. Gowen, and is a prominent insurance broker in Chicago. He is the "still" photographer of the party.

Mr. Ingraham is a motion picture operator of wide experience, having been connected with Burton Holmes, of "Travelogue" fame, for many years. At the conclusion of the present tour he will have exposed at least one hundred and twenty thousand feet of film.

The Yacht Described.

The *Speejacks* is 98 feet long, 17 feet wide and of a net tonnage of 64 tons. She is equipped with two sets of *Winton* engines, each of 200 horsepower, giving a maximum speed of 13½ knots. Her cruising radius is 2,200 miles, at an average speed of eight knots per hour. As an emergency a small square sail and jib is carried.

The interior of the yacht is beautifully fitted out and upholstered. Everything which thought can devise and money provide towards securing the comfort and

weeks sightseeing under the guidance of U.S.A. officials, by whom they were most hospitably entertained. Leaving Panama the *Speejacks* entered on a record tow of four thousand four hundred miles to Tahiti behind the steamer *Eastern Queen*. This cause was rendered necessary owing to the maximum supply of oil fuel carried by the yacht being sufficient to take her only about half the journey. When about 200 miles off the island of Takeroa, of the Yaumotu group, the *Eastern Queen* cast off the tow-line, and the *Speejacks* ventured in close to the land, to be immedi-



The owner of the "Speejacks," Mr. A. Y. Gowen, and his charming wife. When at sea Mrs. Gowen insists on doing her share of work, which includes a regular "watch" steering the vessel.

safety of her passengers has been installed in the *Speejacks*. Her wireless installation consists of a compact telegraph set having a range of 1,500 miles, and a wireless telephone set with a range of 400 miles.

Adventurers' Flag.

The yacht carries the flag of the Adventurers' Club at her masthead. This Club is an international one, and includes on its roll explorers and scientists. Its flag was carried by Scott to the South Pole, and by Amundsen to the Arctic, and has twice surmounted the Andes. The flag is now for the first time being carried right round the world.

A Long Tow.

At Panama Canal the party spent two

atly rushed by the natives, who had only once previously been visited by a modern vessel. The natives evinced the keenest interest in everything on board, and almost swamped the *Speejacks* in their anxiety to see all that was to be seen.

At this stage an incident occurred which convinced the travellers that their movements were being keenly watched by the outside world.

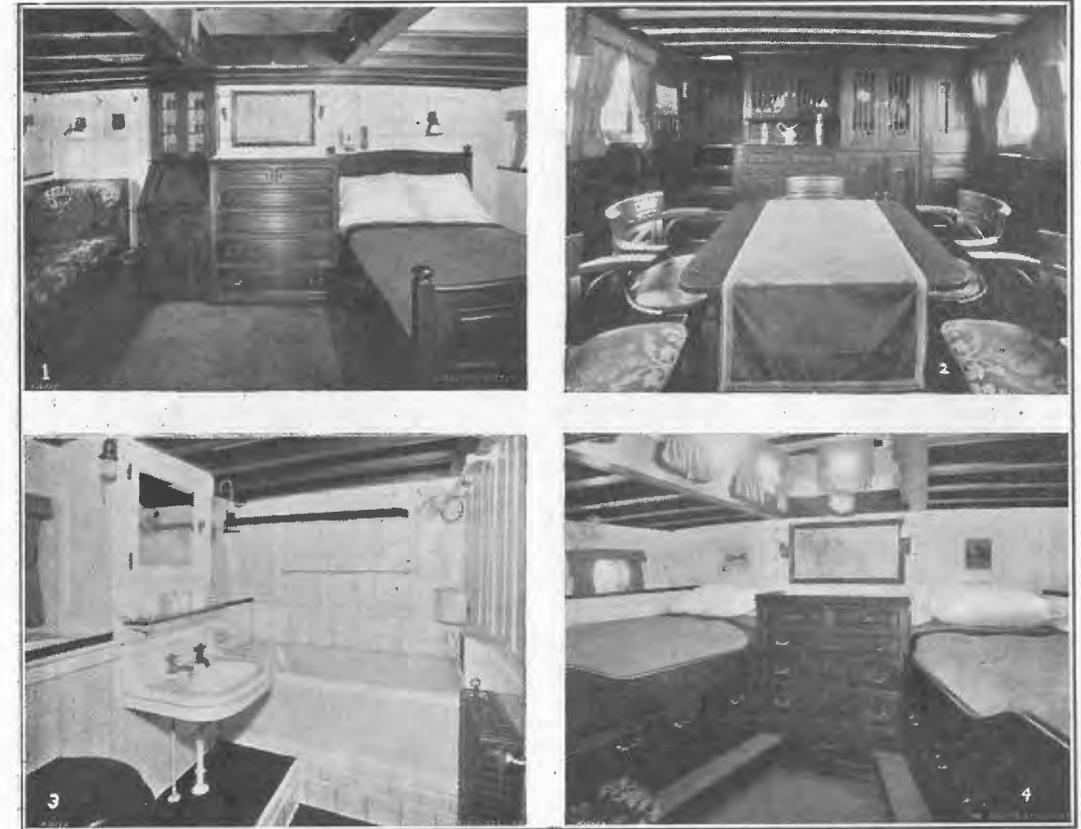
The wireless operator of the *Eastern Queen*, when communicating with the *Hattie Luckenbach* near Panama one night casually mentioned the long tow that his ship had given the *Speejacks*. The operator of the *Hattie Luckenbach* replied that he had just picked up a message from an

American coast station asking all ships in the Pacific to keep a sharp look-out for the *Speejacks*, and he would therefore advise the coast station of the *Speejacks*' whereabouts.

The wireless operator of the *Speejacks* overheard these messages, and to re-assure all ships and coast stations within range gave a concert by wireless. A telephone mouthpiece was fitted to a gramophone, and the officers of the steamer were able to hear everything perfectly through an

becoming inundated. With only fifty-five gallons of fresh water in the tanks, the party had to drink coconut milk on the five days' run to Tahiti.

From Tahiti Mr. and Mrs. Gowen took passage on the steamer of that name to New Zealand, where they spent three weeks touring the Dominion. In the meantime Messrs. Ingraham and Rogers, with the assistance of a French navigator named Richam, picked up at Tahiti, brought the yacht to Pago Pago.

**Interior Photographs of the "Speejacks."**

(1) The owner's stateroom. (2) The dining saloon. (3) A bathroom. (4) Messrs. Ingraham's and Rogers' stateroom.

The furnishing is most elaborate and tasteful, every consideration having been given to comfort. In the above photographs the following appliances are visible: Bookcase, writing bureau, telephones (inter-communicating on board), electric fans, heaters, etc. All linen, crockery and cutlery bears the name of the *Speejacks* and her owner's flag.

ingenious horn rigged up by the ship's operator. Some nights later the *Speejacks* listening in, picked up the Papeete wireless station thanking the *Eastern Queen* for their fine entertainment!!

Water Famine.

A water famine threatened the party at Takeroa—the result of the bilge tanks

"Speejacks" Encounters Storm.

The *Speejacks* encountered a terrific storm on the run from Tahiti to Pago Pago, and for about five days a speed of only four knots an hour was possible. However, the stout little vessel weathered the gale, and Pago Pago was reached in

safety, where the Governor entertained the party.

Samoa.

From Pago Pago the *Speejacks* shaped a course for Apia, where the ceremony of bestowing on Messrs. Ingraham and Rogers the honour of being formally made Samoan chiefs was performed. It was here that the yacht nearly met with disaster. A strong wind sprang up and the *Speejacks* dragged and lost her anchor and fifteen fathoms of chain. Her keel was just beginning to grate on the bottom when the engine was started and she was pulled out of danger.

On December 14 Mr. and Mrs. Gowen



Mr. and Mrs. A. Y. Gowen's two guests.

Mr. I. J. Ingraham, of Burton Holmes' Travelogue fame, and Mr. Bernard F. Rogers, of Chicago, U.S.A.

rejoined the *Speejacks* at Suva. The natives vied with each other in showing hospitality to the members of the party. An inland journey of five days was undertaken during which the explorers slept at night in native huts, and lived solely on a native diet.

From Fiji a course was shaped for Noumea, where a few days were spent. Sydney, the next objective, was reached after an uneventful trip.

From Sydney the *Speejacks* will proceed to the Great Barrier Reef and from thence to the Solomon Islands. Papua and New

Guinea will next be visited, and afterwards a call will be made at Java, where the party are looking forward to the delights of an inland tour. Borneo, the Philippines, Manila and Hong Kong will follow, and then the *Speejacks* will visit Siam, Burma, Straits Settlements, and Ceylon, and if time permits the party will journey overland from Calcutta to Bombay across the Indian Continent, sending the yacht round to Bombay to await their arrival. After Bombay, Egypt will be the next objective, and a few days will be spent in Cairo sight-seeing, where also they hope to eat their next Christmas dinner.

From Cairo the *Speejacks* purposes to visit Constantinople. Thence the little

ON THE NORTH COAST OF N.S.W.

GRAFTON AND DISTRICT

SCENES OF BEAUTY AND CENTRES OF PROSPERITY

By M.D.



A general view of Grafton, taken from the old water-supply tank in Fischer Park.

FOR the tourist who seeks a period of rest and healthful recreation in a locality where mind and body alike are ministered to through bountiful Nature's gifts of fresh air and beautiful scenery, the North Coast of New South Wales provides an ideal resort. Similarly, too, the district's fertile lands and ready means of access to the markets of the metropolis prove a great attraction to land seekers who realise that with Nature in anything like a generous mood in the matter of rainfall during the summer months, few districts in the State offer the same opportunity of winning a competency from dairying and agricultural pursuits as the smiling Clarence Valley. True, the district has its periods of dry weather, when life on the land is not the bed of roses it is popularly supposed to be, and fat cheques are not the order of the day, but this is the common fate of practically all who engage in rural pursuits, be their home east or west, north or south.

Early History of the Clarence.

The early history of settlement on the Clarence is, to a great extent, wrapped in mystery. No accurate record of past happenings has been kept, but it is still possible to find old-timers who are able to recount the experiences of the pioneering days in a manner which illustrates the stern fibre and dauntless spirit of those who "blazed the trail."

The discovery of the Clarence is credited to a man named Craig, who made his escape from Moreton Bay Penal Settlement about the year 1827. For seven years he lived with the aborigines, who abounded on the North Coast in the early days; but about 1834 he came into contact with some Government stockmen from Port Macquarie, to whom he communicated the whereabouts of

ship will pass the historic Isles of Greece, look in at Sicily, and drop anchor at Rome. After viewing the wonders of the Eternal City, the travellers will make their way to Marseilles thence into Spain, and if they arrive on schedule about March next, and the weather in the Bay of Biscay and the Atlantic is inviting, the *Speejacks* will take a flying visit to London, and then, before the bad season comes along race away to the Azores and Bermudas and so back to New York, which they hope to reach in April, 1923.

three Government bullocks. For this he was granted a conditional pardon. He also informed the authorities of the existence of the "Big River," and, acting on his information, the revenue cutter *Prince George* was sent to investigate. The party proceeded only as far as the Heads, and, observing a long line of foam across the entrance, concluded that there was no hope of negotiating the bar, and returned to Sydney. Two Sydney residents (Mr. Francis Girard and Mr. Thomas Small) were, however, deeply impressed by Craig's account of the magnificent forests of cedar lining the banks of the river, and despatched the *Susan* to explore the locality.

This party successfully crossed the entrance to the river, and, proceeding up stream about twenty miles, disembarked at the spot where now stands the picturesque and prosperous township of Maclean. This was in 1837, and from that period dated the settlement of the Clarence.

It was early discovered that the reports of the wonderful timber wealth of the district had not been exaggerated, and this fact soon induced a considerable number of enterprising spirits to make their homes there.

In 1839 the *King William* brought a large party to the river, included in which were a number who afterwards figured prominently in the history of the Clarence district. The spot where Grafton now stands was originally known as "The Settlement," a title it retained for many years until Governor Fitzroy bestowed the name of Grafton. It is not quite clear how the river came to be christened the Clarence. Some contend that the name was given by Captain Perry when he visited the locality, whilst others attribute the honour of naming what is probably Australia's noblest waterway to Captain Rous.

First Industries.

