

QUESTIONS AND ANSWERS

Under this heading the Editor will be pleased to reply to any questions within the scope of the magazine, provided the following conditions are observed:—

1. Questions to be numbered and written on one side of paper only, and not to exceed four in number.
2. All questions must be accompanied by the full name and address of sender, which is for reference and not for publication. Answers will be published under any initials or nom-de-plume selected by the questioner.

G.R.R. (Melbourne).—Question (1): Is there a wireless training school in Melbourne?
 Answer (1): Yes. The Marconi School of Wireless situate at 422-24 Little Collins Street. Their advertisement appears on another page of this issue.

Question (2): Is there any fixed age to begin training? I will be 17 at the end of June.

Answer (2): There is no fixed age, although 17 is just about the right time to commence training as you cannot be issued with a Certificate of Proficiency until you are 18 years old. You should therefore commence immediately in order to be thoroughly conversant with the subject when you are eligible to receive your certificate.

J.S.W. (Armidale).—Question: Where can I obtain wood suitable for making model aeroplanes?

Answer: We suggest you write to the Australian Aircraft & Engineering Co., Ltd., "Union House," George Street, Sydney. They may be able to supply your requirements or advise you where obtainable.

No. 29 (Narrabri).—Question (1): What is the capacity of a four wire T aerial, 160 feet long,

leading in wires 56 feet long, spacing between wires approximately 3 feet, and height of 47 feet? Gauge of wire 18 hard drawn copper.

Answer (1): Probably between .0008 and .001 microfarad, but impossible to say accurately as so much depends on surroundings, trees, buildings, etc.

Question (2): What is the inductance of a coil of the following dimensions: Length 10 in., diameter 3 in., wound full with No. 22 D.C.C. wire to 16 turns to inch?

Answer (2): Approximately 500 microhenries. Note: 16 turns to 1 in. is very wide spacing.

Question (3): What is the capacity of a tubular condenser of the following dimensions: Diameter of sliding cylinder 1 1/8 in., diameter of fixed portion 1 1/8 in., length of overlap 2 1/2 in., dielectric waxed paper?

Answer (3): Approximately .00008 microfarad.

Question (4): What wave length will a set as per diagram supplied tune?

Answer (4): If used as plain aerial circuit maximum wave length about 1,100 metres. If used as coupled circuit (auto-transformer) maximum wave length of secondary 370 metres.

SOME THINGS NO MOTORIST CAN UNDERSTAND

Why one invariably biffs into a stone wall, or another car, just when one's insurance policy has lapsed? and

Why, having parted with guineas in exchange for a portentous-looking piece of parchment which indemnifies us from all liability, one consistently pursues the bumpy, but blameless, path whereon accidents are unknown?

Why one should sustain four punctures in rapid succession when the spare wheel has been left at the vulcaniser's?

Why someone doesn't devise a "Cape cart" hood beneath which it is possible to sit without being reminded of the pier-head during a gale from the sou'-west?

Why makers continue to bring out "new and improved" models when (on their own showing) last year's was "the acme of perfection," "the last word in automobile engineering," and so forth?

Why his car never emulates the miraculous hill-climbing feats (said to have been performed by the demonstrators)?—*Autocar.*

"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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TOPICS OF THE MONTH

EMPIRE WIRELESS

FEW questions are so vitally important to Australia, in fact the whole British Empire, as that of establishing a wireless chain which will bring the far-flung portions into more intimate touch with the mother country. It is a singular fact that many of the great aids to communication which the world has sighed for before they became a living reality, have afterwards been withheld from universal use by the short-sighted policy of individuals or Governments. This particularly applies to wireless and Australia has been the chief sufferer.

Some considerable time ago Amalgamated Wireless (Australasia) Ltd. offered to erect, free of cost to the Government, a high power wireless station in Australia, capable of communicating direct with England, America and Europe, and to make same available for the exchange of messages at a cost, at the outset, of two-thirds of that of cable messages. The Company was further prepared to undertake, in respect of the Commonwealth, a universal and exclusive scheme for the exchange of Press news by wireless, the cost of which would also be a third less, from the beginning, than the present cost of cabling such news to and from Australia.

A Commonwealth Government licence was, of course, necessary before the undertaking could be launched, but for some unexplainable reason the issue of this has been refused for at least eighteen months.

The gain to Australia from the establishment of an inter-Empire chain of wireless

stations is almost beyond vision. In matters of defence alone it would place this continent in a singularly advantageous position, making it possible, in case of invasion, to communicate direct with warships in the North Sea. It will be very many years before Australia has a population sufficiently large to resist an invading force for more than a limited period, but that would be sufficient to flash the call for assistance to where it could be effectively answered. The recent war showed that the first act of the enemy is to destroy the cables, but such a happening could not detrimentally affect us if the wireless service were available.

In matters of mutual interest the free exchange of information is bound to prove of the greatest possible benefit to all parts of the Empire. Where there is insufficient knowledge, there is bound to be misunderstanding, and we have reached a stage now in the development of our ideals where such a thing is disastrous—the more so because it is unnecessary. Public opinion is probably the most powerful factor in the world to-day and the intelligent formation of such, on matters of Empire importance, is only possible when there is free interchange of the news, activities and aspirations of the different countries. The present cost of cable services is the principal factor in curtailing the volume of news which passes between Australia and England, and this is particularly to the disadvantage of our country. There is scarcely a traveller from abroad who does not dis-

play, on arrival here, a total ignorance of our current affairs, and Australians who tour other countries continually complain of the vague and unimportant tidings which reach them, through the Press, of happenings in Australia. The latest to comment on this is the Premier of New South Wales, Mr. John Storey, who declares that he found a most deplorable lack of Australian news in the English papers.

In trade matters it is essential that the means of cheap and rapid communication should be readily available. Australia has to meet world competition in practically everything she sells, and it is to her advantage to be able to communicate as speedily and freely as possible with purchasing countries. In all these things, defence, publicity and trade, Australia has much to gain from the establishment of direct wireless communication with England and the outside world. There is no real reason why further delay should occur. Even the Prime Minister, Mr. Hughes, recognises the tremendous possibilities of the scheme, and in a speech in London recently indicated that his Government is prepared to adopt forthwith a forward policy in respect of the utilisation of wireless communication. General imperial ac-

tion is undoubtedly to be desired, but meanwhile each Empire factor can see to it that to the limit of its opportunities its participation in the benefits of wireless is not prevented by departmental shortsightedness and inaction. Either through over-caution in refusing to take risks, lack of funds, or failure to appreciate the great importance of the invention, the Commonwealth has lagged far behind in the matter of making use of the wireless principle. Private enterprise has shown its willingness to find the capital and undertake the task of establishing a wireless system of communication which will operate at reduced charges. Viewed in light of the fact that as far as Australia is concerned, the rights to use all the well recognised methods of applying the invention to long-distance work are possessed privately, and that when availed of by the Commonwealth they would be subject to royalty, it must be admitted that private enterprise is even better equipped than the Government to carry out its undertakings. The outstanding fact is that a definite, progressive line of action is long overdue and the question which Australia is asking at the present moment is will there be any further unnecessary delay?

CONQUEST OF THE AIR

IT is with feelings of reverent admiration that the world pays its tribute to the great and useful accomplishments of airmen like the late Harry Hawker, who have dared much that mankind might benefit from the result of their labours.

It is not many years since people scoffed at the idea that man could successfully undertake the conquest of the air, and when disaster overtook first one and then another of the pioneers, it was hailed by the pessimists as a token that mere human beings had aimed too high. Happily such dismal prophecies were soon proved to be wrong and to-day aviation has taken its place amongst the great accomplishments which man has brought to his aid in the conquest of civilisation.

It is an unfortunate, but perfectly natural circumstance, that the conduct of aviation is still attended with occasional disaster to those who pursue it—a fate,

which to an equal degree, overhangs all who seek to conquer the means of transport on land and sea as well. No intelligent person, no matter how much he may regret the happening, will argue that a fatal motor accident should bring about the abolition of motor cars, or a shipwreck the abandonment of shipping, but all right thinking people will recognise it as part of their duty to insist that whether the exploit be at sea, on land, or in the air, those undertaking it are at least as well equipped for the trial as it is possible to be.

It is both unnecessary and unjustified to take the risks which some of our daring but ill-advised airmen are still prepared to take in performing some new feat, the accomplishment of which will stir our admiration certainly, but otherwise leave us little better off than we are now. If there is a way of eliminating part, or all, of the risk of an undertaking it should be adopted,

even if it means the temporary abandonment of that on which an airman has set his heart. This much he owes to himself, and no less is it the duty of the community to see that that sacred obligation is fulfilled. Man's conquest of the air is almost complete, and although the victory has not been a bloodless one our sense of regret at the loss of the men who gave up their lives in the great adventure is buoyed up at the thought of what the world owes those who blazed the trail and made avia-

tion a living, useful reality. Having travelled so far in our conquest of the elements it is unnecessary that those who still respond to the magic call of the air should fly in the face of Fate by undertaking exploits ill-equipped to meet the difficulties and dangers to which their unpreparedness exposes them. Such a course will almost inevitably bring disaster to the airman himself and misfortune to the cause which he ardently, but mistakenly attempted to prosper.

LIMITATIONS OF ARMAMENTS

PRESIDENT HARDING'S invitation to the Allied and Associated Powers to send delegates to a Conference at Washington to consider the question of the limitation of armaments, directs attention to what is easily the most important element in the future peace of the world. The invitation has been extended to China also, and those in highest authority in the different countries have expressed their warmest approval of the plan. The Prime Minister of France, M. Briand, has announced his intention of attending the Conference in person, and it is highly probable that Mr. Lloyd George will do likewise. An indication of the outstanding importance which President Harding attaches to the Conference is indicated in the terms of the statement issued, in the course of which he says: "It is manifest that the question of the limitation of armaments has close relation to Pacific and Far Eastern problems, and the President suggested that the Powers specially interested should undertake in connection with this Conference the consideration of all matters bearing upon their solution, with the view of reaching a common understanding with respect to principles and policies in the Far East."

It is admitted by all who have a knowledge of international affairs that the greatest, in fact the only immediate, danger to the peace of the world lies in the problem of the East. If the Washington Conference can evolve a peaceful solution of that admittedly difficult situation it will have more than justified the hopes of its most ardent supporters.

America is perhaps the only nation that could call a disarmament conference at the present time with any hope of success, but to no country is the issue fraught with greater importance than to Australia. If the mad race for naval and military supremacy is to go on unchecked this country will ere long find itself shouldering a burden of debt, which coming on top of a huge war expenditure, will prove a millstone round our neck for countless years.

The expression is often heard that armaments are necessary to preserve peace, which, followed to its logical conclusion, means that if there were no arms what dreadful wars we would have. The absurdity of the former contention has been strikingly exposed by Norman Angell in his book "The Great Illusion." "If there were no armies and navies there could be no wars simply because there would be no means of waging them." If this obvious truth were to strike deep into the minds of those who will soon be engaged in shaping the future destiny of the world only the happiest results can accrue. Secret diplomacy, coupled with international jealousy and distrust, provides the excuse for the insane policy of universal arming which we have evidence of to-day. The Washington Conference will put the acid test upon the sincerity of the nations, all of whom profess a desire to call a halt in the vicious circle of expenditure now going on. The peoples of the world will sit in judgment upon the labours of the delegates to that momentous gathering.

THE NEW IMMIGRATION MOVEMENT

BY

H. S. GULLETT, Commonwealth Superintendent of Immigration

PROPERLY considered, this is a constructive year in the Australian immigration movement. The Commonwealth and States, acting in co-operation, are building up the machinery necessary for the recruiting and reception of a large inflow of people. Some thousands of new settlers will actually be introduced to the country during the year, but it will take some little time for the organisation to be perfected. Next year we should be in full swing and if the temporary industrial depression from which the Commonwealth is at present suffering is then lifted, we should in 1922 make a net gain by immigration of at least 50,000 souls.

Immigration must not be forced. The supply of people introduced must not exceed the industrial demand, and everybody knows that at the present time industrial Australia, in common with the rest of the world, is embarrassed by the aftermath of the war. Moreover, before we can introduce people up to the full capacity of the Commonwealth to absorb,

public interest in immigration has to be educated and stimulated. Happily, there are now many signs that a vigorous, well-informed public opinion on this most vital subject is in the making. Given the support of a sound majority of the Australian public and normal seasons, there is no reason to doubt that the Commonwealth will be gaining at least one hundred thousand immigrants a year within the next three or four years.

Before the War.

Between 1906 and 1914 big and successful work was done in introducing people to migrate from the United Kingdom to Australia. The movement is interesting as an instruction for the future. Between 1895 and 1905 the average gain made by Australia in excess of people arriving over those departing was only five hundred a year. About 1906 the New South Wales Government led the way in a big revival of the early colonial system of assisting a few selected classes of British workers to pay their passage to Australia, with the promise that on their arrival they would be found work by the State. Other States followed, and later the Federal authorities took an active hand in publicity in the United Kingdom, and helped substantially to swell the gathering stream. In 1906 Australia actually lost five thousand people by excess of departures over arrivals. Then the work in London began to bear fruit, and

the gains for the next seven years were:

1907	5,000
1908	5,500
1909	21,000
1910	30,000
1911	69,000
1912	84,000
1913	54,000

Total for seven years 268,500



Mr. H. S. Gullett,
Commonwealth Superintendent of Immigration.

A Good Rally.

It was a fine little rally as far as it went, and it was heartening because it established that British people of the best colonising kind would still come to Australia if proper inducement were offered—although on that point there was never any sound doubt. Australia had long before 1907 broken all records in the attraction of British emigrants. There are in the Commonwealth more people of British descent than in Canada or in any other British Dominion.

To have built up in a single century, at a distance of 12,000 miles from England, a population of five million strong, of which 97 per cent. are of British descent, is an achievement without parallel. It establishes to the world that Australia is a great homing land, rich in all the essentials for the service of man. It demonstrates that there is no question about Australia's capacity to attract and prosper British emigrants and emigrants of the right kind from the Continent of Europe. It is for us to say whether we desire them and whether we will do those things which will ensure to hard working men and women a sound, sure living immediately upon their arrival. We have plenty of remunerative work for them; we need them as a great young ambitious country never needed people before; they are anxious to come.

Finance.

If Australia is to have a big immigration movement, the public must be prepared to pay for it. Even third-class steamship passages secured by the Government at a contract price now cost £38 each. Before the war similar passages were obtainable at £14. The great majority of our immigrants will be British workers and their families, who are quite incapable of paying these big fares. At present the Commonwealth is contributing £12 towards each fare as a gift to selected and nominated immigrants and also in some cases gives further assistance by way of a loan. Even with this concession, however, it is not easy to secure great numbers of people. It is a fallacy to assume that because there are great numbers of unemployed in the United Kingdom at the present time it is easy to get good immigrants. Unemployed people are usually penniless and, moreover, it is an unfortunate fact that, in an industrial depression,

the best workers, which are those Australia requires, are the last to lose their jobs. British people of first-class physical and moral quality will only come to Australia if they are satisfied that they can substantially improve their material condition. They must be approached tactfully and handled efficiently by the Government organisation, and they must, upon their arrival in the Commonwealth, be warmly welcomed and as far as possible helped by the Australian public.

By help is not meant coddling and spoon feeding. All immigrants are plainly told by the Australian immigration authorities in England that Australia presents no opportunities to those who are not prepared to engage in sustained hard work. They, therefore, land here under no misapprehension, and all that is necessary for Australia to do is to find them employment at current wages. The present immigration policy will be no party to the displacement of Australian labour by immigrants. The scheme does not propose preference to immigrants, nor does it anticipate that immigrants should accept work at wages lower than those which are current in the Commonwealth.

The Best System.

The best system of immigration is that under which persons resident in Australia "nominate" their relatives and friends in the United Kingdom. The Australian nominators become responsible for the welfare of the nominees upon their arrival. The system therefore has the advantage that the obligation of the Government to care for the new settlers as they reach the Commonwealth is greatly reduced. Moreover, the nominated immigrants are spread over Australia as a whole. The nominator before he decides to bring out, say, his brother-in-law and family, usually satisfies himself that the new-comer is assured of a job soon after he steps ashore. The Commonwealth Government grants the financial assistance already mentioned in all these cases. But better still, if the person nominated is an ex-British soldier, then he and his wife and young children have their passage fully paid by the British Government. British women who were engaged in war work are also eligible for these free passages. The offer is only open until the end of 1921, although persons whose nomination is completed this year may be brought out at any time

during 1922. As the Commonwealth only brings immigrants to Australia at the specific request of the State Governments, those Australians who wish to nominate their relatives and friends should, in the first place, apply to the State Immigration officer. If the proposal is endorsed by the State, then the Commonwealth will see that the people are brought out.