The district was first devoted to sheep raising, and on January 1, 1840, Captain Grose brought the first mob of eight thousand sheep to Copmanhurst, where he had selected land some time previously. As time went on it was realised that the land was more suitable for cattle raising, and in a few years the sheep had practically disappeared, and the cattle stations on upper Clarence, about twenty miles above Copmanhurst, soon began to gain a reputa-

tion for the excellent quality of the stock which were marketed from their fertile pastures. To this day a number of stations are still to be found on the upper regions of the Clarence, which is navigable as far as Copmanhurst, about eighty miles from the mouth, and approximately thirty miles above Grafton.

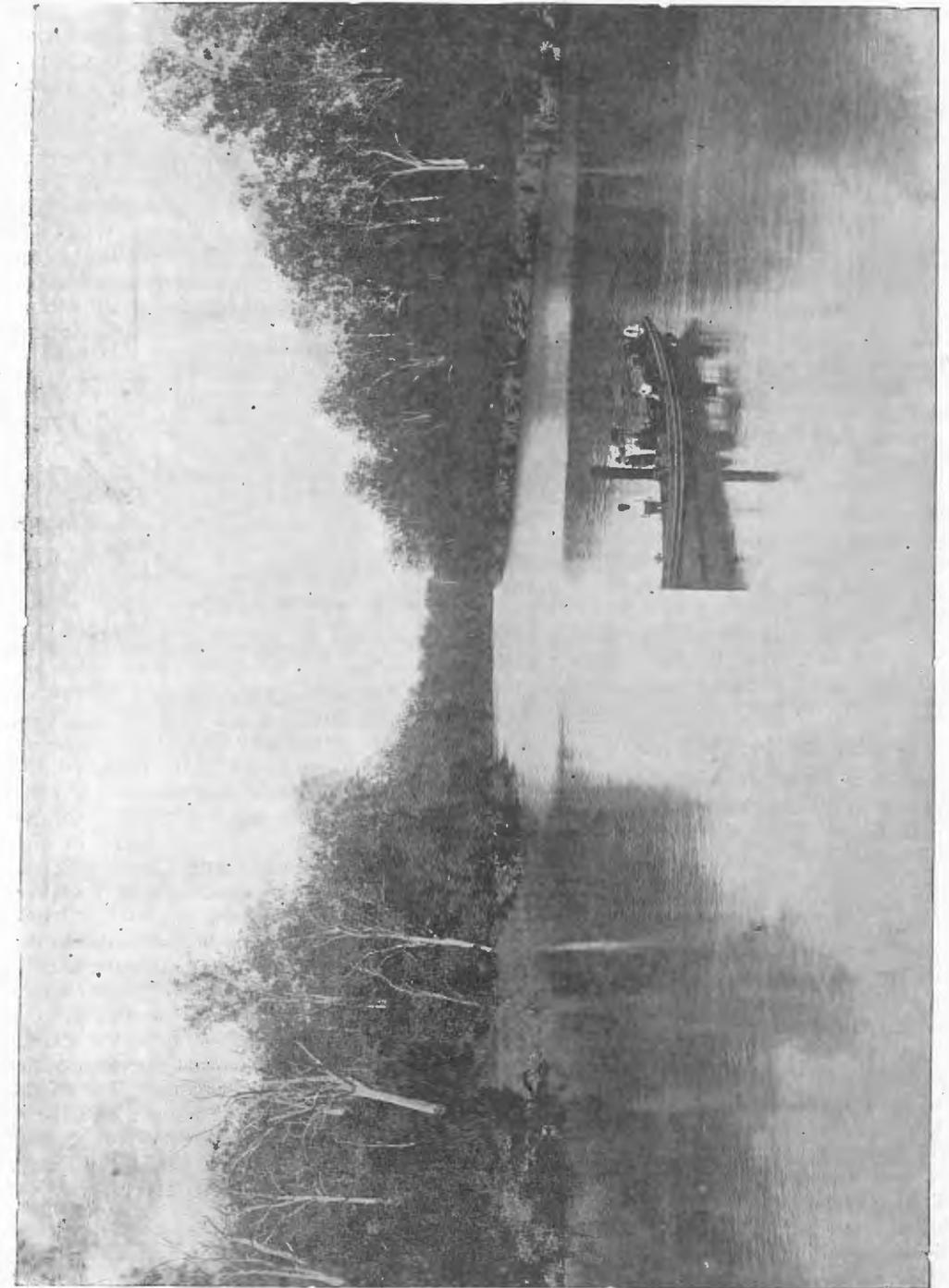
When Aborigines Abounded.

Many stories have been told of the hostility displayed by the native blacks towards the whites when the latter first commenced to pioneer the district. The blacks existed in large numbers at the time, and naturally resented the invasion of their domain by the pale-faces, who brought new customs into a locality where civilisation was unknown. In some quarters the treachery of the natives is given as the reason for the ill-feeling which undoubtedly existed between the two races, while others contend that the white settlers looked on the aborigines as being worthless from a colonising point of view, and lost no opportunity of stirring up strife when, by doing so, they could find an excuse to wage a war of extermination upon them. One happening, which is said to have occurred in the "forties," probably explains why the enmity between the two races eventually resulted in the almost total disappearance of the native tribe. Flour at that time was a very scarce commodity, its price ranging from £70 to £100 per ton. To steal an article once its use was discovered early became a weakness of the blacks, and under the conditions prevailing at the time the theft of flour was regarded by the whites as a most heinous crime. Consequently when the robbery of a shepherd's hut was reported there was a stern resolve to deal summarily with the offenders.

The whites, it is alleged, mustered in strong force, and surrounded the blacks' camp on the banks of the Clarence. At daybreak an attack was made, and the natives were shot down indiscriminately. Some time later it was discovered that in this instance punishment had been meted out to the wrong party—the real offender, so the story goes, being a white hut-keeper.

The District Progresses.

So the history of the Clarence district rolled on. Fresh settlers came, new lands were opened up and additional industries started. Maize and potato growing, cane-



An old-time scene on the Upper Clarence River.

farming and cattle raising were the principal means of livelihood. About twenty-five years ago dairying was first started, and the Fresh Food & Ice Co., Ltd., established creameries and butter factories throughout the district. Some years later the private separator made its appearance, and one by one the creameries closed till to-day every dairy farmer separates his own milk and despatches the cream by boat or coach to the nearest butter factory.

Where Prosperity Reigns.

The Clarence district to-day, thanks to the dairying industry, is a highly prosperous one. Practically every holding is devoted to mixed farming, which means that maize and potato growing are combined with dairying. Practical experience has proved that this combination gives the best results. Cattle and pig raising are also conducted simultaneously with other industries, and it is a bad season indeed when the man on the land is not able to earn a decent living from one or other or all of his undertakings. On the Lower Clarence sugar cane growing is still carried on fairly extensively, and the Colonial Sugar Refining Company's mill at Harwood is usually engaged in crushing operations for the latter half of each year.

Routes to Grafton.

There are three well-defined routes by which the traveller from Sydney may reach Grafton, each affording an opportunity of viewing the fertile lands and beautiful scenery which are such an eye-opener and a relief after the drab life of the metropolis. For many years the ocean trip of three hundred miles from Sydney to Clarence Heads by one of the North Coast Company's up-to-date passenger steamers and thence fifty miles up the broad, picturesque river on a smaller steamer, was practically the only means of reaching Grafton. In recent years, however, the overland route *via* Glen Innes or Macksville has become widely popular, and now thousands of people annually travel by train to one or other of the above railway towns and thence journey by luxurious touring cars to the township. The distance from Glen Innes to Grafton by road is one hundred and nine miles, and few more beautiful motor trips can be taken than this route which crosses the Great Dividing Range. The scenery is magnificent, and many spots

of historic interest are met with on the journey. The alternate route from Macksville is approximately six miles longer, and traverses the rich coastal area almost parallel with the route of the North Coast railway. The building of this line has been in progress for a number of years and there is now only one section on which work has not been commenced. From South Grafton the line has been completed as far as Glenreagh, and work is now in full swing on the next section to Coff's Harbour. A branch line will also tap the famous Dorrigo, which has justly earned the reputation of being the finest dairying and timber country in Australia.

South Grafton.

All roads from Sydney bring the visitor first into the picturesque town of South Grafton, which is situated on the south bank of the Clarence, almost directly opposite Grafton. Communication between the two towns is by means of a steam vehicular and passenger punt, the river at the point of crossing being half a mile wide. Time was when a Government ferry steamer plied between the two towns, but she was taken away some years ago, and private enterprise provided an intermittent service from that time up to a few months ago. South Grafton is a compact business centre, the majority of the business premises being situated in the main (Skinner) street. There is, however, a big resident population in close proximity to the town, and on the hills which lie in the background there are many fine residences. Dairying and maize and potato farming are the principal industries, and the country for miles around lends itself admirably to the successful pursuit of these callings. The farming lands along the river bank, both above and below the township, are noted as being the richest in the district, and in favourable seasons some prolific yields of maize are harvested. Perhaps the greatest disadvantage from which these areas suffer, is their liability to floods, owing to the fact that the banks for many miles are very little above river level.

Grafton.

Grafton was incorporated in 1859, and the jubilee celebrations marking its fifty years' anniversary were held on July 20, 1909. That was a red-letter time in the history of the town and district, and the festivities, which extended over several



The Gorge, Upper Clarence River.

days, were on a scale greater than anything attempted, before or since, in the history of the North Coast.

The town is famous for its wide, well-formed streets. As a business centre, it too, is compact, the majority of the commercial premises being confined to Prince Street, a fine thoroughfare running due north from the river. The town is built on rich alluvial river flats, which accounts for the wealth of vegetable and flower gardens adorning the entrances to the great majority of private residences. It is generally recognised that a mistake was made in building the town in its present location. Had a site a few miles higher up the river been chosen, it would have served the double purpose of rendering the town immune from floods, and providing a narrow crossing and high banks for the railway bridge which it is hoped will some day span the river at Grafton. This bridge has been spoken of for many years, and the fact that sooner or later it will be a

necessary link in the coastal railway line connecting Sydney and Brisbane by a shorter route than at present, makes it inevitable that it will some day be built.

Grafton is by no means backward in its public buildings and institutions, and from a commercial point of view the volume of business transacted in serving the needs of the vast outlying districts is as great as in any town of similar size in New South Wales. Two daily newspapers, both of which are old established, enjoy a wide circulation, and the educational standing of the community may be judged from the splendidly conducted public and high schools and similar private institutions.

Not the least of the many natural advantages which Grafton enjoys is its situation on the bank of the river carrying a sufficient depth of water to enable vessels of well over one thousand tons to berth in safety at the wharves. Opposite the upper part of the town, and situated in the

middle of the river, is Susan Island, a fertile area about two miles long and well over a quarter of a mile in width. The end nearest the town has been cleared and equipped as a picnic resort, and in the days when the ferry steamer plied for passengers it was visited by hundreds of people weekly. It is still a popular resort and band recitals and continentals are held at frequent intervals during the summer months. The upper end of the island is clothed in luxuriant forest trees and undergrowth, and is of never-failing interest to the lover of Nature. Excellent bathing facilities and two rowing clubs provide ample opportunity for residents and visitors, who indulge in these forms of recreation, to enjoy themselves.

The Upper River.

A trip on the Upper Clarence as far as Copmanhurst affords the visitor an opportunity of viewing the beautiful scenery and prosperous homesteads which can be seen from the river steamer. In the upper reaches of the river high rocky cliffs clothed in masses of dark green foliage blot out a view of the country behind, but in

their very contrast to the level banks and fertile farms to which the sight-seer has grown accustomed, they bear evidence of Nature's lavish gifts of scenic beauty. Above Copmanhurst, the head of navigation, a number of picturesque waterfalls mark the river's course, and still higher up the great Gorge is reached. Here the narrow river is bounded on each side by frowning rocky banks, which provide every facility for harnessing the swiftly flowing stream to generate the vast supply of electric energy promised under the Gorge hydro-electric scheme.

There are many additional places of interest in the Clarence River district which will keep the tourist engaged for many weeks. The people are kindly and hospitable, the social life of town and country alike goes with a swing which effectively bars the entrance of that drab monotony so often to be found in centres outside the metropolis. Surely then the Grafton district can justly claim a fair percentage of those who, in seeking a change of scene and environment, decide to explore "fresh fields and pastures new."

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The New Year Cyclone.

THE terrific gale and mountainous seas along the Australian coast during the first few days of the New Year, although involving shipping generally in an anxious time, was fortunately unattended by serious consequences.

At the same time it was productive of a display of seamanship on the part of several commanders who found their ships in difficult positions, attended by a demonstration of the sea-going qualities of their vessels which are the only really bright spots in a trying period.

"Pulganbar's" Rough Trip.

The North Coast Steam Navigation Company's steamer *Pulganbar*, in the Sydney-Byron Bay service, met the full force of the gale on the run from the latter port to Sydney. For many hours she battled bravely against the mountainous seas, but her progress at times was only three knots an hour. Later she was hove to for some time and when the storm abated slightly the run to Sydney was continued. The master, officers and crew speak in the highest terms of the vessel's sea-going qualities.

"Eastern" Encounters Gale.

The steamer *Eastern*, which arrived at Brisbane on Christmas Eve, was able to take on board only five tons of coal, and consequently she was ill-equipped to meet the fierce gale awaiting her immediately she left Cape Moreton on the run to Sydney. The master of the vessel described the weather as the worst since the cyclone of December, 1920, and such serious inroads did it make into the supply of coal in the bunkers that when off Cape Byron it was decided that supplies would have to be

secured to take the vessel to Sydney. To enter Newcastle was impossible owing to the state of the bar, so the only thing was to return to Brisbane. Accordingly, with the wind and sea behind her, the *Eastern* sped northwards again and made a quick run to port where she obtained the coal necessary to complete the trip to Sydney.

Fine Display of Seamanship.

Captain Hume, of the collier *Wear*, provided spectators with a fine display of seamanship when he brought his vessel in over the Newcastle bar with the gale at its height and the danger signal flying from the lighthouse. The *Wear* was on a voyage from Melbourne, and being in light trim was rolling heavily when she arrived off the bar. The master, deciding that it would be more dangerous to remain outside than to attempt to enter, brought his vessel up close to the narrow entrance, and with the leading light towers in line steamed at full speed for the bar. At one time the collier's bows could be seen raised high in the air, and the next moment her elevated propeller was racing madly. Captain Hume, however, never faltered, but nursing his vessel splendidly he reached the bar, where a big swell swung her bows round to port and headed her for the signal station. A moment later, as she lunged downwards her bows swung back into the middle of the fairway, and the next roller lifted her round to starboard and towards the Stockton breakwater. A quick movement was noticeable on the little bridge, and the vessel once more swung into the channel. Shortly afterwards she lifted on the crest of a wave, and was safely across the bar. The

spectators, and no doubt those on board as well, heaved a sigh of relief when the ordeal was safely accomplished.

Ship's Boiler Washed Up.

A relic of the past in the shape of an old ship's boiler, estimated to weigh between twenty-five and thirty tons, was washed up on Maroubra beach during the gale of a few weeks ago. The boiler is believed to have come from the Union Company's steamer *Tekapo*, which was wrecked about five hundred yards from its present position. The *Tekapo* was a steamer of 1,544 tons, and went ashore at the southern end of Maroubra in a dense fog in the early morning of May 16, 1899. The vessel subsequently became a total wreck and it remained for the recent gale to unearth a relic after a lapse of over twenty-two years.

Captain and Sea Birds.

Captain Wm. O'Connor, of the Illawarra Company's coastal steamer *Merimbula* is, like all men who learned their sailing in deep-water ships, a great lover of sea birds. Quite recently he decided to make friends with the screeching gulls which follow his ship along the coast. Scraps of food were thrown about the fore deck, and soon a number of the birds summoned up courage to "nose dive" and pick up some of the morsels. Next trip the same thing happened, only the birds came in greater numbers, and after it was repeated several times they lost all their shyness and now come regularly and fearlessly to the ship to partake of their banquet. Captain O'Connor is well known on the North Coast, where he at one time commanded one of the N.C.S.N. Company's steamers. He is recognised as a skilful and fearless navigator, and has figured in more than one daring exploit. He will always be remembered on the North Coast for the skill displayed in crossing the Clarence River bar, on more than one occasion, by moonlight. Some years ago Captain O'Connor gave up the seafaring life to become licensee of the Commercial Hotel in Grafton, but after a brief period his old love claimed him again and he joined the Illawarra Company's service.

Preventing Collisions.

According to the *Scientific American*, the White Star liner *Baltic* is equipped

with an electrical device for preventing collisions with other vessels. The moment another vessel enters the "magnetic field" of the *Baltic* an indicator on board points in the direction of the vessel and the steersman knows what course to take. Even the action of an unseen steamer's propeller is registered by the indicator.

"Sonoma's" Propellor on Strike.

When a couple of hours out from Pago Pago on her last voyage to Australia, the starboard propellor of the *Sonoma* refused to continue work. For several hours the vessel was held up while the engineers endeavoured to coax the refractory screw into action. It refused to budge, however, and the steamer was obliged to continue her voyage with only one screw, giving a maximum speed of eleven and a quarter knots in action.

Orient Liner "Ormuz."

The fourteen thousand ton liner *Ormuz*, originally built in Germany for the Norddeutscher Lloyd Company, arrived in Australia a few weeks ago flying the Orient Company's flag. The vessel was launched during Armistice time, and is one of the most luxurious passenger liners afloat. She has accommodation for two hundred first-class and nine hundred second-class passengers, and is in command of Captain A. J. Coad, Commodore of the Orient fleet. With the exception of the *Ormonde*, Captain Coad has commanded every vessel of the line.

Steamer for King Island Trade.

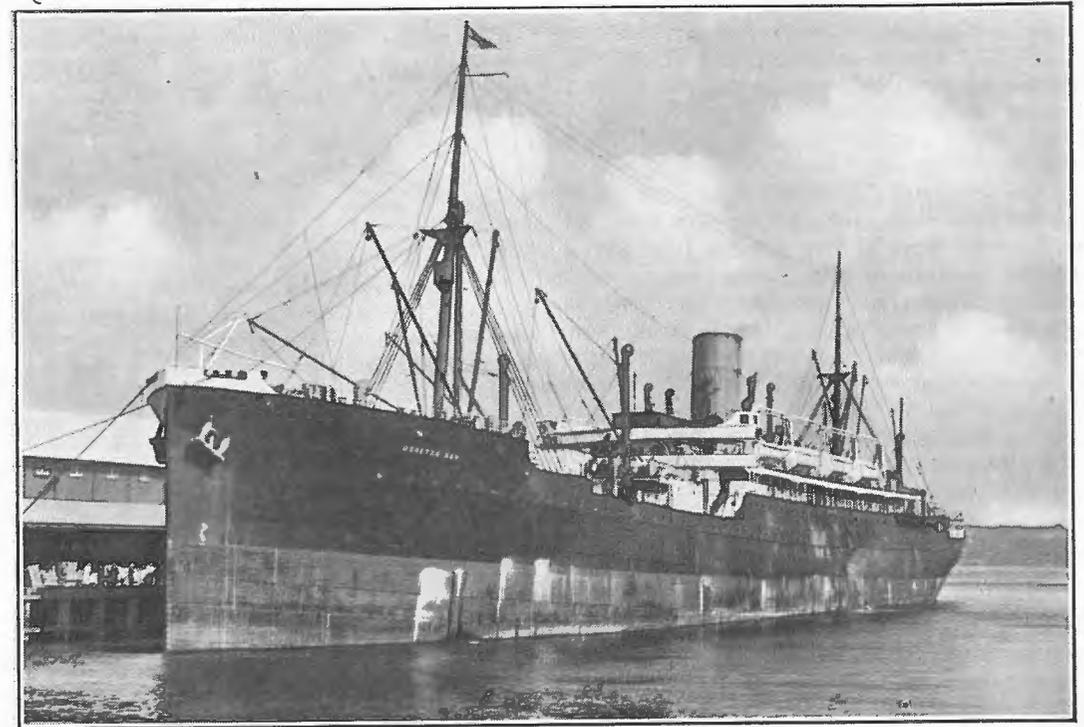
Quite recently the Tasmanian Government purchased the steamer *Tambar* for the King Island trade.

The *Tambar* was built by the Greenock and Grangemouth Dockyards Company, and is 145 feet two inches in length, 30 feet 1 inch broad, 8 feet 7 inches deep, with a gross tonnage of 456 and 200 net. She is fitted with electric light and has a refrigerator plant. The engines are seventy-three horsepower, four cylinders.

The *Tambar* was built for the North Coast Steam Navigation Company to trade between Sydney and the northern rivers. Being specially constructed to navigate the shallow bars at the harbours, she is suited to the requirements of the island where there is a big rise and fall of the tide.

"MORETON BAY" ARRIVES

FIRST COMMONWEALTH PASSENGER LINER



The new 14,000 tons Commonwealth passenger liner "Moreton Bay," the first of the "Bay" class to reach Australia.

CONSIDERABLE interest attached to the arrival of the 14,000-ton liner *Moreton Bay*, the first of the "Bay" liners to reach Australia. The vessel entered Sydney Harbour on January 16 in command of Captain J. Avern, R.N.R. Captain Avern was formerly marine superintendent of the line, and later assistant manager in London. The chief engineer, Mr. R. D. McPherson, was at one time in the Huddart, Parker service. He has a long war record, and after his period of service he joined the Commonwealth Steamship Line.

PASSENGER ACCOMMODATION.

The accommodation on the *Moreton Bay* is practically for one class only, with the exception of six two-berth cabins on the boat deck for the convenience of first-class passengers. Each of these cabins has a

bath-room attached, and travellers therein will have plenty of deck space at their disposal and will share a cosy dining-room under the bridge with the officers.

The maximum number of berths in any one class cabin is six, and the space is stated officially to be well in excess of the Board of Trade requirements. Each cabin contains a tip-up basin served by a small tank. The bath and lavatory provision is one of the best features of the vessel. An abundance of plunge-baths for men and women, fore and aft, with hot and cold water, and shower-baths with cold and warm water, should be ample even for a full ship. Large lavatories with rows of wash-basins are provided, as well as tubs, with hot and cold water, for the washing of clothes.

These conveniences count for much on a ship carrying hundreds of one-class passengers, and ought to induce a large number of travellers to patronise her on the homeward journey. To provide for extra cargo space homeward, portions of the one-class cabins are removable. These cabins are not temporary structures in the sense that they are makeshifts, the removable partitions and doors are stowed away when not in use, and are placed in position again with metal catches. "Open berth" does not exist.

The dining-room extends the full width of the ship with seating for three hundred and fifty. Special thought has been given to the location of the ship's food department. Everything to do with food is grouped in order of succession in one section of the ship—stores, cleaning, preparation and cooking lead the food by direct route to the windows where the stewards in the dining-room receive it. Cooking and the cleaning of tableware are in duplicate, so that each half shall serve one side of the dining-room. Machinery and labour-saving equipment are used to the utmost, and are of the latest design.

The "social" equipment is much in excess of what one expects to find in a one-class ship. The "social" hall and the smoke-room take up the whole beam of the ship, except for the passage between them, and are nearly forty feet long. The social hall is the larger and covers one thousand one hundred square feet; the smoke-room six hundred and seventy. The appointments of both are similar, oak-pannelled walls with mirrors, upholstered or leather covered seats along the walls, or arranged in square alcoves, plenty of small tables, ten in the social room, and a dozen in the smoker, with four swivel armchairs for each, and seven writing tables in the social room, which also has a piano. Both are fitted with steam-heated radiators. Each room opens through double doors to a portion of the main deck, which is sheltered by the promenade deck, and here again are tables and seats similar to those of the smoke-room. This portion of the main deck is some fifty feet long and extends the width of the ship. The remainder of the deck, both here and forward, can be covered with canvas so that a good area of protected space is available in bad or hot weather.

The hospital is self-contained and includes an operating theatre, and a

maternity ward. Stores and food are provided apart from the main stores of the ship. An isolation ward is, of course, also provided.

Grounding of "Cooma."

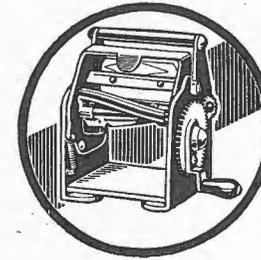
The passengers on the steamer *Cooma*, which recently went aground on Breaksea Spit, had an exciting time while being transhipped to the *Camira*. There was a fairly heavy sea running at the time, and each passenger had to jump from the deck of the *Cooma* into the boat as it was borne up on the crest of a wave.