New Settlers' League.

As already stated, the quick development of a big stream of immigrants means that the Government effort must be warmly backed up by the public. All Australians should take every opportunity that offers to show courtesy and extend help in the way of advice to the new-comers. The best agency in immigration is the happy letter written by the new settler to his friends in the United Kingdom. The writer frequently hears of a case of a successful immigrant who has, within a year or two of his arrival, nominated as many as a dozen of his friends and relatives and brought them to Australia. Under the nomination system, in short, immigration can easily be made into a great accumulating, ever-rolling snow-ball.

To ensure kindness and hospitality to immigrants and also to stimulate public opinion, there is now being established in Australia the New Settlers' League. Already divisions of this fine body have been formed in New South Wales, Victoria and Queensland, and it is expected that within a few weeks the organisation will be found in the remaining States. The aims and objects of the League as set out in the Constitution of the New South Wales Division, are:

- (a) To impress upon the people of Victoria the vital importance of immigration to the national safety of the Commonwealth; to the maintenance of a White Australia; to the effective occupation and use of the land; to the free development of industry, and to the per capita reduction of the national debt.
- (b) To co-operate vigorously with the Commonwealth and State Governments in the introduction to Australia of selected new settlers from approved countries, and particularly from the United Kingdom, so far as is consistent with the interests of returned members of the A.I.F. and the maintenance of sound labour conditions for all Australian workers.
- (c) To make known as widely as possible in Australia the terms of the free and reduced passages offered to British

nominated new settlers, and to encourage the nomination of these people by their relatives and friends in Australia.

- (d) To welcome all new settlers; to assist them in securing employment; to afford them courtesy and advice, and generally to promote their welfare and settlement.

The League is a national non-party movement of the best kind and deserves the support of every good Australian. The President of the New South Wales Division, Sir Arthur Rickard, was reported recently in the Press as having said: "The League knows neither politics nor sect, neither class nor party. It invites the co-operation of every one in the community since its objects are the concern of all alike."

What the League Will Do.

The League will, in short, act as an honorary auxiliary to the Government effort. It will take up the work where the Government leaves off, and after carefully selected people have been assisted to come to Australia, it will extend to them a cordial hand and make their way as easy as possible during their first few strange and difficult months. It is hoped that about 1,000 branches of the body will be established in the Commonwealth. The metropolitan branches will meet new settlers upon their arrival in the capital cities and will, by various little acts of kindness, make their first impression of Australia a pleasant one. But the main activities of the League will lie in the country districts. Country branches will be advised of the number and classes of immigrants who are expected in each State, and will set about ensuring employment for them before they reach Australia. They will meet the immigrants as they arrive at the country railway stations; extend to them perhaps a little hospitality and introduce them to their new employers. They will assist the stranger with sound advice, particularly in the direction of values of land and stock or anything else they may wish to purchase. Moreover, country branches will, it is hoped, engage actively in nomination. If the development of the League is marked by the same enthusiasm which has attended its initiation it should be possible to devise a scheme by which every branch undertakes each year to nominate a given number of people. This would mean an ideal form of activity.

(Continued on next page.)

LANDING GROUNDS FOR AIRSHIPS OF VITAL IMPORTANCE IN PREVENTING ACCIDENTS

CAN airplanes successfully weather atmospheric storms?

This important question has been brought forcibly to the attention of the country by the deplorable accident which occurred at Indian Head, Md., when the army *Eagle* flying ambulance crashed to earth while attempting to make a landing during a storm.

In answering this important question, Charles F. Redden, President of the Aeromarine Airways Inc., said:

"Sad as this accident was, it could have been avoided and probably would have been, had the passengers been flying in a Navy 'plane which would have insured them a safe landing place anywhere in the Potomac. In other words, flying boats always fly over the water, hence a safe landing place is always available, and the cause of this terrible accident was undoubtedly due to the fact that they had no safe place to land.

"It is a well known fact that the airway between Langley Field, Va., and Bolling Field, Washington, D.C., an air distance of 130 miles, is one of the most travelled aerial routes in the country and yet it is not organised for landing purposes. The ground on the Virginia side is marshy and unsuited for landing, and on the Maryland side of the Potomac River it is covered by trees and other obstructions.

"Therefore when Lieutenant Ames suddenly found himself in the midst of the storm and attempted to land, he was met with the worst possible conditions. Had he been flying a Navy flying boat he would have had a safe landing place below him on the Potomac River ready to be used at any moment of the flight.

THE NEW IMMIGRATION MOVEMENT

(Continued.)

Treading as it is closely upon the heels of repatriation in a year of some industrial depression, the opening of the new immigration campaign is being attended by considerable difficulties. But the future is full of promise. Australia needs more people; more people of the right kind are

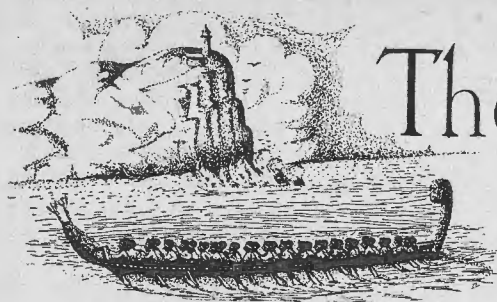
"Practically all airplanes, and particularly flying boats, are capable of weathering storms in the air. The only difficulty that arises is the question of landing, and until proper landing facilities are made throughout the country, the flying boat will be the premier form of flying craft.

"These two types of flying boats have made an enviable record under all conditions. There are more than a thousand pilots in the country at the present time who have flown them successfully through bad storms, but their success was in a great measure due to the comforting fact that always below them a landing place was available on the surface of the waters over which they were flying.

"These sturdy craft are staunch enough not only to weather storms in the air but also storms upon the water. This was evidenced during the operation of the Navy Flying Cruisers of the Aeromarine Airways during the winter mail and passenger carrying operations between Key West and Havana. Not a single accident occurred during the four months of operation, and the schedules each day were maintained with better regularity and punctuality than the railroads.

"Only a short time before the accident at Indian Head one of them, the famous *Santa Maria*, flew from New York City to Detroit by way of Montreal and Toronto, carrying a complement of fourteen passengers and crew. During this flight the huge flying boat struck a terrific storm along the Hudson River, which became extremely violent in the region of the Catskill Mountains. At times the *Santa Maria* was but three or four feet above the river, but it was never in danger, because at all times the river itself afforded an excellent landing place.

available, and the writer has no doubt that within a few years immigration will be recognised as a great national principle, and take rank in the public imagination with such non-party principles as a White Australia and National Defence.



The Headland where the sea dashes up.

By HENRY BATESON

RAE-AKIAKI, which means "The Headland Where the Sea Dashes Up," is the picturesque and peculiarly appropriate name which the Maori has given to Pencarrow Head, the bold, bluff headland which stands at the treacherous, rock-strewn entrance to Wellington Harbour, New Zealand. No harbour in the southern hemisphere and very few in the northern have such a treacherous and dangerous entrance as Wellington. Centuries ago, when the Maori first came to New Zealand, he regarded it askance. Splendid sailor and fearless voyager though he was, the narrow entrance and the wind-swept straits outside filled him with dread. To-day the master mariner prays fervently for fine weather in the straits and heaves a sigh of relief when he has successfully negotiated the entrance.

It is a wonderful sight to see the entrance in rough weather. The wind, a fierce, chilly blast coming from some quarter in the south, whistles and shrieks as it dashes through the entrance, whipping the sea into giant, foam-capped waves. As the seas from the strait strike the calmer water further up the channel they leap often ten feet high. And along the rocky shores on either hand they break in masses of white foam and flying spray. The wind playfully throws the roar of the breakers towards the high, barren-looking hills, as though in mournful challenge of battle. High above the sullen waves, on the highest point of Pencarrow Head, stands the lighthouse. At night its light flings out a message of warning, a penetrating beam of white light that can be seen for miles. It throws the peaks of the bare hills behind into queer, shadowy outlines, giving them an air of grimness

that is indescribable. It is as though they were grim Death's minions watching the fight for life that is going on in the pit below between the fierce elements and the handiwork of man. Perhaps, if the light is good, the sea may be seen as it rushes across Barrett's Reef, whipped to foam as it strikes the jagged points of rocks.

To enter Wellington Harbour on a clear evening, when the elements are hushed, is a sight not easily forgotten. The bold Pencarrow light, the flashing guide light and the fixed light on Soames Island safely guide the ship through the narrow entrance. A few flickering lights on the hills on the left side mark Seatoun, and later, but on the opposite side of the channel, Day's Bay, Rona Bay and Muritai. Ahead, save for a few penetrating lights, all is darkness. And then you swing round a point and head towards the wharves! What a sight it is! High up on the hills, to the front, to the left and behind, and nestling at their feet are thousands of gleaming, encircling lights, rising in tiers and chains, with here and there a black void illuminated by only a few scattered pin-pricks of light. At the wharves the twinkling lights of the ships glitter and gleam, their white beams contrasted here and there with the coloured lamps which mark the various berths. To the left, where Oriental Bay lies, the lights are reflected in the smooth water, the dark bodies of quietly-moving people may be seen, and the faint strains of a band come drifting over the water.

The long list of disasters which give the entrance such a dreaded name extend over centuries. At first Maori canoes were the only victims, but since the Pakeha took up his residence in New Zealand, fine sailing craft and splendid steamers have been lost

here. How many war-canoes and fishing-canoes have been broken to matchwood in the southerly "busters" and how many natives have been drowned here it is impossible to say. Maori legend and superstition, however, point to the number being large.

It must have been a splendid sight to see a loaded canoe, which perhaps had been on a visit to Wairau or Tory Channel or maybe fishing in the rolling blue *Sea of Raukawa*, which is the Maori name for Cook Straits, entering the harbour in rough weather. The critical moment came as they ran in past *Rae-akiaki*. The channel begins to narrow; on one side the dreaded jagged rocks of the *Tangihanga-a-Kupe*, called Barrett's Reef by the white man, show dimly through the mass of sea spray, or perhaps are hidden from view as seas following one on top of the other in bewildering fashion surge in before the fierce gale; on the right-hand side the furious waves climb high up *Rae-akiaki's* stony side in masses of white foam.

It is now that a strong pair of arms and a quick brain are required at the long steering paddle. One moment of hesitation, one error of judgment, will be fatal. The narrow canoe broaches to, and on the morrow many doleful tangis will be held on the Poneke shore. As the canoe comes up the channel the choicest of the fish or a greenstone ear-pendant or some other appropriate article is cast overboard as an offering to the gods, a short appropriate incantation being addressed to the deities of wind and sea the while. It depended on their wishes and the strength and skill of the man at the long steering paddle whether the canoe would successfully negotiate the entrance.

Then came the day of the sailer, and the day of terrible disasters. Many a fine full-rigged ship or fast barque has arrived off *Rae-akiaki* when a fresh southerly, with a slight westing in it was blowing. It looks as though the run up the channel will be easily accomplished, but the wind laughs at man's false hopes and swiftly and playfully chops round to the north. It does so without warning and with disconcerting quickness. The captain can either stand out to sea or beat in in the teeth of a "muzzer." In the latter case he has a ticklish job on hand. Only good seamanship and unfaltering judgment will bring success. If the master does not know his job or is somewhat inexperienced,

the 1,200-ton ship will end on the jagged rocks that form Barrett's Reef or be pounded to pieces on the rock-strewn shore beneath Pencarrow's frowning walls. But the old sea captains who commanded the wool clippers of the early days knew their jobs as few sailing masters know them to-day. The majority of them had served in the China tea clippers and had worked their way up from before the mast. They tacked their ships from one side of the entrance to the other, never faltering or making a single mistake. To the landsman who happened to be a spectator of the scene, it looked as though the ship was bound to crash on to Barrett's Reef or run aground on the sharp rocks on *Rae-akiaki's* side. But, always at the right moment the vessel swung round on a new tack.

The sailer *Sabraon*, bound from Wellington to Sydney, was the first disaster to occur in the vicinity of *Rae-akiaki*, but as early as 1845 the barque *Tyne* was lost on the Black Rock, close to Island Bay. The *Sabraon* went ashore on Barrett's Reef in 1848 and became a total wreck. She had a large number of passengers aboard, many of whom had been scared into leaving Wellington on account of the great earthquake. Since then something like twenty-five sailers, averaging from 20 tons to 800 tons burden, have been lost in the shadow of *Rae-akiaki*, and many others, including the 2,800-ton barque *John Ena*, have gone aground around the shores of Pencarrow, but have been successfully refloated. One or two steamers have also been lost in the narrow entrance, the largest being the fine cargo steamer *Devon*, which, in 1913, ran ashore on the rocks directly beneath the Pencarrow light and was never refloated. A twisted mass of rusted iron to-day marks the spot where the vessel was lost. Barrett's Reef lays claim to the most victims. Nine vessels, sailers and steamers, have come to grief on her jagged ripping teeth, but *Rae-akiaki*, the Pinnacle Rock and Steeple Rock can boast almost as many victims.

Already three sailers have come to grief this year. On January 31 the small auxiliary schooner *Omaka*, after making a splendid passage from Blenheim before the southerly, was broken to matchwood by the fierce waves and her crew of six drowned within hail of land. Later the auxiliary schooner *Magic* miss-stayed and ran ashore just inside Pencarrow. Luckily

her crew escaped, but the vessel is still being pounded to pieces on the rocks. The last victim of *Rae-akiaki* was the well-known barque *Rona*, belonging to the Scales fleet of sailers, which includes the *Alice A. Leigh*, now *Rewa*, the largest British sailing vessel, the *Raupo* and the *Ysabel*. The *Rona* was successfully re-floated, and by a stroke of wonderful luck was barely damaged.

The *Rona* went ashore on a Sunday during a howling southerly gale. Her bow rested on the Steeple Rock, on the opposite side of the entrance from *Rae-akiaki*, and under Fort Dorset. During that night and the following nights the searchlights from the fort played on her, making a strange sight in the powerful glare of the lights. Her white and black sides, her tall masts, with portion of her canvas torn to ribbons, and shadowy forms hurrying about the deck all stood out as clear as though it were day.

The southerly winds and the quick changes in strength and direction are responsible for the dreaded name which *Rae-akiaki* now bears. People who do not know *Rae-akiaki* are often sceptical about the

reports of sudden changes in winds, but those who have fought *Rae-akiaki* for years are not amazed at anything she or the elements may do. It not infrequently happens that a gentle breeze blowing from the north will suddenly chop round to the south-east or south-west and in an hour become a howling gale. Perhaps it will rage for hours or days, and then die away as suddenly as it has arisen. And a fresh southerly, blowing strongly, will in ten minutes become a mere zephyr. No wonder seamen dread *Rae-akiaki*!

Although *Rae-akiaki* has taken a fearful toll of ships and men, no lifeboat or life-saving facilities are to be found in its neighbourhood. There are many—not landsmen—who assert that a lifeboat would not live ten seconds in some of the seas which rage at the entrance during the fierce southerly gales. But other competent authorities think otherwise, and a proposal to establish a lifeboat and rocket station close to *Rae-akiaki* is well under way.

But *Rae-akiaki*, sitting in all her majesty, only laughs and the foam-capped waters below surge and thunder the fiercer!

WIRELESS FOR PHYSICIANS



EVERY physician can now equip his motor car with a wireless telephone set, the same as the American doctor in the above photograph has done. The instruments in this car will successfully work up to a distance of five miles and uses only a very small part of the battery current.

It is found that the wires for the aerial stretched round the top of the car are successful in picking up sound waves; and

the set is earthed to the engine as is done in aeroplanes.

By equipping cars with a wireless telephone set similar to that illustrated above physicians can maintain communication with various points while visiting patients in their district and can be advised of any urgent case that may require their immediate attention.

THE AUSTRALIAN ABORIGINE

A CHILD OF NATURE

BY

KAE MacDOWELL

THE Australian black, in spite of various characteristics, which scientists attribute to his primitive position in the scale of human evolution, has many tribal and domestic customs and traditions which are not only particularly interesting, but are fraught with sound common sense and considerable agility of mind and imagination.