A sensational experience befel one lady. As the boat came in on a wave an officer shouted to the woman to "jump," but the boat receded very quickly, and the woman fell between the *Cooma* and the lifeboat. Fortunately she grabbed a chain as she leaped from the vessel's deck, and by the aid thereof managed to keep afloat. A seaman in the lifeboat grabbed her, but was unable to pull her aboard until a passenger came to his assistance. The woman was then in a very exhausted condition, and to add to her troubles she was struck under the chin by an oar shortly afterwards, and fell into the bottom of the boat. Everything possible was done for her aboard the *Camira* by way of ensuring her comfort. The *Cooma* was afterwards floated off and continued her voyage.

Medical Officers for Ships.

On the 1st inst. the regulations under the Federal Navigation Act governing the carriage of medical officers and persons qualified to render "first aid" came into force. The regulations stipulate that every foreign-going ship or every Australian trade ship on a voyage between consecutive ports of call which exceeds six hundred nautical miles, having one hundred persons or upwards on board, must carry a duly qualified medical practitioner; and every such vessel having more than ten or less than one hundred persons on board, must carry a person certified as qualified to render first aid.

Included in the approved authorities whose certificates are recognised as qualifying a person to render first aid are the St. John, St. Andrew, and St. Patrick Ambulance Associations, and the British Red Cross Society.



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"HELEN B. STERLING" WRECKED

The four-masted schooner *Helen B. Sterling*, while on a voyage from Newcastle (New South Wales) to Papeete with a cargo of coal, encountered a cyclone when about two hundred miles north of the coast of New Zealand, and after a severe battle with the elements, became waterlogged on January 23. Before the worst happened, however, the wireless operator flashed out the call for help and the H.M.A.S. *Melbourne*, which was proceeding to New Zealand picked up the message and rushed to her assistance. When she reached the position indicated in the ill-fated schooner's call only wreckage was found. The search was continued, however, for

rescued by H.M.A.S. *Melbourne*: Captain G. H. Harris (master), J. Harris (first mate), J. Francis (second mate), R. H. Shaw (wireless operator), A. Callaghan (apprentice), J. Allan, F. Fans, J. Campbell, S. Yates, G. Hobbots, J. Boarke, F. Ollens, and A. Newick (seamen), A. Buclough (cook), J. Benton (cabin boy), Mrs. G. H. Harris, Mrs. J. Harris, and Master Leslie Harris.

DANISH TRAINING SHIP.

News has been received by the English mail that the new Danish five-masted training ship *Kobenhaven*, which with the



The four-masted sailing vessel "Helen B. Sterling," which encountered a cyclone near the New Zealand coast and became waterlogged. Her crew was rescued by H.M.A.S. "Melbourne."

many hours and a faint wireless call was again received. Communication was maintained between the two ships until the *Melbourne* reached the sinking schooner, and after great difficulty took her crew on board. Oil had to be poured on the water; even then the rescue was attended with great difficulty and danger. The *Melbourne* afterwards proceeded to Wellington, where a tremendous public reception was accorded all concerned in the exciting rescue.

The *Helen B. Sterling* was owned by Captain Sterling, of Sydney, and her loss means a serious blow to him as neither the vessel, her cargo or freight was insured. The total loss is approximately £53,000.

The following are the names of those

exception of the French barque *France* is the largest full-rigged ship in the world, has left Copenhagen on a three years' voyage to South American and Australian ports. The *Kobenhaven* is owned by the East Asiatic Company, and it is said that the ship is one of the best-fitted afloat. She was built at Leith by Messrs. Ramage & Ferguson, and her appearance in Danish waters gave rise to much enthusiasm, and many commendations were made at the high standard of the British shipbuilding industry. Some idea of the size of the ship may be gauged by comparing her with the "E" class steamers of the Commonwealth Line, whose carrying capacity she exceeds by one thousand three hundred tons.

The Call for Endurance

IN those hours of business when the need for vigour is greatest—when nerves should be steady, and wits alert—how do you respond?

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Pyorrhœa is a disease of the mouth, but its germs invade the body and cause many physical ills. Medical science proves this.

Pyorrhœa begins with tender and bleeding gums. Then the gums recede, the teeth decay and loosen, or must be extracted to rid the system of the Pyorrhœa germs which breed about them.

Four out of five people over forty have Pyorrhœa. It is a menace to health. If you value health as a business asset, you cannot afford to have Pyorrhœa.

So visit your dentist often for tooth and gum inspection and start using Forhan's For the Gums today.

Forhan's For the Gums will prevent Pyorrhœa—or check its progress—if used in time and used consistently. Ordinary dentifrices will not do this. Forhan's keeps the gums firm and healthy, the teeth white and clean.

How to Use Forhan's.

Use it twice daily, year in and year out. Wet your brush in cold water, place a half-inch of the refreshing, healing paste on it, then brush your teeth up and down. Use a rolling motion to clean the crevices. Brush the grinding and back surface of the teeth. Massage your gums with your Forham-coated brush—gently at first until the gums harden, then more vigorously. If the gums are very tender, massage with the finger, instead of the brush. If gum-shrinkage has already set in, use Forhan's according to directions, and consult a dentist immediately for special treatment.

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TASMANIAN STATE SHIPPING DEPARTMENT

THE first annual report of the Tasmanian State Shipping Department has just been issued. This shows that the fleet at the time consisted of three vessels—the cargo steamer *Melbourne*, 1,739 tons, built in 1892, the cargo steamer *Poolta*, 1,675 tons, built in 1921, both acquired for the inter-State trade, and the passenger and cargo steamer *Collaboi*, built in 1917, for the Flinders Island trade. The purchase price of these three vessels totalled about £122,000. Parliament has voted half a million for six vessels. Since the issue of the report the



The cargo steamer "Poolta," a recent addition to the Tasmanian State Government's fleet.

steamer *Tambar* has been bought for the King Island trade; and two others will be purchased later for the inter-State trade. During the year covered by the report, only the *Melbourne* was running, the total expenditure being £62,190, and revenue

£71,581, leaving a gross profit on the year's working of £9,391. The balance was dealt with as follows:

Interest on capital at six per cent., £3,766; reserve for contingent liability, £3,453; reserve for bad debts, £312; depreciation account £1,859. The report

states that but for the necessity of placing the amount mentioned for contingent liability, the result of a Sydney agent's misappropriation, the Department would have shown the handsome profit of six per cent. on the first year's operations.

The report mentions that the *Poolta* was built at a cost of over £100,000 and was acquired for less than half that amount. She is to be used chiefly in the trade between north-west coast ports of Tasmania and Sydney.

ITEMS OF INTEREST

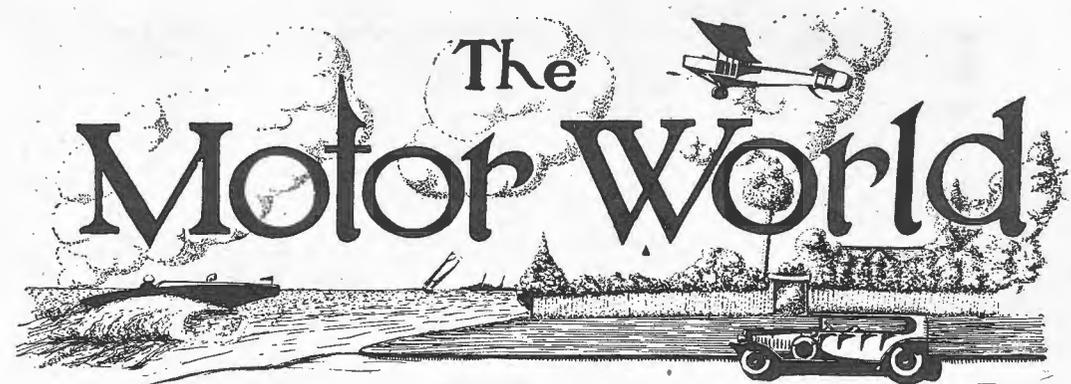
The World's Largest Clock.

The largest clock in the world is in Jersey City, New Jersey. It is known as the Colgate clock. It weighs about six tons, the face is 38 feet in diameter and has an area of 1,134 square feet. The minute-hand is nearly 20 feet long and weighs about a third of a ton. It travels at the tip between 23 and 24 inches each minute, or more than half a mile a day. The weight that causes the hands to revolve weighs about a ton.

An Elusive Bird.

The Greeks are acknowledged to be very accomplished restaurant men, but they don't seem to succeed in making a hash of Turkey.

The vacillating man, however strong in other respects, is always pushed aside in the race of life by the determined, the decisive man who knows what he wants to do, and does it; even brains must give way to decision.



By "SPARKING PLUG"

First Car Over the Mountains.

WE have all sorts of monuments—in the concrete and abstract—to remind us that Blaxland, Lawson and Wentworth were the first to cross the Blue Mountains of New South Wales. This is as it should be, but why not an occasional mention of the first motor car to cross the famous slopes on the way to the black-soil plains of the west.

Many residents of Bathurst vividly recall the mingled feelings of curiosity and excitement when the motor pioneer first shook the dust from its wheels in the Gateway of the West two years before the inauguration of the Commonwealth.

As might be imagined the car was somewhat different to the average *Rolls-Royce* and other makes which have multiplied throughout city and country in a ratio second only to the eternal and invincible "bunny." The engine, chassis, upholstery and lay-out generally, not forgetting the up-to-date rubber-shod buggy wheels, of the now out-of-date pioneer machine, demonstrate in the most eloquent way imaginable the giant strides made in the motor world to improve the comfort and efficiency of motor vehicles during the past twenty years.

In 1899 the first car was an event or epoch in the history of Australia, attracting alike both the curiosity and envy of thousands who would cheerfully undertake a ride in it.

How many to-day would be game to go for a spin in it during the luncheon hour, say, in George or Pitt Street, and run the gauntlet of modern eyes deriding the now obsolete but honest pioneer motor car?

Innocence is Bliss.

The traffic constable at the corner of King and George Streets recently checked the progress of a youthful lady motorist, whose contempt for congested thoroughfares was in keeping with her ideas generally on the uses and abuses to which motor cars can be put.

"Why do you fly through the city at that pace?" inquired the dutiful constable, pulling out his note-book and pencil.

"What pace?" timidly asked the fair offender.

"You were travelling forty miles an hour—"

"Oh, Mr. Policeman!" broke in the delinquent. "How could you. I've only been out a half-hour."

The delightful simplicity of the embryonic scorcher was too much for the constable, who returned to his post a wiser, if vanquished, officer.

Motorists' Happy Medium.

England at present is engaged with the task of popularising the autoglider—a single track spring frame runabout—which is a cross between a motor car and motor cycle. It is not exactly a motor cycle, though it belongs to that category. It is not even a "scooter," though perhaps it may answer to the title of a glorified "scooter" more than to any other name.

Roads and Tours.

The Roads and Tours Committee of the Royal Automobile Club of Australia has drawn up its programme for the year as follows:

February 25: One day reliability touring contest to the South Coast, *via* Bald

Hill, returning *via* Bulli Pass and Appin.

March 31 and April 1: Two days reliability touring contest, to Bathurst *via* Jenolan Caves on the first day, returning *via* the Main Western road on the second day.

May 13: One day reliability touring contest to Kurrajong Heights and return.

June 24: Flexibility trial.

August 19: Hill-climbing contest on Artillery Hill, National Park.

September or October: Inter-State reliability touring contest from Sydney to Brisbane.

In this programme it will be noticed that the committee exhibits a decided preference for reliability touring contests, and it is believed that members favour this form of contest, which includes reliability, petrol consumption, and hill climbing. A flexibility trial has, however, been put down for June, when the days are short, and one hill-climbing contest on that historic convincing ground, Artillery Hill, National Park, was, of course, inevitable.

Caution Signs.

The Royal Automobile Club of Australia specially requests that motorists should observe the caution signs. It is only by united effort that the motoring fraternity can silence the army of "croakers" who have been so eager of late to put motorists in the dock whether guilty or not guilty.

Where to Go To-Morrow.

Wherever motorists may decide to go for a one-day spin they are strongly urged to keep well away from the stretch of road between Penrith and Parramatta, which at the present time is in a deplorable condition.

On the southern line an exhilarating trip can be made as far as Camden and from there a delightful spin to the Burragorang Valley, which possesses all the charm and wonderful scenery that a romantic gourmand could wish for. By cutting through to the South Coast on the return journey a delightful wind-up may be enjoyed by taking the Carrington Drive through the National Park and following the usual route home *via* Tom Ugly's Point and St. Peter's Bridge to the city.

Vauxhall: The Car Super-Excellent.

There are no more attractive cars today than the latest model *Vauxhall*, and

none which command equal attention on the open road. Robustness, liveliness, sweetness of running, smooth riding, minimum attention, and appearance are salient points in the *Vauxhall*, which help to place it in its present premier position.

The strength which is evident in all parts of the *Vauxhall* chassis has been determined by experience embracing the widest range of conditions extending over many years. The *Vauxhall* has always been looked upon as a high-duty car. This reputation was acquired, and has been maintained, by specialising in high-speed research work, and by systematic participation in reliability trials.

The work done by the *Vauxhall* in Australia, New Zealand, Africa, Great Britain and on the Continent has afforded the most valuable data relating to the strength needed in the various parts of the chassis to withstand the severest conditions of use. The whole production has been considered chiefly from the standpoint of absolute reliability, rather than reduction of weight or cost of production. Nevertheless, the *Vauxhall* does not exceed in weight the average for the type. Particular attention is drawn to the design of the frame, springs, axles and hubs. The users' safety depends upon these cardinal points.

Though the *Vauxhall* cannot be classified as specially light, it is notable for acceleration (or liveliness). This liveliness has been achieved by making the best use of the possibilities which experiments have shown to be available in the petrol engine. The *Vauxhall* engine has always been noted for its smooth running and absence of periods. Its design is of peculiar rigidity; the cylinders are *mono-bloc*; the crankcase is of very stout section; the crankshaft is of large diameter, and supported on five bearings. The assiduous care paid to these familiar principles explain why the *Vauxhall* has always displayed a smoothness of running unequalled in any other four-cylinder engine. The sweetness of running of these cars as a whole is assured by the special attention given to the formation of the gears, the disposition of the propeller shaft, and the spring suspension. The chief attention needed by the car is lubrication. A great advantage of the *Vauxhall* design is the slight demand made on the time and trouble of its owner to keep his car lubricated.

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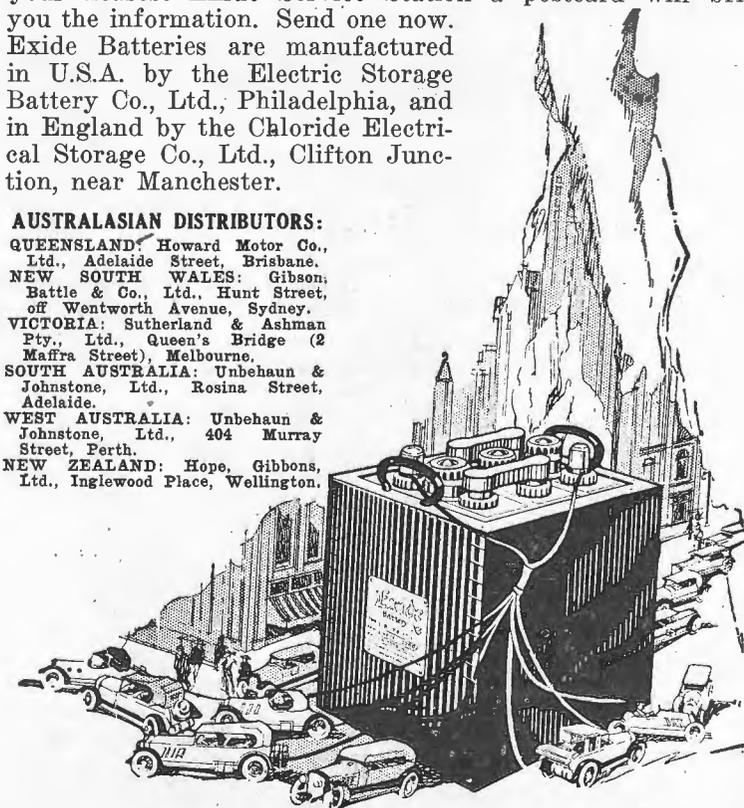
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Exide Batteries are manufactured in U.S.A. by the Electric Storage Battery Co., Ltd., Philadelphia, and in England by the Chloride Electrical Storage Co., Ltd., Clifton Junction, near Manchester.

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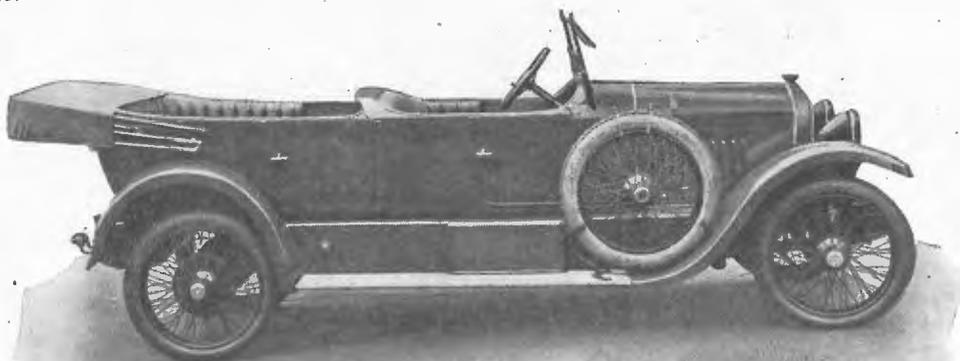
QUEENSLAND: Howard Motor Co., Ltd., Adelaide Street, Brisbane.
NEW SOUTH WALES: Gibson, Battle & Co., Ltd., Hunt Street, off Wentworth Avenue, Sydney.
VICTORIA: Sutherland & Ashman Pty., Ltd., Queen's Bridge (2 Maffra Street), Melbourne.
SOUTH AUSTRALIA: Unbehaun & Johnstone, Ltd., Rosina Street, Adelaide.
WEST AUSTRALIA: Unbehaun & Johnstone, Ltd., 404 Murray Street, Perth.
NEW ZEALAND: Hope, Gibbons, Ltd., Inglewood Place, Wellington.



The shape of the *Vauxhall* radiator and the lines of the bonnet are everywhere admired. That they have a distinctive appearance is beyond question. The proportions of the chassis allow the body builder the scope needed for the production of fine bodies.

Specifications, 25 h.p., four cylinders, 95 x 140 m.m. (3,969 c.c., multi-plate clutch, four speeds, separate gear box, half-elliptic front and rear springing, C.A.V. lighting and starting.

Thirty-ninety-eight h.p., four cylinders, 98 x 150 m.m. (4,526 c.c.), other details as above. Boyd Edkins Limited, are the New South Wales distributors for *Vauxhalls*.



The new model "Minerva," with body built by the agent, I. Phizackerley, Elizabeth Street, Sydney.

"M.L." or "Bosch."

In a recent issue of the *Motor* appeared a most important article by Lieutenant-Colonel W. A. Bristow, M.I.E.E., M.I.A.E., F.R.Ae.S., dealing with the comparative merits of the British and German magnetos. By a process of elimination the author puts forward the *Bosch* "Z.R." type as the best of the German products, and he then proceeds to compare it with the leading British types. The appended precis is entirely in the words of the article, but slightly abbreviated:

"In the following it has been assumed that a comparison of the best types of magneto produced in each country is the chief matter of interest. As it is generally accepted that the *Bosch* Company produced the best German-made article it is proposed to take their machine as a standard for comparison. It is well known that the *Bosch* Company were adepts at instilling

into the public mind the idea that their machines were constructed so mysteriously and so wonderfully compounded that it would be worse than useless to attempt to make them."

It was part of the *Bosch* policy to recommend different sizes of magnetos for motor cars, differing slightly in horsepower. The reason for this was that the slow speed sparking of the smaller magnetos was so different when working in the retarded position that the spark was insufficient. Even the smallest British magnetos are suitable for anything up to the largest tank engine. A 300 horsepower *Green* engine was run at maximum

power on a motor cycle magneto in conjunction with a distributor.

The figures corresponding to permanence and strength of magnets compare as follows:

Remanence:	
German	9,500
British	10,500
Coercive Force:	
German	56
British	65

And the *M.L.* Magneto Syndicate has produced magnets having a coercive force as high as 250, and still retaining a remanence of 10,000. The German magnets are still made in two pieces. This lowers the efficiency, as the combined strength of the two magnets side by side is less than the sum of the separate strengths.

The German machines were always fitted with solid cast-iron pole shoes. On the British *M.L.* machines the shoes are lam-

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Sole Distributors,

AUSTRALECTRIC LIMITED

97 Clarence Street, Sydney.

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inated and for any given voltage the speed of the British machine is much lower.

The *Bosch Z.R.* machine was overwound on the secondary. It consisted of 10,000 turns and at full speed surging took place with misfiring and, in many cases, breakdown of the H.T. insulation. The number of turns had to be reduced to 8,500.

The *Bosch Z.R.* construction of C.B., cams and camcage is good, but the whole of the moving parts are too heavy, with the result that at high speeds the rocker arm breaks. In the British machines radical changes have been introduced. In the *Lucas, B.T.H.*, and *M.L.* machines the camcage is integral with the cam. The cages are of steel and there is much less tendency for them to become oval in service.

The *C.B.* has also been considerably altered. The *M.L.* Company employ Bakelite instead of fibre for the pivot brush. This material is non-hygroscopic and brushes can be immersed in water for long periods without swelling.

The repeated mention of the *M.L.* magneto in this report indicates the great confidence which the author places in this machine. Every possible improvement has been incorporated in it, and the latest Royal Air Force dirigibles and aeroplanes are fitted with these machines.

R. N. Bubb, the motor accessory house, 4 and 6 Wentworth Avenue, is opening new shipments of English electric and gas lamps, in sets, for comprising head, side and tail lights, in all-nickel finish.

Motorists requiring new lamps should see these latest models. A full range of all the necessary accessories for cars, including pumps, jacks, chains, electric bulbs, mats, tyre and tube repair outfits, tyre gaiters, spark plugs, enamels, sementol, graphite, rim paint, etc., are also on hand, and a call is sure to be both interesting and profitable.

In Japan, when anything goes wrong with an automobile, owners are instructed to notify the police immediately.

Excellent Car Performances.

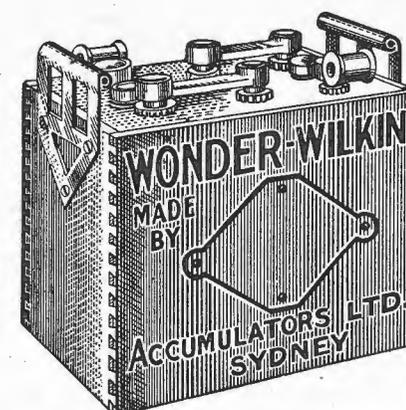
There may be cars which have a better record of service than a sixteen-passenger *Cadillac* and a two-seater *Dodge*, which

form part of the splendid motor passenger service of Messrs. Robinson Brothers on the North Coast, but their performances are at least worthy of mention. The eight-cylinder *Cadillac* has been in service continuously since 1916, and now has a mileage of well over one hundred thousand to its credit. It is still going strong, and for comfort and smooth running it has few equals in even the most expensive modern touring cars. As an evidence of the splendid pulling power of the engine it might be mentioned that a few weeks ago this car did the one hundred and fifteen miles journey from South Grafton to Macksville over a road which is decidedly hilly and rough in places without once getting into second, let alone low gear. This is a tribute alike to the manufacturers, driver and the mechanics who overhaul the car.

The second car which has performed exceptionally well, is a four-cylinder *Dodge*, which holds the record, three hours fifty minutes, for the one hundred and nine miles journey from Grafton to Glen Innes. Those who know the mountainous nature of this road will realise what a really excellent performance this is. The car in question has been on the road only five months, but its mileage already exceeds eleven thousand, and in one week alone it travelled over one thousand miles. Perhaps one of its best runs was that of a few weeks ago when, after leaving South Grafton at 7.10 a.m. and crossing three punts it reached Macksville (one hundred and fifteen miles) at 11.30 a.m. And mark you, the trip was not one in which every ounce was got out of the car. It was just a performance that car and driver will do any day in the week without the slightest suggestion of bustle, and at the end of which the engine will be no more than properly warmed up.