Like his savage brethren in every part of the world, "bingi" is a hunter by instinct, and of no mean order. His guilefulness in snaring game, his tracking abilities and keen sense of smell are remarkable.

Cunningham, an early writer, comments at length on the tracking powers of the blacks, and states that they can tell exactly what time has passed since a track was made, and can recognise the footprint of one they know as easily as we can recognise the handwriting of a friend. On one occasion, when a white man had been murdered, and it was suspected that his body had been thrown into a water-hole, the services of a native were enlisted before dragging was commenced. He quickly pronounced on the case—declaring that he could see and smell traces of the "white man's fat" on the water!

The habits of the aborigines, though they differ considerably according to locality and environment, are, in many respects very similar in the north and south. It has often been stated that an aborigine has no faculty for agriculture or food conservation. This is largely true, and because of it his habitations are constructed with little idea of permanency—the scarcity of food alone making constant moving imperative.

In some localities—such as the Alligator River, there are, however, several favourite and fairly permanent camps close to the great Billabongs, where lily seeds and roots are to be found in great abundance. They remain here, fishing and hunting, as long as the food lasts, each family having its own *mia mia* (ancestral hall), which during the dry season is very often nothing more than "a bough or two" slanted

against a tree or shrub, to obtain a little shelter from the sun.

While the women and children wade up to their necks in the water collecting lily "tuckout," the men snare wild fowl and flying foxes, catch fish and hunt for wild honey. Then when food gets scarce they move on to another district—and so on year in and year out.

Many white men and women, bound to the tireless wheel of city industry, will doubtless sigh with envy while contemplating an existence of such untroubled quietude. A closer examination of the blackfellow's mode of life will show, however, that while it has its fascinations, it is not without drawbacks. A rat, a lizard, or a flying fox cooked without either skinning or cleaning does not appeal to the fastidious, neither does the fact that during the process of cooking, the food is often pulled out of the fire and torn to pieces by the teeth of the cook to test if it is ready for consumption.

The Australian black eats anything that is edible, and in the Northern Territory, it may be stated, he does very well, for there is abundance of fish and game—kangaroos, native companions, lizards, snakes—and on the coast, dugong, turtle and turtle eggs.

Spencer cites the Kakadu blacks' very interesting method of killing a snake—a dainty he is particularly partial to. There are in that district two or three non-venomous species, about four feet in length, that exist in large numbers. The blacks collect them in bags, often bringing them alive into camp. When it is desired to kill one, he catches hold of it just behind the head, which he places in his mouth up-side-down. Holding the neck immediately behind the head-tightly in his teeth, he gives the body a sudden, strong jerk, dislocating the vertebrae column.

Some of the natives' fishing methods are also curious. *Bobling* for eels is perhaps the best known, as many Australian white boys also practice it. N. M. Thomas describes the aboriginal method thus: Big round worms are transfixed with finely

split lawyer cane, a dozen or so at a time, at the end of a short stick. As soon as the sportsman feels a bite, with a quick jerk of his shoulder, he lands his wriggling victim on the bank.

A really remarkable way of catching small fish is resorted to in the districts round the Tully River. It entails the use of a web of a large spider which the natives kill, preserving the abdomen. Next they wind the web on to a stick, dipping the free end into the glutinous silk bag of the dead insect before trailing it on the surface of the water. The small fish bite at this readily, getting their tiny jaws hopelessly stuck together, and are pulled out at a great pace by children as well as adults.

There is a quaint method used in dugong and turtle fishing. For this, the sucker fish is greatly prized. This fish is often found on the bottom of canoes and can be kept in the water for several days. When *Bingi* desires to go deep sea fishing, he ties a string to the tail of the sucker fish and as soon as a dugong is sighted lets his captive go over the side of the boat. The sucker makes straight for its prey, affixing itself upon it and proving a most accurate guide for the native when to use the harpoon. The harpoon is really a spear with a detachable head. At the mouth of the Tully River sharks are harpooned in the same way on moonlight nights.

Some of the blacks' methods of snaring birds are almost incredible in their simplicity. In New South Wales, one writer tells us how the native was wont to stretch himself quietly on a rock in the sun, with an enticing piece of fish in his hand. This fish would naturally attract the attention of some bird of prey, which would be adroitly seized by the leg as soon as it attempted to get away with the bait. In the same way, water fowl were taken by swimming out under water, and pulling them beneath the surface, or with a little more circumstance by noosing them with a slender rod, the head of the fowler being covered with weeds as he swam out to his prey, which he dragged beneath the water. As soon as he had the bird in his hand he broke its neck, thrust it into his girdle and was ready for the next victim.

A very bold and intriguing method of catching turkey bustards in Queensland, is to hang a grasshopper, moth, or a small

bird, to the end of a noozed rod. Thus armed and disguised with a bush, the hunter approaches his prey, which is fascinated by the movements of the living victim on the rod. Then suddenly the native slips the noose over the head of the game and draws it tight.

While on the subject of animal food of the Australian aborigine, the question of cannibalism must at least be referred to. Thomas states that nowhere on this continent is human flesh a regular article of diet. Some of the blacks have undoubtedly killed to eat, but others only eat those who have been slain in warfare or have died of disease—a superstition being that human flesh or fat, particularly kidney fat, which has been cut out before death—gives to the latter the courage of the victim. On the Gascoyne River in Western Australia quite a ritual was connected with the eating of human flesh; in southern Queensland it was at one time the recognised method for the honourable burial of friends. In this district there is also a statement which, however, lacks substantiation, that a girl was once sacrificed to some evil spirit.

Great dainties with the blacks all over Australia are grubs and several other insects. In New South Wales a large species of moth is highly thought of, and fires are lighted beneath the rocks on which they swarm causing them to fall to the ground, where they are swept into heaps. Then, when the earth is hot enough, the ashes are cleared away and the moths cooked upon the heated ground until the wings and down fall off. After this they are eaten or pounded to paste in wooden bowls. The blacks and their dogs get very fat on this diet, which, when smoked, will sometimes keep for a week. The strangest food of all is probably clay, which is eaten without preparation, both in times of scarcity and as dessert after ordinary meals.

As a water finder our blacks have probably no equal in the world, and in many instances where a white man would perish miserably, *Bingi* thrives with abundance to drink. When the native wells—really deep and narrow holes—fail, their ingenuity commences. In the mallee scrub, for instance, they used to dig until they found a certain root about a foot and a half long. This root contains quite a large quantity of water which can be drained

into a vessel. Then again, moisture may be sought wherever the pandanus tree grows. Usually a spear is pushed three or four feet into the ground and if, on withdrawing it, the point is damp, a wad of grass to act as a strainer, is rammed down. The water may then be sucked up through the hollow reed.

In the more permanent camps in the far back areas, when the natives are not occupied with religious ceremonies, they spend their evenings in a congenial kind of corroboree, which may be witnessed by men, women and children. These entertainments take the form of set dances, each with its own figures, which may occupy either an evening or several weeks.

For a more elaborate performance the performers bow to their audience to the accompaniment of what is called "boomerang music." Then they stamp about on the ground, half squatting and advancing, vibrating curiously from thigh to knee. The orchestra is usually contributed by the audience, which keeps a kind of measure to the figures as they are performed. Sometimes the singing is kept up all night, and every evening there is a change of costume. At the end of the dance all the properties are faithfully destroyed.

In preparing for this class of ceremony much etiquette is observed, and important messengers are sent out provided with badges of office in the form of a sacred stick or a bull roarer. These messengers are as official as the bearers of His Majesty's Royal Mail, and may proceed anywhere with perfect safety. The aboriginal has a very curious regard for the sacredness of messengers, which extends to blacks who are carrying communications for white people.

A letter is spoken of as a "paper yabber" and is carried in a cleft stick so that it may be more easily seen. This "paper yabber" is a mysterious missive in the eyes of the aborigine. Once a black abstracted a stick of tobacco from a parcel he was carrying, and was highly indignant with

the "paper yabber" for telling the white man what he had done, because he had hidden it in a hollow log before committing the theft, so that it should not be able to see what he was doing.

A word in regard to the aboriginal type of humour which, though elementary, is not widely dissimilar to many a white man's. Nothing "tickles" him more than the sight of an accident which places a companion in a humiliating or uncomfortable position. Should a man tumble over a log and hurt himself the whole camp will roar with mirth, and if someone else arrives who did not witness the accident, the victim is required to give a replica of it for his benefit. Spencer tells that years after the event happened, the recital of how two old men of the Kakadu tribe had to run for their lives to keep ahead of two charging buffaloes, together with an imitation of how they ran and what they said, were greeted with roars of laughter and kept a camp cheerful for an hour at a time.

It may readily be understood that the science of the Australian black is almost an unknown quality and what there is, is considerably imbued with superstition. Comets are fearsome objects indeed—some tribes explaining them as enemies having long spears, while shooting stars are either the spirits of the dead or wicked wizards dropping firesticks to kill unwary mortals.

Some of their star lore is also queer—take for instance, the legend that the Maelanic clouds are the teeth of a serpent. So long as they are visible silence must be maintained in the camp for fear of attracting his attention. The Pleades, says Thomas, are supposed to be a group of young women providing corroboree music for the young men who form Orion's Belt. The Milky Way is a river of fish—Thunder, the voice of a god.

It seems a pity that more of these curious ideas, which are fast dying out, have not been chronicled.



KEEP THE OLD FLAG FLYING

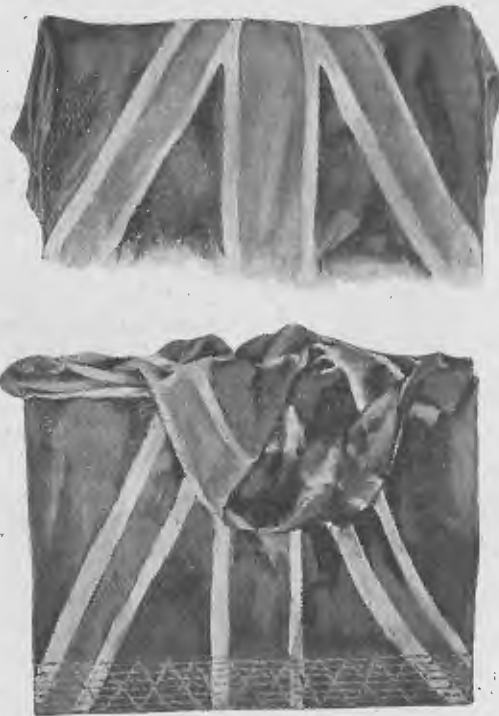
THE average life of a flag has been calculated at thirty days of constant use. Flags generally show signs of wear first along the fly.

The following method of reinforcing them has been tried and tested and will increase their life ten to twelve times.

Run six or more rows of stitching across the end to a depth of several inches. Two

its appearance and it is therefore desirable to match the colours as far as practicable to the portions of the flag being stitched.

Flown for over four months on a flag pole one hundred and twenty-five feet high during the stormy spring months, a flag treated in the manner described was found to have broken down only to the



Method of reinforcing a flag to lengthen its life. (In this illustration the stitching is slightly exaggerated.)

lines of criss-cross stitching are then sewn as shown in the illustration. This strengthens the straight stitches and prevents the outer line of stitching being blown out by the strong winds and also supports the corners which are liable to give more rapidly than the centre.

Lines of stitching in one colour across the flag are inclined to slightly alter

extent of two rows of stitching at the corners and one in the middle.

Of course, a wind-proof flag will not last for ever, but this slight trouble taken when the flag is new, or before it has worn too far, is well worth while, and is commended to sailors, yachtsmen, radio enthusiasts and all who care for the flags they fly from yardarm and masthead.

MOTOR TRUCKS IN TRANSPORTATION

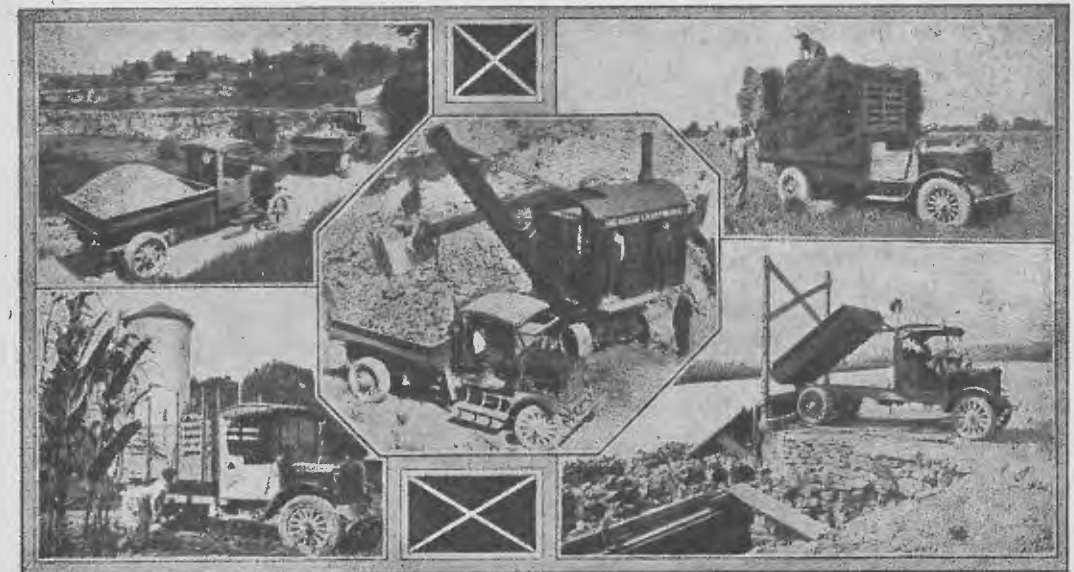
What the automotive vehicle can accomplish with an adequate system of highways is being demonstrated convincingly in the United States—Efficiency of transportation depends upon proper co-ordination and correlation of different mediums, each with the other.

BY
ROLFE C. SPINNING

THE transportation system of a nation is a complex thing. As civilisation advances there develops an interdependency of communities as well as individuals. The family of a hundred years ago for instance, could care for itself by itself. It spun its own yarn; made its own clothes; raised its own food. It was a self-sustaining unit.

delivered to the furnaces at Pittsburgh, and cotton from the south to the mills of New England.

The transportation system of the United States must move heavy, bulky freight, long distances at low cost, handle short-haul freight quickly and promptly, deliver mail from New York to San Francisco within a reasonable time, as well as deliver



In the United States the motor truck is found engaged in almost every form of transportation, and its value as a carrier over old methods of transport has long since been demonstrated beyond question. The above pictures show a few of the many services in which motor trucks are engaged in America.

But to-day we are dependent upon the outside world for everything we wear and use, and in direct proportion to the development of the tendency is the need for transportation.

A nation's transportation system must accomplish certain definite results. It must deliver to the crowded cities food raised on the farm, and to the farmers must be delivered manufactured products from the cities. In the United States ore from the head of Lake Superior must be

groceries promptly at the back door of the homes.

If the United States were obliged to-day, in the light of present knowledge, to develop a transportation system for the nation, many changes would be made over existing methods.

But the problems of to-day do not consist so much in devising new means of transportation as in properly using the means already at the country's command.

Four Transportation Mediums.

There are four principal transportation mediums—railways, waterways, highways, and air—and each has a particular field in which it can operate the most efficiently.

The railways can best handle long hauls of heavy, bulky materials, and, since the beginning of transportation on a big scale, they have been and will continue to be, the great carriers, notwithstanding the tremendous progress made by the motor truck.

The waterways can, of course, serve only certain localities for different classes of slow-moving freight.

The developments of the aeroplane is rapidly bringing into prominence a new form of transportation, which covers exactly the opposite field from those previously mentioned, being highly efficient where light weight freight, express or mail is to be moved, either for long or short distances at maximum speed.

The company with whom the writer, in Pacific ports, has the honour to be associated, for instance, at this time operates a fleet of eleven airplanes, which are used in emergency cases to deliver truck repair parts to their dealers and the users of their trucks, as well as to take officials on business trips where speed is important.

The highways through the use of the motor truck, are assuming an increasingly important place in the country's transportation system, and it is with a few of the many phases of motor truck operation that we are now interested.

But first it must be said that the efficiency of the transportation system as a whole is not so much dependent upon any one, or any two of our principal forms of transportation, as upon the proper co-ordination and correlation of each with the others.

It is of the utmost importance that each handle only that kind of transportation which it is best able to handle. With each carrier operating in its own sphere, and each working with the others, the national bills for transportation will be kept at the minimum, and transportation is one of the greatest considerations in the cost of everything we eat and use.