Worth Knowing if You Wash Car.

A mighty useful device for the man who washes his own car may be made by sawing a keg or barrel in half and clamping to the edge an ordinary clothes wringer. The half barrel is filled with water and the chamois cloths used for cleaning the car are soaked therein and afterward passed through the wringer, so that a dry surface may be assured in the final operations of cleaning the body.



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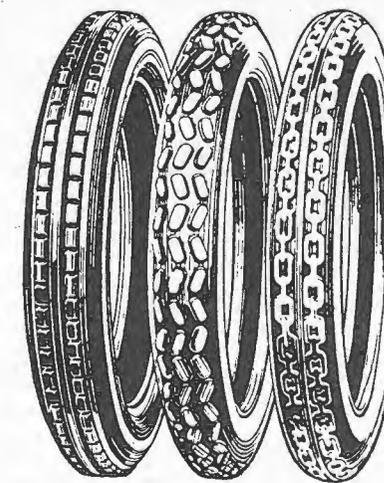
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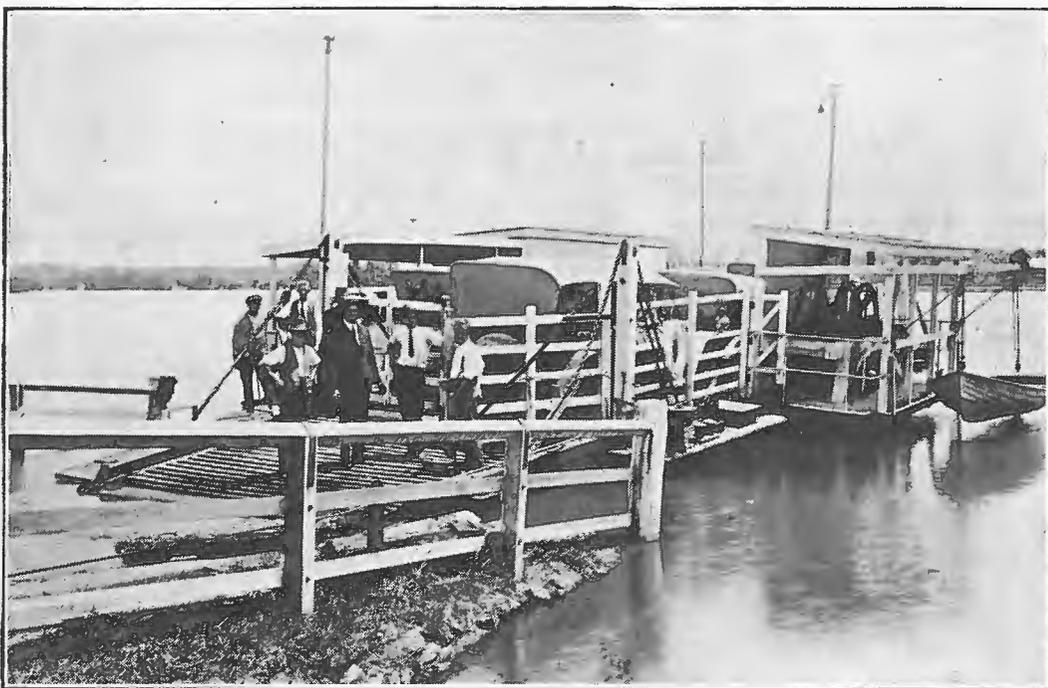
'Royal Cord' 'Nobby' 'Chain'

NORTH COAST MOTOR SERVICES

ROBINSON BROTHERS' ENTERPRISE

MANY people cherish the impression that motor passenger services are either unknown outside the metropolitan area, or else are conducted in a haphazard manner disintitling them to be classed as up-to-date enterprises. Such an impression is entirely erroneous, and visitors to the North Coast, whether they travel *via* Glen Innes or Macksville, are

simple matter when in close proximity to the metropolis, but in the country it is an entirely different proposition. There are so many obstacles to be overcome in the shape of securing supplies, organising repair depots and meeting all kinds of bad roads. Fortunately, however, when Robinson Brothers started the venture they understood their business and laid plans which made failure practically impossible.

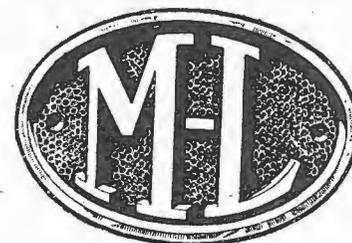


Crossing the Nambucca River at Macksville.

The above photograph, taken on January 3, 1922, shows six of Robinson Brothers' cars on the Macksville punt on their way to Grafton. The firm's cars are all fitted with Nobby Tread tyres.

afforded the opportunity of travelling by one of the best organised motor transport services in Australia. The name of Messrs. Robinson Brothers is known far and wide, and the excellent service they render has won for them the golden opinions of all who travel by their speedy, comfortable, and above all, thoroughly reliable *Cadillac* cars. To organise and maintain a daily motor service is a comparatively

At the head office at Grafton they established an up-to-date and thoroughly equipped repair depot where every class of work is carried out by highly skilled mechanics. It is the firm's proud boast that no car ever leaves the garage that is not thoroughly tuned up to concert pitch and capable of performing every call made upon it. The journey from Macksville to Grafton, one hundred and fifteen miles,



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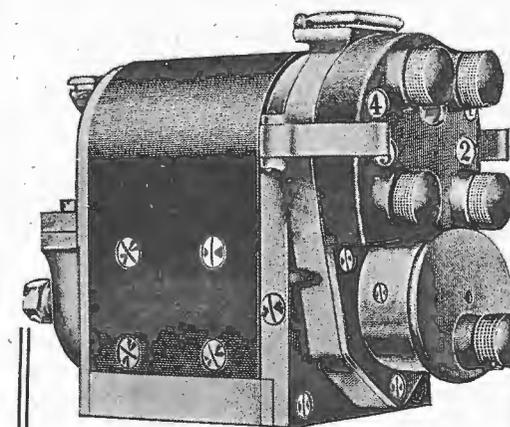
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and from Glen Innes to Grafton, one hundred and nine miles, is served by the firm's cars, and a tremendous number of passengers are carried each year. To give an idea of the patronage which they enjoy it might be mentioned that on Christmas Eve, 1921, Robinson Brothers transported well over two hundred passengers, and the car mileage was close on to two thousand. From Glen Innes to Grafton the scenery is magnificent, and to travel along the North Coast route from Macksville to Grafton is to pass through some of the most picturesque and fertile country in New South Wales. The car fares are exceptionally reasonable, and ample time is allowed for refreshments along the route.

* * *

REPLACING HEAVY TYRES

THE apparent ease and despatch with which a thoroughly experienced driver can dismount and apply, without assistance, big pneumatic truck tyres is evidence that there is a knack to it that is worth the attention of those who own or operate trucks.

In the following article, the United States Rubber Company, the pioneer builders of truck pneumatics, point out briefly how handling these tyres can be made a one-man job.

To dismount the tyre and rim from the wheel, jack up the wheel until the tyre freely clears the ground, loosen the tyre bolts, and then the rim by shock, and turn the wheel so that the sector containing the valve is near the ground. With both hands grasp the tyre and rim at points just below the level of the hub, and quickly lift and pull the rim away from the top of the wheel. At the same time watch the valve to make sure that it does not bind in the felloe, when the rim slides off the felloe band.

If properly performed, this method of dismounting the tyre and rim from the wheel requires very little lifting, and causes no damage to the valve or the tube at the valve band.

To detach the tyre from the rim, lay the tyre on level ground, locking ring side up, remove the valve plunger to complete deflation, and push back the valve stem

inside the rim. Remove locking and side rings, loosen flap all around and, standing inside of the rim, lift the tyre straight up off the rim.

When the tyre is ready for replacement on the rim, reverse the operations of detaching the tyre from the rim with tube flap in place and valve stem pushed back flush with the base of the flap, drop the tyre carefully over the rim, taking care that the base of valve stem is directly opposite the rim valve hole. Step down the tyre on the rim all around by treading on the bead, apply side and locking rings, draw out valve stem to proper position and inflate.

Finally, in applying the rim and tyre to the wheel, engage the valve stem in the felloe at a point level with the hub, push the rim firmly against the felloe and slowly turn the tyre, rim and wheel until the valve is at the highest possible point. The rim will drop into place on the felloe except at the bottom, where it can be pushed on by the foot.

This knack of first engaging the valve, then turning the tyre and rim on the wheel eliminates all direct lifting, and makes the applying of an eight-inch tyre, the largest perfected truck pneumatic, a one-man job.

* * *

Left-Hand Steering.

A legal decision of far-reaching importance was recently given in England, when a driver of a commercial motor van, with a left-hand steering wheel, was summoned for not putting out his hand to the right when turning to the right out of a busy thoroughfare. His defence was that it was impossible, owing to the steering wheel being on the left-hand side of the vehicle. Lord Ilkstone, in giving judgment, said that persons driving cars so fitted must have somebody with them to give warning of any sudden turns to the right, and, in default, would be held responsible for any accidents that might happen. The case is also interesting, in that the driver was summoned, although a collision did not actually occur. This decision is likely to have a considerable effect in Great Britain and the Dominions on imports of cars from countries where left-hand steering—to conform with the rule of the road in the country of origin—is the vogue.

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Aviation in Australia

Australian Air Force.

A statement was issued recently indicating the curtailment in the activities of the Royal Australian Air Force consequent upon the reduction of the Defence vote. Generally speaking, the formation of an air force for defence purposes in Australia has been made possible only by the generosity of the Imperial Government in forwarding gifts of equipment. The present policy in building up the air force is to endeavour, as far as possible, to supply aircraft to enable the fullest measure of co-operation to exist with the naval and military forces. Unfortunately, as matters now stand, these activities will have to be curtailed in many directions.

Negotiations are still proceeding for the purchase of a site on Sydney Harbour for a seaplane base. Owing to the generosity of the British Government, the Australian Air Force obtained many modern aeroplanes and seaplanes of various kinds. These include six *Fairey 3D* seaplanes, which are not in use at present.

A plan is being prepared by the department for the training of citizen forces in all branches of flying, with the exception of seaplane work. It is unlikely, however, that this scheme will be brought into operation for some time.

Air Research.

A new meteorological observatory is being erected at the Weather Bureau, Sydney, a feature of which is a flat roof specially designed for the investigation of the upper air, partly for the benefit of aerial navigation. The roof, in the present state of meteorological progress, will be an essential adjunct to the work of the observatory, for it will enable Sydney, in collaboration with Melbourne, to work on parallel lines with many of the European and other oversea observatories in deter-

mining, for one thing, the directions and velocities of the wind at various altitudes.

The data thus obtained will be of unquestioned value to aviation, and will also enable the bureau to study the structure of the atmosphere under much better conditions than at present in respect to developing storms and other features of the weather. For the purposes of this work a theodolite is used, and by means of it the movements of a little pilot balloon, only about twelve inches in diameter, may be closely followed until it becomes a mere speck away in the upper blue. What might strike the eye as simply a toy balloon, will actually be doing a work of great scientific value. These pilot balloons, which are of rubber, and filled with hydrogen, have been found exceedingly useful for this branch of meteorology. Very little is known about the true structure of the atmosphere at present, and it is only by a systematised form of observations of this description that our knowledge of the higher atmosphere can expand. Here, again, one sees the direct value of the new building, for the Weather Bureau, under existing conditions, is quite unable to do this new and valuable work.

Chance for Inventors.

Advice has been received that the British Air Ministry is offering a prize of £50,000 for a practical design of an helicopter aeroplane which will rise 2,000 feet with a man, and an hour's fuel supply, travel horizontally at a speed of sixty miles an hour, and remain stationary between earth and sky for half an hour in a gale of wind. The conditions are certainly severe, but they are hardly likely to deter motor engineers all over the world, who have already solved so many seemingly impossible problems, from trying their skill on this new ideal.

If the project is ever accomplished it means that aviation at once becomes safe.

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The method of taking off and alighting, to which an element of risk is now attached, would be devoid of its present uncertainty and unpleasantness, and flying would become widely popular for business and pleasure purposes. These facts alone will ensure the best inventive brains in the world being engaged on the problem, for the cash value of the prize will be enhanced by the grateful thanks of an admiring world.

Seaplane Squadron for Sydney.

Despite the drastic reductions in the amount of money available for naval and military aviation, it is proposed to go ahead with the plans for the establishment of the nucleus of a squadron of seaplanes in Sydney. The planes only recently arrived in Australia and are of the latest type. Each has a crew of three—pilot, gunner, and wireless operator—and carries guns, ammunition, wireless apparatus, bombs, and sufficient petrol for a flight of five hundred and fifty miles at one hundred miles an hour. There are folding wings to facilitate storage. To suit Australian conditions the wings, fuselage, and tail have been coated with aluminium varnish to cut off the active rays of the sun, which otherwise would cause the fabric to deteriorate. The floats are enamelled white, the idea being to keep down the internal temperature of the floats.

The machines can attain a speed of one hundred and ten miles an hour and climb five thousand feet in six minutes forty seconds. The overall length is thirty-six feet one inch, area of main planes five hundred square feet, weight five thousand and fifty pounds, and the wireless has a radius of two hundred miles. The squadron will be in charge of Captain de la Rue.

Sydney-Brisbane Aerial Mail.

Mr. R. U. Hoddinott, of the Civil Aviation Department, Melbourne, is now engaged on a survey of the aerial mail route between the above cities. The route will follow the coast line, for the country inland is rough and heavily timbered, and in addition the beaches will provide ideal emergency landing grounds. It is proposed, where possible, to have landing grounds at intervals of from ten to fifteen miles, and with the up-to-date machines which the contractors propose using this service

should soon become widely popular and commercially remunerative.

North Queensland Service.

Plans are well matured for the opening of the Charleville to Cloncurry *via* Blackall, Longreach and Winton aerial mail service in July next. The people of the districts concerned are evincing the keenest interest in the project, and they share the aviators' quiet confidence regarding the result. The Company has several aeroplanes at present in commission, and larger machines capable of carrying three, five and seven passengers, in addition to mails, are now being assembled by the Australian Aircraft & Engineering Company.

A Government subsidy of £12,000 for the first twelve months is being provided. Lieutenants Fysh and McGinness are to be the Company's chief pilots, and as both are skilful and experienced airmen, the venture should prove a great boon to the outlying districts it will serve.

Parer's Flight.

Lieutenant Parer, who is flying around Australia, arrived in Kalgoorlie on January 10, after experiencing an uneventful journey from Port Augusta. From there he journeyed to Perth by easy stages.

Lieutenant Parer expects to be advised at an early date of the completion of arrangements for taking part in the trans-Pacific flight which are being made on his behalf by English backers. As soon as this information is to hand the present exploit will be abandoned, and the Australian airman will leave for England.

INFORMATION FOR AIRMEN.

From the Controller of Civil Aviation (Lieutenant-Colonel H. C. Brinsmead), a list of notices to ground engineers and other items of interest to airmen generally has been received. The list has been issued by the British Air Ministry, and no doubt Australian airmen will find much useful information contained therein.

Fitting of Ballast in Aircraft.

Attention is drawn to the precautions necessary when fitting ballast in aircraft for trimming purposes.

The ballast should take the form of bags filled with earth or sand, or of weights made of sheet lead.

Bags of small shot or stones should not be used, as experience has shown that such bags wear out quickly and allow the filling to escape.

The bags or covers for the lead should be made of stout canvas or other strong material, and should be provided with adequate means of attachment, such as straps or strong cord, by which they can be secured in the cockpit.

In order to preclude all risk of accidents, such as fouling of controls or falling out of the aircraft, the ballast should always be securely attached in the cockpits.

Defects in Aircraft Timber.

Attention is drawn to a common defect found in aircraft timber, especially spruce, which is usually known as "spiral" and sometimes erroneously as "cross grain." The existence of such a defect is due to the twisting of the tree during growth, and consequently, cannot be determined by a casual examination of the straightness of the grain. It can, however, be detected by closely examining the direction and inclination of the wood fibres. It is usually most apparent on the "flower" side of the grain, and takes the form of small resin channels of a brownish colour, running at an inclination to the axis of the strut or spar, as the case may be.

A slight inclination is of no disadvantage, but when the slope is great the timber is liable to break off short. An indication of the amount of slope, which, from experience, has been found to be satisfactory, is roughly when the inclination of the fibres is not more than one in fifteen.

The defect is more readily found by means of splitting the timber, the angle of the split

giving the true slope of the fibres, and when making new timber parts for replacement it is recommended that the part be made slightly longer, to allow for a short piece to be cut off for splitting purposes.

When making such tests the split should be made in two directions:

- (1) In line with the grain, and
- (2) At right angles to it.

Foreign Matter in Petrol Systems.

Forced landings may be caused by the presence of foreign matter in the petrol systems, which is liable to choke the non-return valves, filters, etc., with consequent reduction in the supply of petrol to the engine.

Although petrol systems are designed to be proof against the entry of dirt and other impurities, it is nevertheless essential that the ground engineer should be careful to see that all precautions are taken to keep the petrol system clean.

The following preventative methods are suggested:

- (1) Clean out filters daily.
- (2) Always use a chamois leather and fine mesh gauze petrol funnel when filling tanks.
- (3) Inspect non-return valves and pumps before flight.
- (4) Check petrol flow daily to ensure that there is no stoppage in the pipe.
- (5) Take particular care when fitting new tanks to ensure that they are perfectly clean.

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JUNIOR MECHANICS SECTION

In order to keep this section as bright and up-to-date as possible we seek the co-operation of our readers. By contributing simple constructional and experimental items—written in non-technical language that will occupy space varying from a small paragraph to a full page or more—accompanied by diagrams and illustrations, readers will materially assist. All contributions will receive our most careful consideration and, if accepted, will be paid for on publication.—Ed.

HOW TO MAKE A SENSITIVE MICROPHONE

By J. F. DUNN

THIS instrument will probably appeal to many readers as it costs so very little to make, and the articles necessary for its construction are so easily obtainable. It works on the same principles as the telephone and will be found to be very interesting and instructive.

The sounding-board may be made of a cigar box, the top of which must be planed down to one sixteenth of an inch and cut to about five inches square. A good glue should be used to fix the sounding-board

half-way along the pencil to allow a piece of steel wire to be inserted. This should fit tightly into the carbon and should protrude about a quarter of an inch each side, the ends having a knife edge filed on them. The carbon block upon which one end of the pencil rests should be made about one inch by one half inch by one quarter inch, and should be fixed on the board by two small brass screws. The rest upon which the carbon pencil swings is made of thin brass sheet bent into two right angles. Two

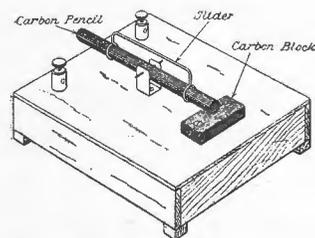
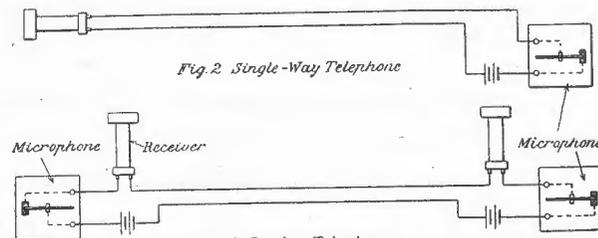


Fig. 1.—General View of a Simple Microphone.



Diagrams of Connections for Single and Duplex Telephones.

together, as brads, etc., will decrease the sensitiveness of the instrument. When finished, the board should be about three-quarters of an inch high. The legs are best made about a quarter of an inch by a quarter of an inch by three-sixteenths of an inch, and can be glued to the four corners. A small piece of felt fixed on the legs will prevent the jolting of the object upon which it stands from affecting the instrument. The carbon pencil is a quarter of an inch in diameter and about four inches long. A small hole must be drilled

holes are drilled to take the screws fixing it on to the board, and two others to receive the knife edge. The slider is made of thick brass wire, bent as shown in Fig. 1. One terminal is connected by a thin wire to the rest, and the other to the carbon block.

The connections for single and duplex telephones are shown in Figs. 2 and 3.

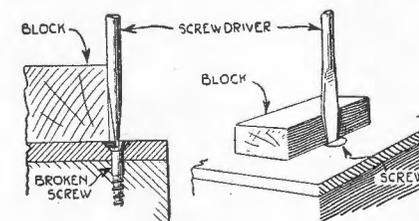
The principle of working of the microphone is quite simple, and it will be well for the reader to understand it before attempting to construct the instrument.

When the vibrations of the voice, or other sound source, hit the sounding board they cause it to vibrate. Consequently the pressure between the two carbons varies according to the magnitude of the vibrations. The resistance to the current, therefore, is constantly changing, and consequently the current which passes through the receiver also changes, so producing sounds similar to those hitting the sounding-board. The reader probably knows that the slightest change in the pressure between two pieces of carbon greatly changes the resistance to the passage of an electric current passing between them.

By placing the instrument in a concert hall the music, etc., can be heard quite distinctly at any distance provided that the battery is of sufficient strength to overcome the resistance of the line. (A two-cell dry-battery supplies quite enough current for ordinary purposes.) This is only one of the many uses to which this instrument can be put, and no doubt the reader will find out others.

How to Remove a Wood Screw Having a Broken Head.

When one side of the slot of a wood screw breaks off, as it frequently does, especially when setting the screw up tight, it may be removed for inserting another as shown in the illustration. Use a flat



A Block Aids Screw Driver in Turning Out a Wood Screw Having a Broken Head

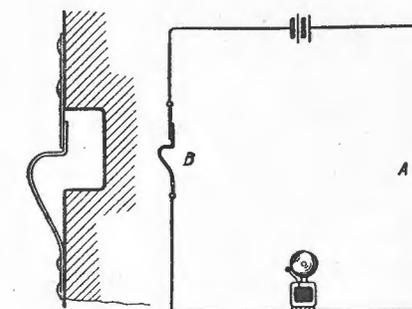
block at one side of the screw driver where the head of the screw is missing. Support the block firmly with the hand, pushing the blade of the screw driver toward the intact side of the slot while the driver is turned, following the rotation of the blade with the block.

How to Make a Glue-Joint Invisible.

When making a glue joint, always, if possible, lightly sandpaper the joint before the glue dries. This will fill up any slight crack with fine sawdust and greatly aid in hiding the joint.

A Burglar Alarm System for the Garage.

The illustration shows a simple contact set in the door frame of a garage so that when the door is closed the line is open.



Simple Circuit with Door Contact, Switch and Buzzer to Sound the Alarm

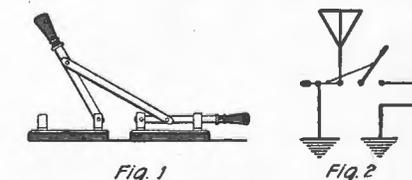
The switch *A* and the bell are placed in the house, and when the door is closed, the contact *B* is open. When the door is opened, the contact completes the circuit and the buzzer gives the alarm.

A Solution for Retaining Heat in Hot Water Jug.

An excellent warming bottle may be made as follows: Mix sodium hyposulphate and sodium acetate in the proportion of one part of the latter to nine parts of the former. Fill an earthenware bottle about one-third full with this mixture. Be sure that the bottle is well corked and place it in either hot water or an oven until the salt within the bottle is melted. This bottle will radiate heat for at least a half-day, and need only to be well shaken from time to time to renew the heat-giving energy.

How to Construct a Wireless Aerial Switch.

One thing that always adds quite a little to the already high cost of wireless apparatus is the purchasing of a good aerial



Two Switches Connected to Make a Double-Throw Switch for a Wireless Set

switch. Herein illustrated is a simple makeshift that works just as well as a pur-

chased switch, and its cost is negligible. In many shops, car barns and like places, it is possible to procure old, discarded, single-pole, single-throw switches on fine slate bases for almost nothing. These are discarded in favour of large, centrally controlled switchboards.

A way to make a single-pole, double-throw switch out of two single-pole, single-throw switches is shown in Fig. 1. A hole is drilled in the centre of each knife and a heavy piece of copper is fastened between them by means of a loose bolt and nut on each of its ends. The switches should be mounted on a board as shown. The switch is connected as in Fig. 2.