The Motor Truck on the Farm.

The United States Department of Agriculture recently made a survey of truck operations in the rural districts, and found that the length of hauls by motor truck

averaged 11.3 miles as against nine miles by horse and waggon; that 3.4 round trips were made a day with the truck as against 1.5 with team; that with the truck, wheat and corn have been transported to market at fifteen cents a ton-mile as against thirty cents for wheat by horse and thirty-three cents for corn by horse; that the average waggon load of wheat was fifty-five bushels as against eighty-four on trucks. Cotton has been transported to market by truck at eighteen cents a ton-mile, as against forty-eight cents by horse.

These facts, discovered by the department of agriculture, prove in point of time and miles covered that the motor truck is practically four times more efficient than the horse and waggon, and the farm that once sold for a reduced figure because it was twelve miles from market has, by the introduction of the motor truck, been brought to within three miles of market.

Progressive farmers are realising that the truck is capable of doing in a third of the time what the horse and waggon once did, and this saving of time enables them to do a more perfect job of preparation, planting, cultivating and harvesting, which in consequence gives a lower cost of production.

Conditions under which farm trucks must operate are particularly trying. A truck suitable for farm operation, is frequently called upon to go right out into the fields to get its load. It must be able to negotiate lanes and frequently poor roads leading to the main highways.

It is particularly essential, therefore, that trucks for this purpose be so constructed that they are cushioned against the weaving and twisting strains caused by road inequalities if they are to function efficiently, and operate over a long period of years.

A more extended use of motor trucks on the farm means lower prices for food for the consumer, and on the other hand, greater profit for the farmer, who is better able to pick his market and ship at the most opportune time.

More and more attention is being given to good roads and highway transportation, and at every stage of this work we find the motor truck ably taking care of a large and important part of the work.

In the preparation of roads, one of the most important considerations is the foundation in which crushed rock plays a lead-

ing part. Motor trucks have time and time again proven their efficiency in quarrying operations. One example of this is shown in extensive quarries at Fremont in the State of Ohio. Stone is blasted out and loaded into the trucks by steam shovels, and hauled by truck to the crushers. There it is crushed and divided into several sizes used for different kinds of work, and the different sizes are put into separate bins. From the bins it is hauled to the scene of operations by trucks. The trucks run under the bins and the stone in question is lowered into the dump bodies, which are finally automatically dumped by means of hydraulic hoists operating from the engines.

From the bottom of these quarries to the point at which the trucks emerge at the top is a distance of two hundred feet, in which distance there is a rise of thirty-five feet—the equivalent of a sixteen or seventeen per cent. grade. Each truck, with its load of over five tons of rock, negotiates this steep grade from fifteen to twenty times a day, in addition, each truck has been averaging, for the last two years, between eighty-five and one hundred miles a day.

Careful cost records prove conclusively that trucks are handling the work much cheaper than when horses were used.

In hauling from the quarry to the crusher, for instance, a short haul of only about two hundred yards, six horses and eighteen men previously hauled only from fifteen to eighteen tons an hour. Now six men and one truck are delivering forty tons an hour.

As an example of the sturdiness of construction of the modern motor truck, these people tell a story of their oldest truck, now over four years old which, a short time ago, heavily loaded with stone, went over a 30-foot embankment. At that time it was working in three shifts, twenty-four hours a day, and the accident occurred shortly after midnight. It turned over twice in rolling down the embankment, but in three hours was righted and driven away under its own power, with not a broken bolt nor any damage whatsoever except a cracked running board.

These trucks are seeing most severe service, and the entire expense during the first four years of the life of this truck was less than seven hundred dollars, which included two repaintings and a general

overhaul each winter. During the four years a mileage of over 54,000 miles has been run, as indicated by hubodometer.

In addition to this kind of work, motor trucks are proving their value in many other phases of road building and construction operations.

When truck manufacturers urge the adoption of motor trucks for hauls more efficiently handled by railroads, they are urging something economically unsound.

On the other hand, when railroads attempt to handle short hauls upon which they lost money and which can be handled more cheaply and quickly by the motor truck, they, too, are furthering a thing economically unsound.

Many computations as to the relative costs of railroad and truck shipments have been made, the one shown in this connection having been prepared by W. J. L. Banham, traffic manager of the Otis Elevator Company.

He rightfully assumes that transportation costs should cover all the expense involved in making a shipment, starting with boxing and packing and including all expenses incurred until delivery is made in good order.

He includes, therefore, in railroad freight costs the first-class rate plus 15 cents a hundred, teaming charges from shipper's warehouse to freight house; plus 15 cents a hundred, teaming charges from freight warehouse to receiver's warehouse; plus 24 cents a hundred, increased cost of boxing to cover shipments made by rail; plus 17 cents a hundred, on account of increased weight on which freight must be paid, caused by heavier packing.

And it should be borne in mind that these figures were made before the increase in freight rates, recently granted the railroads.

Comparisons of costs between less-than-carload freight movement and motor truck transportation per hundred pounds is given in the following table:

	Via Freight.	Via Truck.
From Yonkers to Newark ..	\$1.04	\$0.20
From New York to—		
Newark	0.91	0.15
Passaic	0.91	0.18
Paterson	0.91	0.20
Elizabeth	0.91	0.20
New Brunswick	0.91	0.40
Trenton	0.98	0.60
Philadelphia	1.02	0.80
Chester, Pa.	1.05	1.00

From New York to—	Freight Truck.	
	Via	Via
Coatesville, Pa. . . .	1.15	1.05
Port Chester, N.Y. . . .	1.02	0.63
Greenwich, Conn. . . .	1.02	0.63
Stamford, Conn. . . .	1.03	0.65
Norwalk, Conn. . . .	1.06	0.68
Bridgeport, Conn. . . .	1.10	0.70
New Haven, Conn. . . .	1.13	0.73
Derby, Conn. . . .	1.13	0.73
Ansonia, Conn. . . .	1.13	0.73
Shelton, Conn. . . .	1.13	0.73
Naugatuck, Conn. . . .	1.15	0.74
Waterbury, Conn. . . .	1.16	0.75
Meriden, Conn. . . .	1.16	0.75
Hartford, Conn. . . .	1.21	0.90
Springfield, Conn. . . .	1.25	1.00
Holyoke, Mass. . . .	1.25	1.00
Worcester, Mass. . . .	1.31	1.50
Boston, Mass. . . .	1.36	1.50
Providence, R.I. . . .	1.32	1.10

These figures show that, while the motor truck makes a large saving for short hauls, the saving diminishes as the length of the haul increases, emphasising again the necessity for using each form of transportation in its proper sphere.

The Motor Truck in Delivery Work.

Although there are places where the horse is more efficient than the truck, as in certain kinds of terminal work where congestion necessitates a great deal of waiting, it really seems that when traffic managers begin to figure accurately the cost of their deliveries, the motor truck is able to prove that it can do the work better and more cheaply.

An example of this can be cited in the Hydrox Company, distributors of ice cream in the Chicago territory, who, until only three years ago, were making all their deliveries by horses. It seemed to them that, on account of short hauls and many stops, it would not be practical to use trucks.

A comparative test, however, was made. A single truck was purchased and accurate cost records were kept on it as they had been kept on the horses, and as a result they are now operating a fleet of twenty-four trucks.

But not alone is the cost of delivery decreased; that was only the first advantage. The next advantage was that by means of these trucks the business has been materially increased, because they have been able to extend their delivery to the suburbs, the trucks sometimes making seventy-five miles a day, which was impossible with horses.

Ice cream must be handled rapidly, and the Hydrox Company feel that their business would not have been thus extended were it not for trucks. The biggest thing trucks have done for them has been to enable them to do a much greater business, and increase their opportunities for the profits that this business brought.

And here let me insert a word concerning the keeping of accurate cost records. They are valuable not alone because they show how much your delivery is costing you, but because an analysis of your costs will enable you to find methods of doing your work more economically. They show you lost time; lost efficiency; and will aid you materially in decreasing subsequent costs.

The costs kept by the Hydrox Company show that the trucks saved them over \$20,000 last year. With horses the cost of delivery was \$0.0506 per gallon, while with trucks the cost has been reduced to \$0.0322. In other words there was a saving of almost two cents a gallon, and they deliver over a million gallons a year.

The Motor Truck as a Machine.

Just as the transportation system of the country can be divided into different parts, each functioning more efficiently than others for certain kinds of work, so in the field of motor truck operation is the work so divided that different kinds and sizes of trucks are more efficient than others for certain work.

No two sets of operating conditions are the same, but vary with the nature of the load, the kind and condition of the road and the grades which must be negotiated.

It is a very important and oftentimes difficult task to see that the proper analysis of hauling conditions are made and the right truck selected for the job in hand. For this reason the leading truck manufacturers in the country have developed extensive transportation engineering departments, which specialise on work of this kind and see that the right sized trucks are used, equipped with the proper gear ratios, wheel-bases, etc.

Certain it is that no truck ever operates under absolutely favourable conditions. They must travel over the highways and roads as they find them, and they are all subject to the five following fundamental strains and shocks:

(1) Load Stresses—stresses imposed by

carrying the load. The load the truck carries, especially an unevenly distributed one, tends to distort the carrying members and force them from their natural positions. These stresses are not particularly destructive to the chassis when it is standing, but an unevenly balanced load inflicts very severe punishment upon a truck in motion over a bad road.

(2) Road Strains—the strains imposed on the truck in motion; the twisting, weaving and bending strains caused by the twisting of the chassis in conformity to road inequalities.

(3) Road Shocks—these depend a great deal upon the speed at which the truck travels, inasmuch as the force of the shocks increases in proportion to the speed, and may be said to be four times greater at twenty miles an hour than at ten. These are occasioned by bumps in the road, crossing railroad tracks, cobblestone pavements, etc.

(4) Driving Strains—these are strains occasioned by transmitting the power from the engine through the clutch, propeller shafts, transmission, universal joints, rear

axle and wheels to the ground, where the pushing force is exerted.

(5) Braking Strains—when the brakes are suddenly applied the load must be brought to a stop in a short space, and the shocks and strains thus imposed upon the axle housing and the parts holding it in position are the same as if the truck had been caught by an obstacle of sufficient size to stop the truck in the same space of time.

Trucks should be cushioned against these fundamental shocks and strains, in order that they can be absorbed or cushioned without ruining the working parts or works of the truck. And the possible life and dependability of the truck may be safely estimated by the degree of protection it has against these five fundamental causes of most motor truck troubles, for no truck is more dependable than its shock insulation.

Modern truck engineers and designers have made great progress in shock insulation, which is one of the reasons for the dependability and long life of the trucks manufactured by the leading American motor truck concerns.

WIRELESS TELEPHONY

Signor Marconi, in speaking of the future of wireless telephony, says: "I think we shall be able to telephone to America in the near future. Our only hope at present is by wireless telephone, not by ordinary telephone. If you have got something with which you can speak all day to New York there will certainly be many people who will want to use it. I do not think it will be in every home, but I think that for long distance work it can be connected to an ordinary telephone exchange, and so enable the subscribers to speak to distant countries from their own homes. Supposing we have a station in London and a station in New York, I think it will be unnecessary to go to the wireless station in order to speak to New York—the connection being made direct on to the private telephone. It is needless to enlarge on the importance of the development for connecting up the various parts of the Empire—it is self-evident."

AMATEUR WIRELESS

The Postmaster-General has issued a regulation prohibiting the granting of

licenses to amateurs unless an undertaking is given that they will not divulge any message intercepted, except to an official of the Department, or to a legal tribunal. It is explained that the number of wireless amateurs now operating throughout Australia has made such a regulation necessary in order to insure the secrecy of intercepted messages from Government plants.

THE PESCARA HELICOPTER

From Barcelona it is reported that the Pescara helicopter has been tested in the garden of its inventor. Although weighing a matter of 880 kilograms (1,760 lb.), and having an engine of 120 h.p. only, the machine is said to have risen easily, and to have remained at a height of one foot for a considerable time. One presumes that the height attained does not represent the ceiling of the machine, but that she was kept there by anchoring arrangements of some sort. Later M. Pescara intends to have the machine transferred to the Barcelona aerodrome for the official tests.

AUSTRALIA'S PLAGUE

BY
"BILL BOWYANG"

THE rabbit is rather encouraged than otherwise in most parts of Europe. A rabbit warren is looked upon as a good feature in an estate providing sport. In Belgium rabbits are bred for the market. Many an English schoolboy counts a hutch of rabbits among his valued pets.

But in this great land of ours the rabbit is a dreadful pest. Ordinarily some credit is due to the individual or individuals who lay the foundations of a big industry, no matter how small its origin, but it would be a doubtful honour to thrust upon anyone the credit for making it possible to have a rabbit industry as one of the great avenues of employment.

There seems to be some conflict of opinion as to whether rabbits were first let loose in Victoria or New South Wales. It is recorded in the *Melbourne Age* sixty years back, that a Mr. Bacchus purchased a number of pairs and turned them loose in the locality now known as Bacchus Marsh, and it was there that the remark was made: "There goes many a poor man's meal," as the liberated animals scurried away for shelter. It is beyond dispute that since then rabbits have made many a meal for poor men, and have also formed part of many a rich man's dinner. Hundreds of men have made a good living merely in destroying them, while hundreds of others have found employment in erecting fences and other things designed for their annihilation. It is no exaggeration to say that the pest has cost millions of pounds in four of the Australian States in the losses they have occasioned and in the efforts made to eradicate them.

About forty years ago it was realised that rabbits were threatening the destruction of the pastoral industry, and action was taken in the three eastern States, as well as in South Australia, to cope with them. In ten years the Government of Victoria spent £162,132 in trying to destroy the pest, but with very little success, and soon 38,000,000 acres were infested with it. From January, 1884, to December, 1888, South Australia spent over half

a million in an effort to rid the country of rabbits, and then abandoned the task as hopeless.

A Rabbit Act was passed in New South Wales in 1883, providing for a bonus on scalps, and in the first year of its operation only £489 was given away. In four years the amount of scalp money increased to £210,593, which represented the bonus on 27,000,000 animals. The subsidies ceased in July, 1888, and by that time rabbits had cost the country over £1,000,000. At one time more than 3,000 men were engaged in trapping in New South Wales, and as they received from 3d. to 1s. a scalp, their earnings ranged from £3 to as high as £12 a week. The men affected great style in their mode of dress and manner of living, and if a specially well appointed turnout was seen in the farms of rabbit infested areas the owner was at once put down as a trapper. It is stated that a gorgeous champagne supper was given at Wilcannia by a rabbit trapper, who also gained notoriety by tendering a cheque for over £1,000 in payment for a drink.

As the result of a conference held in 1885-86 a start was made with the fencing of the western boundary of New South Wales. The fence was completed in 1890, and then the Government initiated a system of poisoning. It is recorded that at Youhl Plains, 2,909 were killed in this way at the Government tanks in one night. So great was the devastation caused by the rabbits, however, that 7,000,000 acres of land in the western and central divisions were abandoned in 1895, "owing to the expense of working the country, consequent upon the prevalence of the rabbit pest."

The spread of rabbits northwards into Queensland was, to some extent, checked by the erection of a wire netting fence along the border line with New South Wales, but it did not prove wholly effective, and eventually a second and third line of defence had to be established. The intervening country is crossed and re-crossed by numerous lines of fencing, and

by the end of 1896 nearly 6,250 miles of fencing had been put up in southern Queensland and wire netting has also been extended northwards along the South Australian border for a distance of 300 miles. Indeed South Australia since 1891 has erected 29,148 miles of fence. In the South Australian Act of 1914 the rabbit-proof fence is described as being made of wire netting, three feet wide, set four inches into the ground and topped by a strand of barbed wire placed above the netting.

There was one curious method of rabbit-extermination proposed in Australia as to the usefulness of which the writer heard a story when travelling with an Irish immigrant recently. From the study of the family life of the rabbit, it was proposed that the animals should be kept in check by a systematic warfare on the females only, allowing the males to go free. The argument was that, with an excess of males, the rabbit race in Australia would lose its great fecundity.

Now, the story heard concerned an Irish landlord, who had a rabbit warren on his estate, had rabbits trapped, partly to supply the table, partly to keep the tribe in check. The traps would catch more buck

rabbits than does, as the male wanders about more than the female. Whilst trapping was kept up, the rabbits in the warren were healthy and vigorous. When trapping was for some reason stopped for a few years the rabbits decreased very much in numbers and size.

Someone has calculated that the rabbits in Australia must reach to the number of 1,000,000,000,000. But, of course, there is no means of taking a census, the calculation is largely guess-work, its foundation being a rough numbering of the rabbits to be found in an acre of country, and multiplying that by the number of rabbit-infested acres.

Another theorist on the rabbit problem suggests that some day the rabbit will actually be cultivated and improved in Australia, as the sheep was, his fur lengthened, and the value of his skin thus improved, both as clothing in cold climates and as the basis of felt for hats. He pictures possible future stud-rabbit sales. But that is a dream of the future. At present the rabbit in our States is a declared public enemy, to which no man can give harbourage without incurring the resentment of the law.

AMERICAN AIR INSURANCE

In making plans for the coming year the National Aircraft Underwriters' Association, the conference of stock insurance companies in the United States which write aviation insurance, has decided to apply the principle of co-insurance to fire, theft, transportation, windstorm and collision coverages. Accordingly the maximum at which aircraft can be insured is fixed at 75 per cent. of the total actual value, after all deductions have been made. This is the first of many contemplated moves to put the business of aviation insurance in America on its own feet. Up to the present time American insurance companies have not tried to make money out of this line, charging losses to experience. Last year, however, it was evident that a large part of the excessively heavy losses were due to carelessness and dishonesty. Making aircraft owners stand for

25 per cent. of the losses is expected to make a big difference. To avoid the disproportionately heavy administration expenses connected with making the adjustments of small claims, the collision and windstorm policies will hereafter be endorsed to the effect that the assured shall pay for all losses not greater than 5 per cent. of the total value of the aircraft, and shall pay this 5 per cent. (with a minimum of two hundred and fifty dollars) toward all larger losses. On theft the assured is required to pay the first hundred dollars. Windstorm, stranding, and sinking are now grouped under the coverage called "mooring perils." Regular collision is called "flight collision." Flight collision rates are reduced in consideration of a warranty that the plane remain within gliding distance of a specified landing field.

ODDITIES OF PHYSICS

SOME INTERESTING PHENOMENA IN EVERY-DAY PHYSICS

BY

H. WINFIELD SECOR

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Do Railroad Cars Fall With the Wheels Toward or Away from the Tracks in a Wreck?

FREQUENTLY we hear the subject discussed, and the question asked as to which way railroad cars, particularly freight cars, fall in a wreck, and the accompanying illustration shows some of the theoretical considerations which apply to this every-day phase of physics. The usual answer by railroad men is that the cars fall with the wheels to the rail, and

To convince oneself as to which way a railroad car, under these conditions, would tend to fall when thrown outward from the curved rails if travelling at too high a speed, let us have recourse to the simple cardboard model shown in the figure. This model can be made about 3 in. by 5 in. and cut to the shape of a freight car. A button or small piece of lead, etc., corres-

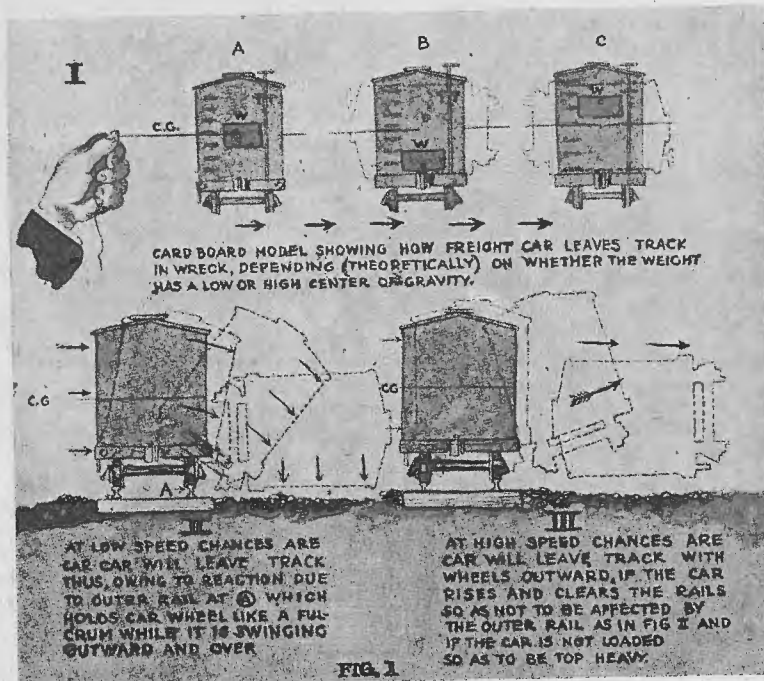


Fig. 1.—Which way do railway cars fall in a wreck—with the wheels toward or away from the rails? The three principal ways which cars will fall when rounding a curve at high speed are shown above.

while this figures out theoretically for possibly the majority of cases, there have been cases where the cars fell with the wheels away from the track, and with the top of the car lying next to the rail. The present discussion applies, of course, to a string of cars travelling around a curve.

ponding to a movable weight "w," and which can be secured in different positions by means of a pin or otherwise, permits us to change the centre of gravity so as to give a low or high centre of gravity. In the actual freight car the position of the centre of gravity depends upon how it is

loaded, with the predominating weight toward the bottom of the car and trucks or toward the top. A string is attached to the centre of the cardboard car model and when the model is spun around in a circle horizontally, holding the string between the index finger and thumb, the effect will be clearly demonstrated and proves that the car will fall in one of *three* ways, to wit:

If the centre of gravity or major part of the weight is low or toward the trucks, the car will fly off the rails with the wheels pointing away from them; if the weight of the car and its load is evenly distributed as by placing the dummy weight "w" at the exact centre of the model, then the car will fly outward evenly, with regard to the top and bottom; and finally, if the centre of gravity and the major portion of the weight is placed toward the top of the car, then the top will fly outward and the bottom inward, so that the car theoretically at least (and if no other force is present to alter this motion), will fall with the wheels toward the rail.

In actual wrecks, however, photographs frequently show a string of cars laying alongside the rails with the wheels toward the rails, and it seems to be the usual result in an accident or wreck. Fig. II, of the accompanying diagram, shows clearly why this is so. Consider that the train is moving at an abnormally high speed around the curve so that the cars are subjected to great centrifugal force tending to throw them outward. If all the conditions are right, such as the centre of gravity under the action of centrifugal force, the car will tend to turn outward and over, using the outer rail as a fulcrum—the cars will, in this case, invariably fall a few feet from the track with their wheels toward the rails.

A point often incorrectly entertained is that with cars going around a curve, at such a speed as to keep the wheels at one side only on the rail, the outer wheels would be the ones to lift off the rails and not the inner ones, but the reverse is true as Fig. II. shows in demonstrating how freight cars usually fall.

Fig. III. shows a case where the cars in a wreck due to rounding a curve at very high speed, can fall with the tops of the cars towards the rails. At abnormal speed which would result in the condition like that shown at Fig. III., and with the

centre of gravity or load or the major part of the weight placed low or toward the trucks, the car would fly outward by centrifugal force as shown by the dotted lines, and the bottom of the car would turn outward and up as shown by the arrow; the conditions for this result being that the car moves at a sufficiently high velocity to cause it to be virtually lifted from the rails, so that the wheel flanges clear them. Otherwise, the result is more likely to be that of case II., if the wheels do not clear the rails or if the rails do not spread, or otherwise fail so as to nullify or eliminate any reaction pressure on the outer rails.

Are House Walls Perfectly Parallel?

When we build a house or other building and providing the usual degree of me-

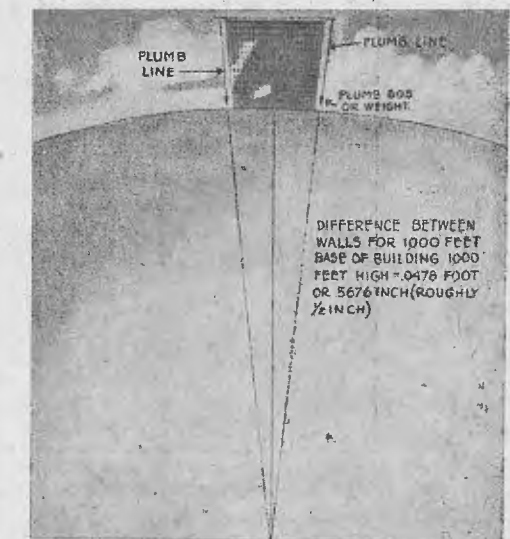


Fig. 2.—When is a plumb line not plumb? When it lies on a radial line passing through the centre of the earth, which is all the time (taking the usually accepted meaning), and thus if two sides of a building are erected to correspond with plumb lines, they will not be parallel, but will be found to be farther apart at the roof than at the base of the building. The accompanying illustration shows the difference in the length of a line spread between two walls of a building at the base and also at the roof, the structure measuring 1,000 feet square and 1,000 feet high; the difference in this case would be a trifle more than half an inch.

chanical craftsmanship is applied in its construction, we might expect to find upon accurate measurement, that the four walls measure exactly the same distance apart at the base of the building as at the top.

But such is not the case, however, as physics proves to us, for upon a little reflection it is evident to anyone that this is impossible, especially when Fig. 2 is examined. Where only the usual methods of construction are applied, *i.e.*, plumbing the walls with the usual plumb line and weight or bob, it is not possible for either the side walls, or the front and rear walls to be parallel to each other or the same distance apart at the top and bottom except from inaccuracy of construction.

They must be farther apart at the top than at the bottom, as each individual wall will, if lined up with a plumb bob, be on a different radial line from the centre of

tance between top and bottom walls; further, as the distance between the two walls increases, the difference of chords at top and bottom of the walls will likewise be augmented.

Is a Level Wall Straight?

When it comes to building long concrete walls, dams and other constructional projects a mile or more in extent, we once again bump unconsciously into the inexorable laws of Nature and for once in our lives find that a level wall is not straight, by any means! The truth of the matter is that such a wall is curved and actually follows the curvature of the earth. The

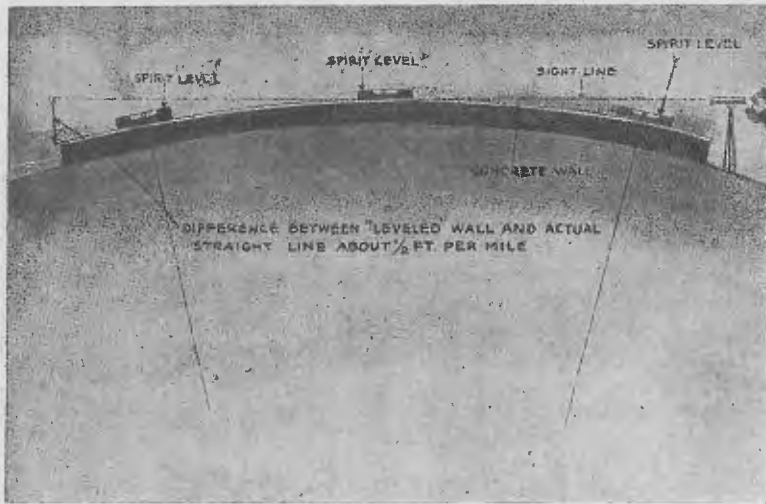


Fig. 3.—The diagram above shows that a wall constructed with spirit levels is not perfectly straight, but curves in accordance with the curvature of the earth. The only way to erect a perfectly straight wall would be by means of a perfectly taut wire, or else by sighting through a levelling telescope, as shown in the picture herewith.

the earth; and the chord of the angle subtended between two radial lines as shown in the drawing, will increase progressively as we move outward from the centre of the earth. Building constructors, architects and engineers are familiar with this fact and in large buildings or other constructional operations, this fact is taken into consideration. It has been computed that for a building 1,000 feet long and 1,000 feet high, the walls, if simply plumbed with a plumb and bob, would be one-half inch farther apart at the top than at the base. As the height increases, so does the difference in the chords or dis-

writer remembers hearing this point argued many times, and it makes an interesting point for debate, you can well believe.

Illustration 3 demonstrates that a straight wall cannot be constructed by levelling, that is by levelling in the ordinary manner, for the reason that the level will act the same as the plumb bob, and it simply indicates that the bottom of the level is at right angle to a radial line pointing to the centre of the earth, and at that particular point only. As soon as you move the level to a new point, even if only a few feet away, and providing

you had instruments sufficiently accurate to measure the difference, you would find that the level has indicated a tangential point on the earth's surface for that particular radial line only.

It has been computed that when building a wall one mile long, the difference between the actual wall as constructed by levelling with spirit levels, and a dead straight line (sighted across the top of the wall by using a levelling telescope or surveyors instrument) is one-half foot. In other words, if the wall were constructed two miles long by levelling, the top of it would curve upward in the centre, so that

if a perfectly straight line or chord were drawn across the top of the wall, there would be one-half foot difference between the line and the top of the wall at either end. For longer walls this difference increases of course, and decreases as the wall becomes shorter.

How Mountains Attract Masses.

It is a well known fact in physics that if we suspend a mass, such as a leaden sphere, whether small or large, with a cord by the side of a mountain or hill, this promontory will exert an attraction for the suspended mass, and which varies with the respective sizes of the mass and of the mountain.

The particular consideration we are interested in here is that if we were to construct a tall chimney or tower on the side of a mountain and line this up presumably vertically with a plumb line and bob, then as the diagram, Fig. 4 shows, the tower would not be exactly vertical, but would lean outward from its base, owing to the attraction between the plumb bob and the mass of the mountain which, although extremely slight, might become quite an appreciable factor to reckon with in a tall structure. About the simplest way to check up the perpendicularity of the tower or other structure would be by means of a surveyor's theodolite.

Does an Object Weigh the Most on the Earth's Surface?

If you want to start a good "rainy day" argument at the club or in the smoking car, just ask the question, "Where does a cannon ball weigh the most—at the surface of the earth, below the surface, or above the surface?" Due to two well defined laws of Nature, we come to the conclusion, that the object, whatever it may be, weighs its greatest at the earth's surface. The law of weight with respect to distance which concerns the present problem has been formulated as follows: "The weight of a body varies directly as the mass, and inversely as the square of the distance between its centre of gravity and that of the earth."

This is shown in the accompanying illustration, Fig. 5. A 100-pound ball, that is, one weighing 100 pounds at the surface of the earth, will weigh but 25 pounds when four thousand miles above the earth's surface. Since the weights of objects

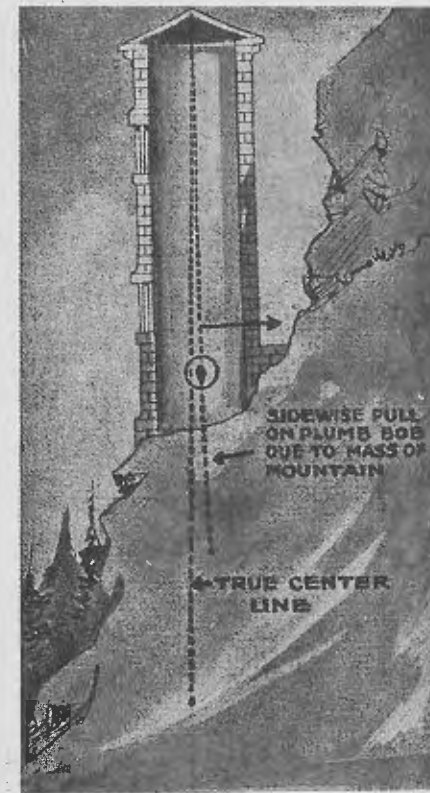


Fig. 4.—The illustration above shows, greatly exaggerated of course, how a mountain or hill exerts a sidewise gravitational pull on a suspended plumb bob for example. That is, if a tower were built by means of a plumb bob on the side of a mountain in the position here shown, the tower would not be straight, but would lean away from the mountain (unless precautions were taken to allow for the sidewise pull of the mass of the mountain of course). This difference would not be very much—but the higher the tower the greater its magnitude.

above the earth are inversely proportional to the squares of their distances from the centre of the earth, we find that w , the weight at any elevation is to W , the weight at the surface, as D^2 —the distance in miles from the surface to the centre of the earth squared, $4,000^2$ is to d^2 —the distance from the centre of the earth to the level at which the object is placed. Algebraically we have:

$$w : W = D^2 : d^2$$

$$\text{or } w : 100 = 4,000^2 : (4,000 + 4,000)^2$$

$$\text{and } w = \frac{100 \times 16,000,000}{64,000,000} = \frac{100 \times 16}{64} = 25$$

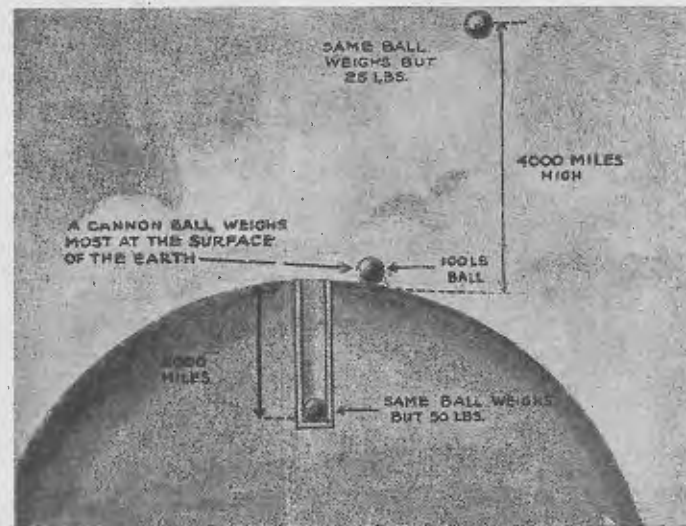


Fig. 5.—Where does a cannon ball weigh the most? You might not think it, but it is a fact a 100-pound ball (or any other body), for example, will weigh the most at the surface of the earth—and less than that amount when raised above or lowered below the earth's surface.