How to Open a New Book to Prevent Damage.

Never force the back of the book. Hold the book with its back on a smooth or smoothly covered table. Let the front

cover down, then the back. Hold the leaves in one hand while you open a few leaves at the back, then a few leaves at the front, and so on, alternately opening back and front, gently pressing open the sections until the centre of the volume is reached. Do this two or three times and you will obtain the best of results. If a new book is opened violently or carelessly in any one place it will probably break the back.

Electric Tooth-Brush Makes Debut.

A new article that is of interest to every human being is the electrical tooth cleaner and polisher that has the same essential scientific principles as used in the dental profession, yet so arranged that the novice or individual in the home by the turn of a switch, can have at his command the same service every day, that, in the past, the dentist gave us but once a year.

A FEW OF AMERICA'S RADIO AMATEURS



This photograph shows over six hundred members of American Radio Clubs at the First Annual Radio Convention, held in New York last year. They are representative of more than 300,000 amateurs in all parts of the United States.

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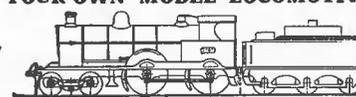
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NEW SOUTH WALES DIVISION

A GENERAL MEETING was held at "Wireless House," Sydney, on January 10, at 7.45 p.m., Mr. J. F. Wilson presiding over an excellent attendance.

After the minutes of the previous meeting were read and confirmed, the chairman called on Mr. Charles Maclurcan to announce the results of the wireless telephone and telegraph competition recently conducted.

The competition, which was announced in *Sea, Land and Air*, was held on six consecutive Sunday mornings, both telegraphic and telephonic signals being radiated from Mr. Maclurcan's experimental station at Strathfield, New South Wales. His transmitting apparatus consisted of eight "V24" valves, four of which were used as oscillators and four as modulators connected on the "Shunt" or Heising system. The high tension voltage was supplied by a small six hundred-volt generator driven by a quarter horsepower induction motor, the valves being lighted by a step down transformer from two hundred and forty volts A.C. mains.

Mr. Maclurcan stated he was very gratified with the results of the competition, which was the first of the kind ever held in Australia, and he was especially pleased with the enthusiasm and perseverance of the competitors. Results show that the speech modulation was very clear and regular, several competitors reporting changes of speakers and the recognition of voices.

The judges, Messrs. Renshaw, Stowe and Maclurcan, awarded the prizes as follows:

Section 1, for the best complete log:—

First Prize: Mr. R. D. Charlesworth, 173 Parramatta Road, Haberfield. (A De Forest inter-valve transformer donated by Mr. C. Maclurcan.)

Second Prize: Mr. C. A. Gorman, West Botany Street, Arncliffe. (Open order to Austral Electric Co., donated by The Wireless Institute.)

Section 2, for the longest distance received:—

First Prize: Mr. E. T. Vears, Grose Street, Leura. (A Room 2 Filament re-

ceiving Valve donated by Mr. C. Maclurcan.)

Second Prize: Mr. G. E. H. Blanchard, Browns Road, Church Point. (An Expanse Valve donated by the Austral Electric Co.)

The marks obtained by the various competitors are shown hereunder in their order of merit:

R. D. Charlesworth, Haberfield	563
C. A. Gorman, Arncliffe	555
R. L. Hewett, Kogarah	540
R. P. Whitburn, Leichhardt ..	521
J. H. A. Pike, Epping	477
R. F. Grosvenor, Strathfield ..	389
E. B. Crocker, Marrickville ..	331
H. R. S. Callan, Chatswood ..	307
W. J. Zech, Annandale	244
G. E. Blanchard, Newtown ..	174
E. T. Vears, Leura	128
E. R. Mawson, Campsie	96
W. G. Best, Rose Bay	49
T. R. Willmott, South Grafton	10
T. E. Dickenson, East Hills ..	4

In addition to the winners, Mr. R. L. Hewett, who obtained third place, is deserving of special mention. For three weeks out of six he "topped the list," but unfortunately lost part of the speech transmission.

The log sheets sent in by Mr. Whitburn are also deserving of praise. His reception was most consistent throughout the whole competition, and he received the whole of the programme. He lost marks, however, by not recording mistakes in spelling, etc., purposely radiated by Mr. Maclurcan.

Mr. J. H. A. Pike, one of the old-timers in experimental wireless was practically ruled out at the start. His station at Epping is almost next door to Sydney Radio (VIS), which when transmitting drowned the weaker signals.

Perhaps the most meritorious performance was accomplished by Mr. W. G. Best, who succeeded in receiving the tonic train and some speech at his station at Carlisle Street, Rose Bay, twelve miles from Strathfield, on a crystal detector.



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The next business of the evening being "Short Papers by Members" was then proceeded with, and were as follows:

- (a) "The behaviour of an aerial under the influence of an approaching thunderstorm," by Mr. H. R. S. Callan.
 (b) "An accumulator 'B' battery," by Mr. R. P. Whitburn.
 (c) "Erection of Masts," by Mr. M. Perry.

(d) "Localisation of faults," by Mr. J. H. Dewis.

These papers were discussed individually and proved most interesting and instructive.

Representatives of the Waverley Amateur Radio Club, who had come to the meeting by special invitation, were then welcomed by Mr. Stowe. Mr. J. F. Wilson, the chairman, supported the welcome, and Mr. Alan Burrows responded on behalf of the visitors.

QUESTIONS AND ANSWERS

A.T.C. (Seacliffe, S.A.).—Question (1): *What is the approximate range of a wireless receiving set comprising: Two slide tuning inductance; crystal detector; 3,000 ohms resistance telephone receivers; with an aerial 100 feet long and 30 feet high in an elevated position?*

Answer (1): 300 to 500 miles at night.

Question (2): *Is a tuning condenser required in the receiving set mentioned in the above question No. 1?*

Answer (2): A variable would be a great advantage.

Question (3): *What is the wavelength used by the coast stations within range of this set?*

Answer (3): 600 metres.

D. Hearps (Marrangaroo, N.S.W.).—Question: *Would any advantage be gained by having a wireless station at present situated on low-lying country to the top of a high mountain. Would the receiving range be increased?*

Answer: No.

F.T.M. (Brisbane).—Question (1): *What is the longest wavelength that the receiving set described would tune up to?*

Answer (1): About 2,000 metres.

Question (2): *What would be the approximate receiving range?*

Answer (2): Between 300 and 500 miles.

B.T. (Ashfield, N.S.W.).—Question (1): *About what quantity of wire would be required to wind a honeycomb coil having a wavelength between 8,000 and 12,000 metres?*

Answer (1): Half pound of No. 28 double silk covered copper wire. The former should be about one inch wide with a diameter of two inches.

Question (2): *How many and what type of valves are required to receive the wireless telephone concerts radiated from Melbourne?*

Answer (2): The concerts have been received in Sydney using one "Q" type valve and six "V24" type valves.

Question (3): *What system of amplification is the best—radio frequency or audio frequency?*

Answer (3): An ideal set consists of three stages of radio frequency amplification, then detector followed by two or three stages of audio frequency amplification.

Question (4): *Apart from being large, are single layer solenoids for long wavelengths as efficient as honeycomb coils?*

Answer (4): Yes, single layer coils are just as efficient.

G.F.C. (Barjarg, Victoria).—Question (1): *Can you advise me how to calculate the wavelength of a honeycomb coil without using a wave meter?*

Answer (1): The following will give you a rough idea of wavelengths of honeycomb coils:

Diameter of former, two inches.

Width of former, one inch.

Diameter of finished coil, four inches.

Wound with No. 28 double silk wire.

Thirty pins each side.

Wavelength with 0.001 condenser 4,500 to 16,500 metres. By adding another half inch of winding to the coil, making total diameter 4½ in. with 0.001 condenser it will tune from 4,500 to 22,000 metres.

J. Milne (Gretna, Tasmania).—Question (1): *Is it possible for me to receive the wireless telephone concerts, radiated from Melbourne, with a No. 1 "Expanse" tuner and a single valve connected, as per diagram, using an aerial consisting of four wires 100 feet long and 65 feet high? The approximate distance between here and Melbourne is 200 miles.*

Answer (1): Yes, you should receive the concerts alright.

Question (2): *Can you tell me if there is any particular station that works about 5.30 p.m., as I often hear faint signals at that time?*

Answer (2): There are generally a number of stations working about that time. Those within your receiving range include Melbourne (VIM), King Island (VZE), Flinders Island (VIL), and Hobart (VIH).

J. D. Mackintosh (Yea, Victoria).—Question: *A friend and I, both twenty-one years of age, are desirous of joining the mercantile marine. Can you advise us how to do so?*

Answer: We advise you to communicate with the various Australian shipping companies. By perusing the shipping advertisements in the leading daily papers you will secure the necessary postal addresses. The likely ones to approach appear to be The Union S.S. Co., The A.U.S.N. Co., and The Commonwealth Government Line of steamers.

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<i>Arafura</i>	H. Taylor (2nd)	<i>Coolana</i>	C. Waite
	T. Dines (3rd)	<i>Coon...</i>	V. M. Brooker
	G. M. Gormlie	<i>Corio</i>	R. D. R. Davis
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<i>Araluen</i>	—	<i>Dilga</i>	H. F. Giles
<i>Aramac</i>	—	<i>Dilkeria</i>	R. H. Alexander
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<i>Australmead</i>	F. Ouvrier		F. Exon (s)
<i>Australmount</i>	—	<i>Eastern</i>	E. McPherson (2nd)
<i>Australpeak</i>	J. B. Ponsonby		W. Peell (3rd)
<i>Australplain</i>	—	<i>Emita</i>	A. Stuart
<i>Australpool</i>	E. J. Glaisher	<i>Enoggera</i>	—
<i>Australport</i>	S. R. Dixon	<i>Era</i>	P. J. Manley
<i>Austfalrange</i>	—	<i>Eudunda</i>	—
	G. Maxwell (s)	<i>Echuca</i>	—
<i>Bakara</i>	S. R. Haworth (3rd)	<i>Eurimbla</i>	—
	T. O. Sexton (3rd)	<i>Eromanga</i>	I. R. Hodder
<i>Baldina</i>	A. W. Hooper	<i>Erriba</i>	—
<i>Bambra</i>	R. C. Williams	<i>Eurelia</i>	F. Marsden
	M. L. Robertson (s)	<i>Flora</i>	—
<i>Barambah</i>	O. S. Kelly (3rd)		A. S. Dening (s)
	E. Seanson (3rd)	<i>Gilgai</i>	N. Olsen (3rd)
<i>Barunga</i>	S. M. Brown		F. Kettlewell (3rd)
<i>Bingera</i>	F. L. Scott		A. H. Jeremy (s)
<i>Bombala</i>	—	<i>Gorgon</i>	T. M. Johnson (2nd)
	F. A. Cook (s)		H. M. Watson (3rd)
<i>Boonah</i>	A. S. Figtree (3rd)	<i>Goulburn</i>	A. R. Catford
	R. Thompson (3rd)	<i>Hexham</i>	A. R. Smith
<i>Booral</i>	T. V. Tressler	<i>Hobart</i>	C. J. Lilley
	T. Alexander (s)	<i>Iron Baron</i>	C. C. Ullman
<i>Boorara</i>	L. C. Farnsworth (3rd)	<i>Iron Monarch</i>	J. W. McKay
	G. T. Davies (3rd)	<i>Iron Prince</i>	J. M. Camps
<i>Bulla</i>	R. T. Stephen	<i>Junea</i>	J. R. Gilligan
<i>Bunninyong</i>	T. Bannister	<i>Kadina</i>	F. T. Neal
<i>Burwah</i>	W. R. Baird	<i>Kaipoti</i>	E. A. Miller
	H. H. Black	<i>Kaikorai</i>	E. T. Heather
<i>Calulu</i>	W. L. Andrews	<i>Kaimanawa</i>	—
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	E. W. Burrows (3rd)		—

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IMPORTANT

With the advent of direct wireless between Australia and England, together with the rapid expansion in wireless as applied to shipping, a great number of positions as Wireless Officers will be available for successful students of the Marconi Schools from time to time. In your own interests it is advisable that you enrol as early as possible, in order that you may be able to accept one of these positions as they occur.

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TOPICAL INTEREST

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