When we go below the surface of the earth we find that objects weigh less as we progress towards the centre. In this case the decrease of weights follows a different law than that for bodies placed above the earth's surface. This last law states that the weight of a body placed below the surface decreases as the distance to the centre decreases. That is, if the body is only one-half as far from the centre as the surface is, it will weigh but one-half as much as on the surface. This is due to the fact that the mass between us and the centre of the earth becomes less and secondly, the force of direction

is less. Thus the weight of a 180-pound ball or mass, 2,000 miles below the surface is but 90 pounds, or our 100-pound ball in the illustration, Fig. 5, would weigh but 50 pounds at a depth of 2,000 miles below the surface.

"Falling East."

One of the most interesting and not so well known of physical phenomena is that known as "falling east." Dr. Daniel W. Hering in his work, "Essentials of Physics" states that inertia has been employed to demonstrate the rotation of the earth upon its axis; and furthermore, if the earth rotates, the top of a tower or

plummet moves faster than the bottom, which we perceive as being true upon consideration of the facts in the case.

The apex of Dome of the Pantheon in Paris is 272 feet above the floor, and the latitude of this structure is 48+ degrees; and for the earth to rotate once in 24 hours, the top of the dome or structure moves to the east faster than does the bottom of the tower, by 0.18 inch per second. A body requires 4.1 seconds to fall from the top of the dome to the floor; theoretically, therefore, the body should strike 0.75 inch to the east of a point directly under the

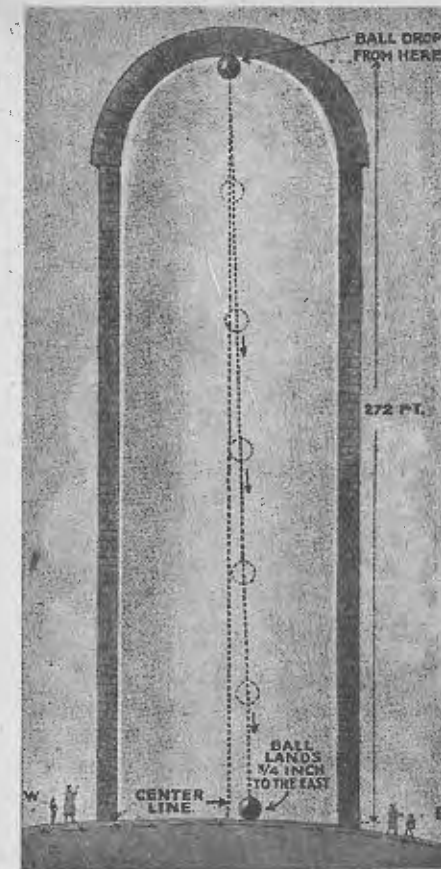


Fig. 6.—An iron ball or other weight dropped from an elevation such as the top of a 272 feet tower here shown, will land to the east of the point directly under the central point from which it was dropped, the ball landing on the average three-quarters of an inch to the east.

plummet when dropped (see Figure 6). This was born out by actual experiments, repeated many times, when an iron ball thus dropped, always fell to the east one-half inch to one inch away.

As Dr. Hering states: "This experiment may be interpreted either way, for if we regard the rotation of the earth sufficiently well proved, we may regard this experiment as confirming the principle of inertia."

Which is the Most Effective—a Short or Long Hitch?

When it comes to a good argument in "applied physics," one that will shake up the whole bunch and rattle the kitchen stove as well as the oil paintings in the

parlour, and when you really feel like starting something, just spring this one: "Which is the most effective—a short or long hitch when pulling a load?"

Fig. 7 illustrates what is meant more clearly. Usually of course it is the farmers' argument, or one frequently heard among those having to do with horses, that it is a well-known fact that when a truck is caught in the mud or ditch, a short angular hitch permitting the horse or horses to pull up and out on the load, will invariably give success; whereas a straight pull, if the traces are horizontal, would not pull the truck out of the mire or ditch.

This question, let it be said, is not as easily solved or answered as might at first seem, for there are several factors which bear on the matter, and these are considered briefly below:

In the first place, we had probably best consider what happens in the case of a short or long hitch when the pairs, traces, ropes or chain used are of different lengths for each pull, but perfectly horizontal during the act of pulling. As the scale in the two figures shown, the pull exerted in this case, 200 pounds, is the same whether the trace is long or short. This may not seem so at first, but it is a proven fact and anyone who has studied engineering calculations, especially those concerning the movement of railroad trains and the power required to move a given load (whether in a car, waggon, automobile or sled) with a certain co-efficient of friction, and knowing the speed at which the mass is to be moved, will see this point immediately.

Regarding the short and long hitch, with the horizontal or usual style of traces, it might be interesting to note that the writer in *Science and Invention* before being able to convince a friend of his that the pull is practically the same in either case (disregarding any small infinitesimal loss due to any extra long traces, chains or ropes used and their consequent weight, or any swinging) had to get the opinions of five professors of mechanical engineering in leading American universities (and these letters are still on file for the benefit of any other "Doubting Thomases"), to the effect that this law is correct.

To sum up the situation in a few words then, and providing the traces are straight or horizontal, and not placed on an angle, which changes the effect of the problem at once: it does not make any difference

whether we use a short or long hitch. The same would apply to a man pulling with a rope attached to a piano or other heavy mass, and he would not pull any more—or less, whether he were five feet or twenty-five feet from the load!

Where this problem changes entirely, due to placing the traces at an angle, is shown in the two lower illustrations at Fig. 7. The illustration showing the front

as 200 pounds, we find that the horizontal component or forward pulling force would be 199 pounds, while at the same time an upward or vertical lifting force of 20 pounds would be exerted to help raise the waggon out of the rut or gully.

The solution of the parallelogram of forces is solved by the laws of geometry, viz.: the force exerted by the traces, or 200 pounds, is equal to the square root of

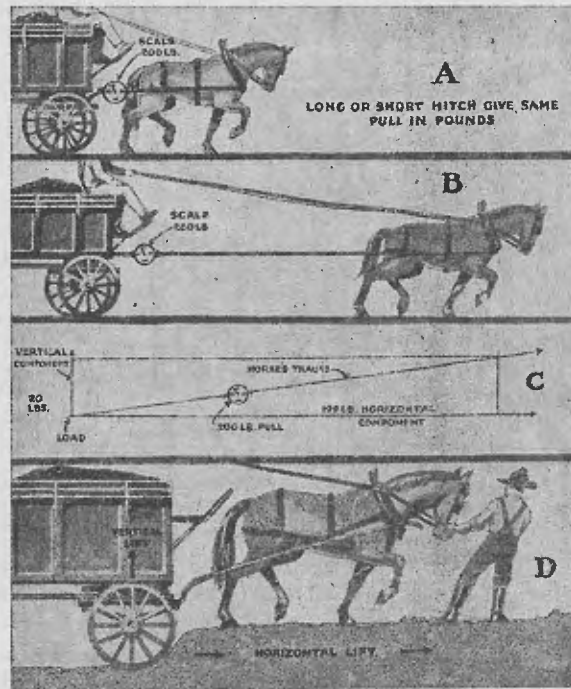


Fig. 7.—Which is the better—a long or short hitch in pulling a given load? Figures A and B show that when the traces are straight this actually makes no difference; but when the traces are on a slant or angle, a greater pull under certain conditions is realised owing to the combination of vertical and horizontal forces. In Fig. D, for example, the driver stands a better chance of hauling the waggon out of the gully with a short, angular hitch than with the traces horizontal, owing to the upward force brought into play as the resolution of forces diagrammed at Figure C prove.

wheels of a waggon in a gully, and resting against a large amount of dirt, talks for itself and shows that the only successful or logical way in which to get this waggon out of the rut, is to apply two forces, one upward and one forward. Calculating the resulting forces accruing from the slanting traces and solving the parallelogram of forces as shown in the drawing, taking the pull exerted in the traces

the sum of the squares of the vertical and horizontal components. Likewise, the value of the horizontal component is equal to the square root of the trace pull, squared, minus the value of the vertical component, also squared; and the value of the vertical component is equivalent to the square root of the trace pull, squared, minus the value of the horizontal component, squared.

It might seem at first glance, after look-

ing over this solution of the short hitch, angular trace problem—that we really obtain more power than was exerted on the traces by the horse, but this is not so, for otherwise we would have perpetual motion. What really happens is this:

When the trace is placed at any angle other than horizontal, the horse begins to exert on the load a lifting effect—as well as a forward pulling one, but as the vertical pressure increases, the forward pull decreases in value, until when we have the trace directly vertical, the horse would theoretically be exerting a purely vertical lifting effort, and would exert no forward pulling effect whatever.

“WHAT MAKES THE ENGINE GO?”

The following letter was received from a customer by a well-known engineering firm, whose name we are not giving:

Dear Sirs,

About the engine. Well: I write to let you know, I've waded through the booklet on “What makes the engine go.”

It took me close on half a day To read through all the guff; The engine goes alright, but don't Keep going long enough.

It's very good to understand What makes the engine go, But why the deuce the d——d thing stops, Is what I want to know.

So now I'm making this request While tears and curses drop, Please send along a booklet on What makes the engine stop.

The folk around here all await With interest, your reply; To them the reason why she goes Don't seem to signify.

So while we wait and chew the cud, Don't let the matter flop; For Mike's sake write and let me know, What makes the blighter stop.

—J.F.W.

Coming Speed Monoplanes.

From what can be gathered, it appears that the coming year will see the re-introduction of the monoplane for speed machines as well as for those intended for more leisurely travel. America has promised to show some “startlers” for the Pulitzer race which is to take the place of the Gordon-Bennett, and we now understand that at least three French constructors are contemplating designs for this race. Probably out of these at least two will be monoplanes, and it is quite on the boards that a retractable undercarriage will be one of the features of these projectiles. It would not be surprising if speeds of well over 200 m.p.h. were attained during the coming summer and autumn.

Handley Page Records.

A summary of flights, issued by Handley Page Transport, Ltd., shows that in nine weeks their aeroplanes covered fourteen thousand miles between London and Paris, and carried five hundred and five passengers.

Passengers in Continental Air Services.

During the first week in May one hundred and eleven people travelled in the British air services between London and Paris, and ninety-six in the French services in the same period.

UP.

It is useless looking up the word “Up” in the dictionary to ascertain its meaning. When you wake up in the morning you get up. You button up your coat, and eat up your bacon, and drink up your coffee. Somebody washes up, and cleans up. After looking up your train you lock up the house, and go up to town. You turn up at the office, and after hanging up your hat you find the market has gone up, which makes you sit up. After a hundred up at billiards you stroll up the street which is up. In putting up your umbrella you trip up, and somebody comes up and says, “What's up?” When you do not feel up to the mark, or are fed up, and have saved up enough, you can lie up, and keep your temperature from going up, or else it might all be up.—*The Aerial*.

[Dry up!—Ed.]

HOW THE "ATUA" WAS SAVED

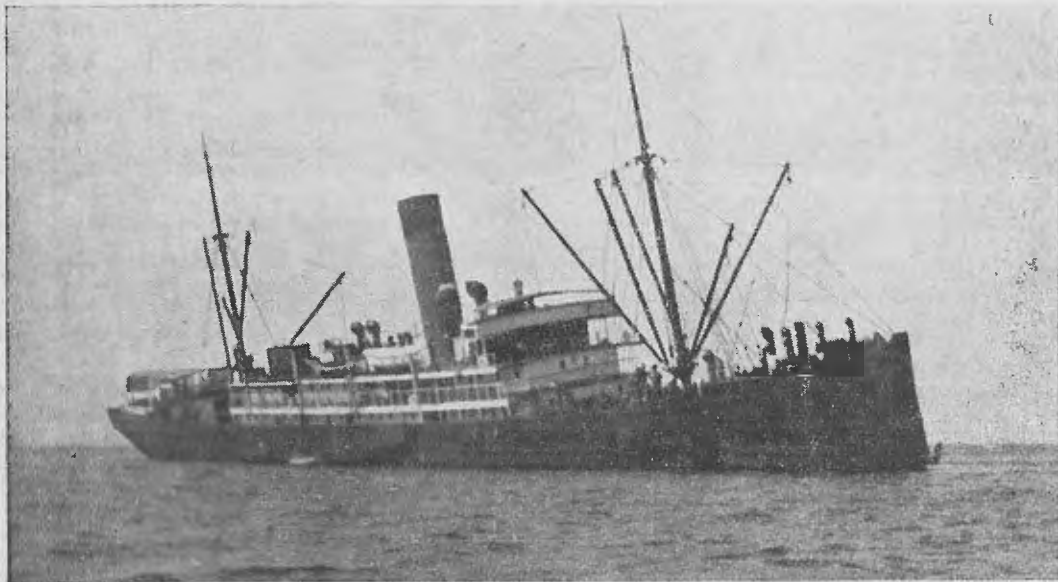
BY
N. LEEDER

ON May 24, whilst proceeding from Lautoka to Suva, laden with sugar, the Union S.S. Co.'s steamer *Atua* struck an uncharted coral head off Naitoni-toni (Navua) about 5 o'clock in the evening. The vessel left Lautoka at 9 o'clock that morning, and was due to arrive at Suva at 7 p.m. to pick up passengers and mails prior to sailing for Auckland and Sydney.

It was bright and clear in the morning with a smooth sea, and the *Atua* had been doing about 11 knots, keeping the reef in sight all the way round. In the afternoon

a few minutes all the boats were swung out ready to lower. Soundings taken of the holds showed that the vessel made seven feet nine inches of water in four minutes in No. 2 hold, and it was rapidly gaining both in Nos. 1 and 2 holds.

The captain—who had been on the bridge since leaving Lautoka in the morning—decided that the only way to save the vessel was to beach her. Accordingly she was turned round, headed into Naitoni-toni and beached on a good sandy bottom in twenty-four feet of water. Too much credit cannot be given to the engineers,



The "Atua" beached at Naitoni-toni. This photograph was taken the morning after the mishap.

it commenced to rain and the weather began to get "thick" over towards the reef and mainland, making navigation difficult.

A particularly nasty place named M'beqa Passage was safely navigated about 4 p.m. and Suva was sighted two hours' steam off. Passengers had visions of being ashore in Suva for a stroll around, when suddenly without warning, a heavy, grating crash was heard, and the ship heeled over to starboard at an alarming angle, scattering deck chairs and their occupants in all directions. Immediately all was confusion, but there was no panic. In

who rushed into the stokehold and worked knee-deep in water, firing the boilers, to keep steam up until the ship was safely beached. Great praise was also given to Captain Frew for his prompt action in saving the ship. He gave his orders from the bridge and was as cool and collected as though nothing out of the ordinary had happened.

At the time of striking the reef, there were only twenty saloon passengers aboard, in addition to eighty Fijian labourers and about twenty Indians travelling steerage. The situation, however, was not without a

touch of humour. Soon after the vessel struck, lifebelts were issued to all the Fijians and Indians. An amusing feature was watching some of the Fijian boys, who are such great swimmers, trying to scramble into their lifebelts. Many got badly tangled up, and one boy seemed perfectly satisfied when he had his belt adjusted round his legs, and the loose end of the tape knotted around his neck. With the Indians it was different. All that concerned them was getting their household goods and chattels strapped on to their backs, and saving them at all costs. Despite their lifebelts, they would, however, have sunk immediately had the necessity arisen for them to take to the water.

After the steamer was beached, and all danger past for the time being, it was ascertained there was fifteen to sixteen feet of water in the reserve bunkers, nineteen feet in No. 2 hold, level with the upper 'tween decks, and about thirteen feet in No. 1 hold.

Soon after, the ship took a heavy list to starboard, and was well down by the head. It was then found that the water was gaining on the pumps, and once during the night it got to within six inches of the dynamos, but by hard and continuous work the engineroom staff gained the mastery, and towards morning the safety of the dynamos was assured.

Next day a diver came from Suva and partially found the extent of the damage, principally by feeling with his hand along the bottom of the ship. The weather was dull and unfavourable for diving operations. A water-tight electric light, made by the engineers, enabled the diver to find out more clearly the damage sustained. Beneath No. 2 hold there was a hole, or split in the plate about eighteen inches long and six inches wide; in addition,

about twenty-five feet of the side of the ship had been stove in, plates and frames being bent and buckled like pieces of tin. About eighteen inches of the bilge-reel, or rolling chock, had been torn off, the remainder buckled three-quarters of its length, and one blade of the port propeller badly bent.

The hole was temporarily plugged with sugar bags by the diver, and over sixty seven-eighth inch rivet holes were stopped with wooden plugs made by the ship's carpenter. Pumping was then carried out by an engineroom pump, which had been rigged in No. 2 hold, while four large oil drums, improvised as buckets, were used to bail the water out of No. 1 hold whilst a sufficient depth remained.

Most of the sugar in No. 3 and 4 holds was transferred into lighters, and consequently as the weight, fore and aft, decreased the ship gradually rose off the bottom.

After six days at Naitoni-toni during which pumping was kept going continuously, Nos. 1 and 2 holds were dry. The work of concreting over the hole and rivet holes was then proceeded with. After one hundred and eighty tons of cement had been used, it was given three days in which to set properly, and the vessel then proceeded to Suva. Arriving there it was found necessary to put more cement into No. 2 hold before the ship was allowed to undertake the five days' trip to Auckland; the location of the nearest dry dock, where a thorough examination and repairs are being effected.

At the main inquiry held at Suva, the finding of the Court was that the *Atua* struck an uncharted coral reef, or "horse-head" of coral, off Naitoni-toni in the Fijian Islands.

LETTER TO THE EDITOR

The Editor,
Sea, Land and Air,
Sydney.

Sir,—I would like to draw your attention and that of pilots generally, to the facilities offering airmen who may be in the neighbourhood of Yerong Creek (a small town between The Rock and Henty) New South Wales.

There is a beautiful aerodrome big enough for the largest 'plane to land and take off from, and after landing it is pos-

sible to taxi up to within fifty yards of the "I.X.L." store, where aviation spirit, oils, etc., are stocked. Twenty-five yards further on is the Post Office and at a little distance stands a nice hotel.

The 'drome is about 200 acres in extent, with clear approaches. It is 351 miles from Sydney and 240 miles from Melbourne, and visiting airmen invariably receive a warm public welcome.

Yours faithfully,
(Sgd.) W. M. TRELOAR.

RUSSIA

BY
H. H. JOHNSON

THE first attempt of Europe to settle international questions by conciliar deliberation was in the year 1815, when the "Congress of Vienna" took place. Its territorial settlements were guided by no principles of nationality or legitimacy. It righted the wrongs of Europe at Napoleon's hands, restored to Europe a much needed balance of power and submitted her to regulations which proved to be a severe repressor of the Liberalism to which the French Revolution had given birth.

Not only did the Congress right the wrongs of Europe, but in Russian affairs also, several important alterations were made, the principal one being the formation of part of the Grand Duchy of Warsaw into the Kingdom of Poland, and that Kingdom's attachment to Russia with the promise of a Constitution. After the unsuccessful rebellions of 1830 to 1863 because a constitution had not been granted it was incorporated into Russia as her Vistula provinces:

Russia commenced her era of "Transformation" with the reign of Alexander II., who succeeded his father Nicholas I. in 1855 and was assassinated in 1881.

Alexander II. did not play a prominent part in Europe. Unlike his father and his uncle Alexander I., he stood aloof from the big events which transformed Germany and Italy during his reign, and merely used the Franco-German War to obtain the erasure of the Articles of 1856 which forbade Russia to maintain arsenals and warships on the Black Sea. Russia's domestic significance lies in its tardy effort to liberalise her constitution and reform the social condition of her people, the last country within the European political system to do so.

To realise what the Russian Empire was in 1815 geographically, it was in that year that she reached the limit of her expansion in the West. The achievement was the reward of Alexander the First's activities. His alliance with Napoleon gave him the Grand Duchy of Finland and the Aland Isles.

He gained Bessarabia by the Treaty of Bucharest, in 1812. The remnant of the Kingdom of Poland was his share of the spoils of Napoleon's shattered system. Finland and Poland were separated from the Empire when Alexander II. came to the throne.

The rest of Russia in Europe consisted of populations and provinces acquired at different times. They formed seven areas:

- (1) Greater Russia, the nucleus of the original kingdom, lies around Moscow, the old capital.
- (2) Lesser Russia, or Little Russia, consisted of the Ukraine, which Russia absorbed towards the end of the nineteenth century.
- (3) The Volga-Ural provinces, the Tartar region of Astrachan, with a mixed population.
- (4) South Russia, contiguous to and won from the Turkish Empire.
- (5) Caucasia. The conquest of this region lying between the Black and Caspian seas, begun by the acquisition of Georgia in 1800, was completed by the Treaty of Berlin (in 1878) and established the military frontier on that face.
- (6) West Russia is the old Grand Duchy of Lithuania annexed by Catherine II.
- (7) The Baltic provinces of Esthonia, Livonia, and Courland. The first two were acquired from Sweden in 1721 (Treaty of Nystad), Courland was gained at Poland's expense in 1795.

Russian society was based on ideas which the French Revolution had expelled from the rest of Europe.

The two important classes which made the bulk of the population were the nobles and the peasants. The nobles consisted of about 100,000 families, and enjoyed many exemptions which the peasants did not. Comparatively few of the nobles sprang from the nobles of Peter the Great's time. The majority of the nobles derived their nobility from public offices under the State.

The peasants formed about nine-tenths of the population. Their position synchronised with that of the French peasantry before the French Revolution.

Public law did not protect them. With customary rights in the soil they still were the slaves of their master, tied to his estates and subject to his jurisdiction.

They paid a poll tax to the State and were liable to military service for twenty-five years.

The Russian Government was an autocracy, the Tsar's residence being the administrative centre. He was assisted by a Council of State and a body of Ministers, of whom the chief was the Chancellor who directed Foreign affairs. Legislation was effected by Imperial Decree (Ukase), there was no deliberative assembly (Duma) until 1906. The Empire was divided into Governments or Provinces, each divided into a varying number of districts.

Under Alexander I. Russia's illiberal system was maintained with little mitigation. Nicolas I. attempted to close Russia against the Western influences.

Foreigners were admitted only under police supervision, and Russians rarely, and for limited periods, were permitted to leave the country. Thrown back on herself Russia's literature developed distinctive characteristics which appear in the writings of various authors, the best known of whom is Lyof Tolstoi, who lived from 1828 to 1910.

During the Napoleonic wars a great many Russian officers lived abroad. They came back to Russia after the Congress of Vienna in 1815 teeming with new ideas and new ideals. Their aim was culture and the public welfare.

Alexander I. had boasted that Russia alone of the Continental powers held her own against "Westernism." Nicolas I. was defeated by it. Alexander II. took the lesson to heart and the era of "Transformation" began.

The Treaty of Paris, 1856, opened a new chapter in the history of Russia, and as was the case after her Manchurian defeats fifty years later, directed searching enquiry upon her internal state. The writer does not intend to digress in the matter of what any Treaties referred to were the result of, or what the Treaties established. In this case, however, it will doubtless be interesting to recall why the Treaty of Paris (1856) was necessary.

As far back as 1844 Nicolas I. had proposed to England the partition of Turkey. England to have Egypt. But England refused to divide the "Sick man's" property before his death. In 1853, after long negotiations, Turkey declared war on Russia, in 1854 England and France supported her and the Crimean War followed.

The terms of the Treaty of Paris were as follows:

- (1) The Sultan of Turkey was required to confirm the privileges of his Christian subjects, but the powers, including Russia, repudiated any right of interference.
- (2) The Russian protectorate over Moldavia and Wallachia was abolished.
- (3) The free navigation of the Danube was established and Russia ceded a strip of Bessarabia to Roumania.
- (4) The Black Sea was neutralised. No vessels of war were to enter it.

It is now generally admitted that the Crimean War ought never to have been fought. The ambition of Napoleon III. of France, the personal characteristics of Stratford Canning, one of England's most distinguished diplomatists, and Menshikoff the Russian Foreign Minister, and the meekness of the Aberdeen Government in England rather than any great political issues were responsible. In 1870 Russia repudiated item 4 without opposition, and Turkish promises in regard to Christian subjects proved of no value as might have been anticipated.

When Russia directed enquiry upon her internal state, writers urged that reform was essential to Russia's well-being. The peasants were impressed by the conviction that their service in that war deserved the instant alleviation of their lot. Alexander II. was assured that reform was inevitable and thought that it was better to guide the movement than to be broken by it.

When addressing a deputation of nobles from Moscow he denied his inclination to proclaim emancipation, yet admitted that he was not entirely opposed to it, but said "It is bound to come. If so it is better that it should come from above rather than from below."

The intellectuals advocated emancipation of the serfs, freedom of the Press, encouragement of education, and control of the Executive. While the Slavophiles or Nationalists preferred to build on Russian foundations, the Westernisers looked to constitutional experiments in France and Belgium for the institutions that Russia seemed to need.

The emancipation of the serfs, the greatest reform of all, was only one of many reforms of Alexander II., which also affected many departments of Russian life. The reforms affected the system of local Government, the judicature, the system of education and the army.

The gift of freedom to the serfs was, however, conditioned. Those attached to their lords in domestic service were not to receive liberty until two full years later, and precautions were taken to prevent the old and infirm among them being thrown upon the world when liberty was acquired. The other class, those who were permitted to labour outside their lord's estate by payment of a small annual fee, became masters of their own actions and labour. The agricultural peasants also received personal liberty, inasmuch as their lords could neither exact old services or sell them. The cottage and its enclosure became the property of the peasant occupier, and the communal lands, hitherto the property of the lords became the collective property of the village, with power of assignment to individuals. Like the cottage, they were purchasable at a valuation. Four-fifths of the purchase money was advanced at request by the State on loans repayable within a term of forty-nine years. So great a transaction was necessarily attended by delay.

In 1882 it was computed that ten per cent. of the peasant families of the district of Moscow were without land. Grants to individual families varied from five and one-half to twenty-seven and one-half acres, and the average allotment of the private serfs was about eight acres; the Crown serfs got more.

As usual there was complaint that the valuation placed upon the land was high.

The freedom of the serfs made possible the institution of constitutional reforms. A good deal of preparatory work upon the emancipation scheme was done by local committees, whose desire for a central body at Petrograd to discuss the matter had been received coldly by Alexander II., but in 1864 he instituted a system of local government from which, forty-two years later, Russia passed to a Representative Assembly (Duma).

In 1864 also Alexander sanctioned a carefully matured scheme of judicial reform; the existing system being arbitrary and corrupt. The Tsar took Western Codes as his guide, the principles on which he laid stress being, the release of the judiciary from administrative pressure, equality of civil rights, the independence of the Bench, public and oral procedure in law courts, and the association of the people with the administration of Justice. The last object

was attained by instituting trial by jury in criminal cases, and by establishing Justice of the Peace Courts of magistrates elected by District Assemblies.

Reform was handicapped by the want of competent men on the Bench and at the Bar, and by the officious activity of the Third Section (police) of the Imperial Chancellery, political offences were withdrawn from the cognizance of a jury, and officials could be tried only with the consent of their superiors.

A Press law was needed, and after the appointment of a Commission (1863) to examine the Press laws of England, France, Germany and Belgium, Alexander promulgated in 1865 a law which established for Russia the conditions which held in France after 1852. The censorship was withdrawn and newspapers were made liable to punishment for bad behaviour, the discipline being vested in the Minister of the Interior acting independently of Courts of Law.

After the attempt upon the Tsar's life in 1866 the law was administered somewhat feverishly.

The subject of education received attention from the beginning of the reign of Alexander II. The restrictions which Nicolas I. had placed upon the number of students attending the Universities were removed.

In 1864 popular and secondary education received attention. Secondary schools were divided into two classes, classical and modern. But after the reaction began, the former alone were permitted (1871) to feed the Universities, and the curriculum of the latter was revised.

Lastly the military system was reorganised (1874) on the Prussian model. The whole male population without distinction was made liable to service.

The Crimean War discredited the system of Nicolas I., and convinced even the bureaucrats of the imperative need for reform. But the conviction hardly survived the first and greatest reform, the emancipation of the serfs. That achievement and the reforms that followed it, directed attention to public affairs to a degree that was unwelcome to those in authority. The Government's interest flagged, while the Polish insurrection of 1863 and the help that it had from other enemies of Russian autocracy, weakened the Liberal Councils surrounding the Tsar.

Excepting the timid grant of municipal reform in 1870, the era of reform ended in 1865.

On the other side, the failure of instant reform to create a new Russia hardened the people and drove them towards the bloody courses which were adopted. The advanced section of the people developed a gospel which was called "Nihilism."

In 1865 the Moscow nobility petitioned the Tsar "to crown his edifice" by summoning an assembly. Alexander replied that it belonged to him exclusively to initiate "this gradual work of completion."

A few months later the first attempt on the Tsar's life was made by a young and impoverished noble who had been excluded from two Universities for lack of means. Moderate Liberalism was thoroughly alarmed by the outrage.

A few months later a young Pole made a second attempt on Alexander's life during his visit to Paris (1867). Reaction hardened into a system. The Press was dragooned; the Universities were deprived of most of the privileges conferred on them by the decree of 1863; the modern curriculum was revised; their scholars were denied access to the Universities; the elementary schools were taken from the District Councils. The District Councils' judicial courts were submitted to the closest observation and interference. In 1869 the Nihilists held a Congress at Basle.

The Treaty of Berlin (1878) set all Russia against bureaucracy and turned Nihilism into terrorism. The boldness of a young girl who fired at General Trepoff,

the head of the police, for illegally condemning to the knout a young student who failed to take off his hat to him, and her acquittal by a jury revealed the new spirit abroad. In June 1879 a remorseless "Vendetta" against the Tsar began. In 1879 the conspirators attempted to destroy the Royal train. In 1880 an explosion of dynamite below the dining-room of the Winter Palace killed and wounded over sixty persons and only failed in its object through the Emperor being detained elsewhere. In 1881 he sanctioned a Commission to consider the project of a Constitution, and on the afternoon of the day he signed the order (March 13) he was fatally struck by a bomb as he drove along the Catherine Canal in Petrograd. For a quarter of a century through the reign of his son Alexander III. and for the first eleven years of the reign of his grandson Nicolas II., reaction held its ground. Not until the humiliations of the Russo-Japanese War, and their revelations of official incompetency, did the pendulum swing again towards Alexander II.'s abandoned project. In August, 1905, Nicolas II. summoned a representative Duma, which assembled in May, 1906, but demanded control of the Executive, and was dissolved, resulting in a reign of terror throughout Russia. In 1907 the second Duma was dissolved, with worse reactions, retaliations and assassinations. The third Duma was elected on a narrow franchise. Private peasant ownership was substituted for commercial ownership. In 1917 there occurred the Democratic Revolution, the deposition of the Romanoffs and the accession to power of the Bolsheviks.

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LAUNCHING OF THE "ECHUCA" QUEENSLAND'S HISTORIC ACHIEVEMENT

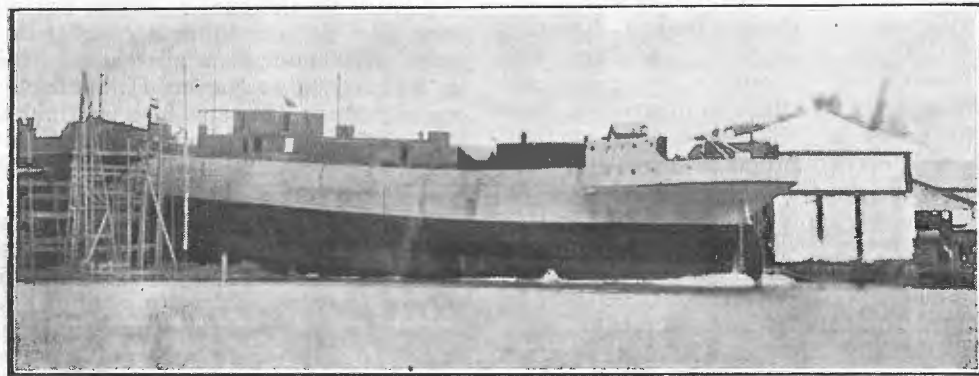
JULY 7 was a red-letter day for Maryborough and in a larger sense for Queensland, for on that day the first ocean-going vessel built in that State was safely launched from the yards of Messrs. Walkers Ltd., of Maryborough. The ship was the *Echuca*, a 6,000-ton steel cargo steamer built to the order of the Commonwealth Government.

The christening ceremony was performed by Mrs. Groom, wife of the Federal Minister for Works and Railways, who was also present.

On the morning of the launching special trains brought great crowds of people from Nanango, Bundaberg, Brisbane and other important centres. Ample provision had

witness many launchings, but none had ever passed off so smoothly as when the *Echuca* slid down the stocks and took the water. "The vessel herself," said Mr. Groom, "is an example of what Australian workmen can do." As far as possible the material used in the construction of the *Echuca* is all Australian—the steel coming from the Broken Hill Co.'s works, and the furniture and fittings are made of Queensland timber. The hull of the vessel, together with the engines and auxiliaries, were all built in Walkers' yard.

The *Echuca* is a single-screw steel steamer, 331 feet long by 47 feet 9 inches beam. She is designed to carry a cargo of 6,000 tons deadweight and is fitted with triple



The new Commonwealth Government steamer "Echuca" entering the water at Maryborough, Queensland.

been made for the accommodation of guests and the general public, and Messrs. Walkers Ltd. had arranged for all their employees, with their wives and families, to occupy a vantage point in the yard from which a full view of the launching could be obtained. The vessel took the water without the slightest hitch, and so well were the arrangements carried out that there was not one person present but felt that good fortune had thus early smiled on the vessel and those connected with her.

Mr. Groom, in replying to the felicitous speech made by Mr. A. J. Goldsmith, the oldest living partner of Walkers Ltd., congratulated the firm on their splendid achievement. It had been his privilege to

expansion engines developing 2,200 horsepower.

The firm of Walkers Ltd., is a very old established one, having originally commenced in Ballarat (Vic.) in 1864. A few years later a site was purchased at Maryborough and a branch opened there—the first casting being made on January 2, 1868. Business was dull for a time, but when the sugar industry began to expand in 1872 there came a big demand for machinery and from thence on Walkers Ltd. began to reap the reward of their enterprise. To-day their works are a hive of industry and no less than fourteen vessels, including dredges, have been turned out from the firm's yards.

Shipping Intelligence.



A Peculiar Mishap.

A REPORT from Wellington (N.Z.), details a peculiar experience which befell the coastal steamer *Huia* recently. When the vessel was nearing her berth in the Wanganui Harbour the engines got temporarily out of control and she cut between two tugs moored side by side, and crashed into the overhead bridge. Her foremast was broken off close to the deck and the funnel bent, but the wheelhouse, in which Captain Campbell and a seaman were standing, just cleared the under-structure of the bridge. The compass and binnacle were torn off, and the vessel's progress was not arrested until her forepart mounted a pontoon moored above the bridge. She was hauled off by a great effort and subsequently berthed safely.

A Long Voyage.

The ship *Terpsichore*, bound from Buenos Ayres to Callao (Peru) in ballast, was towed into Sydney Harbour on June 25 to replenish stores and renew sails lost in heavy weather in the Southern Ocean.

Built at Liverpool in 1883, the *Terpsichore* has had an interesting career. She was requisitioned by the Admiralty during the war and had many exciting experiences dodging enemy submarines. On one occasion a tug rescued her when she was within an ace of being driven ashore on the Irish coast. Later, when voyaging from Cardiff to Santos (South Brazil) her cargo of coal caught fire. The hatches were battened down and a run made for Rio, where the *Terpsichore* arrived with decks alight. The fire was extinguished by ships of the American Navy.

Handing Over a Prize Ship.

An interesting ceremony took place in Sydney Harbour on July 8, when the German prize warship *Una* (late *Komet*) was handed over by Mr. Staunton W. Spain, Marshal of the Prize Court, to Commodore H. M. Edwards, R.N., of the Australian Navy.

The *Una* is a smart yacht-like craft of 932 tons, and was built in 1911 at a cost of £45,000. The story of her capture is an interesting one. Just before the troopship *Berrima* left Rabaul on October 4, 1914, a wireless station at Namanula, Rabaul, intercepted a mysterious message from an unlocated wireless station containing—apparently for the information of Admiral Von Spee—elaborate details as to the disposition of the Australian ships and the number of troops in New Britain. The authorities at the time were unaware of the whereabouts of the *Komet*, but it was surmised that the message came from her. A party under the command of Lieutenant-Commander Jackson, R.N., together with a detachment of infantry under Colonel Paton, and two machine guns under Lieutenant Marsden, at once set out for a spot 150 miles southward from Rabaul.

They located the *Komet*, and taking those on board by surprise effected an easy capture. The crew numbered thirty-eight, including nine Germans, the commander being Captain Moeller, who was in the act of shaving when his cabin door was opened and a revolver thrust in his face by one of the boarding party.

Lieutenant-Commander Jackson subsequently took command of the *Komet* and brought her to Sydney in October, 1914.

Disappearance of Ships.

Within the last six months twenty ships, aggregating upward of 100,000 tons, have disappeared in a mysterious manner off the American coast. It is mainly in the region of Cape Hatteras that this fleet is supposed to have come to its sudden end. In ordinary conditions such a loss, though heavy, would probably have been attributed to the violent gales and mountainous seas which shipping often encounters off this point. It has always borne a bad reputation among sailors. Had the vessels succumbed to the violence of the elements, however, it is highly improbable that the entire fleet would have disappeared, as it appears to have done, without leaving some drifting wreckage, lifeboats or rafts. Underwriters in England and America declare that the most suspicious circumstances attending many recent sinkings have been their almost unfailing occurrence within easy reach of land. In the case of one vessel, at least, there is a suggestion that she was assailed by modern buccaners. A bottle, said to have been picked up off Cape Hatteras, contained a message to the effect that the American schooner *Carol A. Deering* had been captured by a submarine pirate. The message stated that the ship was ransacked and the crew either handcuffed and imprisoned or murdered. The vessel was found abandoned off the American coast. Her sails were set, but all provisions, clothing and lifeboats were missing.

Great Towing Feat.

The Commonwealth Government steamer *Booral* performed a remarkable towing feat in the North Atlantic, while voyaging from Australia to the United Kingdom recently. After weathering a heavy storm she sighted the distressed trawler *T.R.48*, bound from Nova Scotia to Scotland with a cargo of machinery. The trawler had experienced boiler trouble and had been drifting for over a week when sighted by the *Booral*. The latter took her in tow and shaped a course for the Fayal Western Islands. Stormy conditions prevailed for several days and the trawler was tossed about like a cork, thus greatly impeding progress. On six occasions the tow line snapped under the great strain, and extreme difficulty was experienced in getting fresh lines aboard the trawler. Eventu-

ally, after a tow of over 1,000 miles, the *Booral* brought her charge safely into the Azores, where repairs were effected.

Costly Repairs to a Steamer.

The Italian steamer *Vittoria*, recently dry-docked in Melbourne, enjoys the distinction of having the highest repair bill charged to an oversea trader in the port of Melbourne recorded against her for work just completed. The *Vittoria* was commenced in an Italian shipyard in 1916, and before completion was sunk across a harbour entrance to obstruct enemy submarines. Two years later she was raised and converted into a deep sea freighter.

On her maiden trip a heavy loss amounting to more than £100,000, was sustained; the whole blame for which, in the opinion of the surveyors, was due to her hasty construction carried out to meet the nation's war-time needs. The vessel loaded at Geelong in March last, but when seven days on her voyage to Italy she put back into Adelaide leaking badly. Her cargo was discharged, much of it being badly damaged by water, and the *Vittoria* then returned to Melbourne for repairs. It was found that many rivets below the water line had been badly inserted, some being driven through only one plate.

As a result of the delay the vessel has lost her wheat charter and, in addition, the owners are faced with heavy losses in regard to the freight discharged at Adelaide. The cost of repairs at Melbourne is estimated to exceed £25,000.

Export of Vessels.

The prohibition against the exportation of vessels of all kinds and floating docks, which was a war-time measure of the Federal Government, has now been repealed. During the war the high prices offering abroad for vessels of all descriptions would probably have caused a serious depletion in Australian tonnage had not the Government stepped in. The measure operated since February, 1915.

Death of an Old Skipper.

Captain William Hurford, one of the oldest and best known skippers in the interstate service, died in Brisbane on July 13. Captain Hurford in his time had commanded almost every passenger vessel run by the Howard Smith Co.

Italian Steamer Damaged.

The Italian steamer *Duchessa d'Aosta* arrived in Sydney on July 14 with a damaged stern, the result of a collision in Perim Harbour. The master, Captain Zor, states that while his vessel was anchored in Perim Harbour the steamer *City of Calcutta* collided with her. Fortunately no serious damage was sustained and after minor repairs were effected the *Duchessa d'Aosta* proceeded on her voyage. She came to Sydney to the agency of the State Wheat Board to load a full cargo of wheat for overseas.

Memorial for the Mercantile Marine.

The Commonwealth Government has been advised that the King has sanctioned a memorial being presented to the next of kin of all those members of the British, Dominion, Colonial, and Indian mercantile marine (including licensed pilots, fishermen, crews of pilot boats and lighthouse authorities' vessels, and of post office cable ships) who lost their lives through enemy action while serving on British ships, and to the next-of-kin of British members of crews of neutral and Allied vessels under the direct control of the Admiralty or the Ministry of Shipping, who lost their lives through enemy action while serving on such vessels between August 4, 1914, and November 11, 1918.

The memorial will take the form of a bronze plaque of emblematic design and a parchment scroll.

Presentation to Captain and Crew.

The directors of the North Coast Steam Navigation Co. recently presented Captain Richard Purdy, master of the *Brundah*, with a suitably inscribed gold watch in recognition of the part played by him in saving the lives of the crew of the *Our Jack*, which foundered near Port Stephens on June 26, details of which appeared in the last issue (July) of *Sea, Land and Air*.

Sir Allen Taylor, chairman of directors, in making the presentation, commended Captain Purdy for the splendid seamanship displayed by him in handling his vessel at the time of the disaster.

The crew of the *Brundah* were also presented with a bonus of £100 in recognition of their services when the *Our Jack* foundered.

London's New Dock.

The great new dock which will enable 30,000-ton liners to be berthed within 6½ miles of the city of London, was officially opened on July 8 by their Majesties the King and Queen, accompanied by Princess Mary and the Duke of York. There was a brilliant pageant on the Thames as the steamer conveying the Royal party passed through the lines of beflagged vessels and cheering crowds who thronged the banks.

The King, in replying to the address of the Port of London authority, said that the new dock, which is to be known as King George V. Dock, promised to add greatly to the efficiency and prosperity of the port. It enabled vessels of far greater tonnage than ever entered the port before to be accommodated; the dock itself being equipped with the finest and most modern buildings and loading and unloading machinery. He was confident that London would maintain its position as the foremost port of the world.

The new dock, which is really an extension of the Victoria and Albert system, provides a wet dock sixty-four acres in area, with a depth of thirty-eight feet. There are fourteen berths capable of taking the largest steamers.

"Osterley's" Eventful Voyage.

The last voyage of the Orient Company's R.M.S. *Osterley* from London to Sydney was attended by a number of exciting incidents.

Shortly after leaving Rotterdam a severe thunderstorm was experienced, during which a vivid flash of lightning struck and splintered one of the masts. The next incident occurred in the Bay of Biscay, when the cry of "woman overboard" was raised. Lifebelts were thrown into the water and a boat was lowered, but the search for the woman proved futile.

The *Osterley* brought twelve emigrants who were on board the steamer *Benalla* when she collided with a tank steamer in the English Channel last April. The collision occurred in a thick fog and for a time there was panic amongst the passengers on the *Benalla*. They were soon reassured, however, and whiled the time away—it was six hours before a Dover salvage boat located the damaged steamer—by singing and playing, to, as one passenger declared, "keep their spirits up." The *Benalla* had a hole twenty feet in

diameter torn in her side and one hold contained twenty-seven feet of water.

New Blue Funnel Liner.

The latest addition to the Blue Funnel Line is the twin-screw steamer *Calchas*. Built by Workman, Clark & Co., of Belfast, to the order of Messrs. Alfred Holt & Co., the vessel has a gross tonnage of 10,300, and is intended for the passenger and freight service. There are seven holds, so pillared as to render them free from structural obstructions, for the carriage of general cargo. The propelling machinery consists of two sets of Brown-Curtis double reduction geared turbines, developing a speed of 14½ knots.

Argyllshire's Rough Trip.

The Federal liner *Argyllshire* encountered exceptionally rough weather when four days out from the Cape on her voyage from Liverpool to Sydney. Mountainous seas broke over the decks, carrying away the starboard gangways and accommodation ladders. Seas were shipped both fore and aft and it was necessary to keep the passengers below. In the Indian Ocean the weather was even worse, the liner labouring heavily in a fierce gale accompanied by hail squalls. One huge sea which broke over the vessel reached the funnel and left several inches of water on the navigating bridge—about fifty feet above the waterline.

The gale which struck the *Argyllshire* off Cape Otway on July 15 was declared by Captain W. J. Page to be the worst experienced by him for twenty years. Steering became exceedingly difficult, and it was almost impossible to see the navigation lights along the coast.

Death of Captain Sweet.

Captain John L. Sweet, who was for

many years associated with the State pilot service, passed away on July 24.

Previous to joining the pilot service, Captain Sweet was employed in the Howard Smith line. After resigning from that service he engaged for a few years in pilot work at Newcastle and later came to Sydney, where he succeeded Captain Chudleigh as pilot in charge of the *Captain Cook* at South Head.

It fell to Captain Sweet's lot to render assistance to many distressed vessels during his service on the *Captain Cook*. On one occasion he was instrumental in saving the crew of the yacht *Thelma*, which was dismantled and driven ashore on Dobroyd Point by a cyclonic storm during a yacht race. It was a plucky rescue, and the yachtsmen of Sydney presented Captain Sweet with a souvenir to mark their appreciation of his action. The deceased Captain retired from the pilot service owing to indifferent health.

Boys for the Mercantile Marine.

The Minister for Trade and Customs has exempted, for a period of six months ending December 31, 1921, all ships registered in Australia and not regularly employed in trading to places beyond Australia, from the provisions of the Navigation Act in regard to the carrying of boys and apprentices who may wish to embark as deck boys.

It has been decided to take a census in each State of the number of boys desirous of entering the mercantile marine. Good eyesight is an essential qualification, and it is strongly recommended that all lads wishing to enter the service should undergo a medical examination and obtain a certificate as to their physical fitness for sea service. The Department of Navigation accepts no responsibility in regard to finding employment for any applicant.

MOTOR CARS AND WIRELESS

It was recently demonstrated in London that it was quite practicable to control a small electric car by sound waves, which means that the car, without any one in it, could be started, stopped and steered by blowing a whistle. The sound waves were received on the car by a sensitive detector, which brought the controlling mechanism into action. The experiment had

previously been successfully performed by wireless transmission, but control by sound seems to open up a new field. The motorist of, say, a hundred years from now may be controlled by unseen agencies and forces. Every car may be required by law to be equipped with control devices sensitive to sound waves. Then what about the speed limit?

THE LATE HARRY HAWKER

A REMARKABLE CAREER

BY the death of Harry Hawker, the famous airman, who was killed at Hendon (England) on July 12, the flying world loses its most picturesque figure and Australia one of her most daring and adventurous sons. Hawker was practising in a Nieuport machine for the Aerial Derby to be held a few days later, when the unfortunate mishap occurred. The first reports cabled to Australia indicated that the plane had caught fire while in the air, and the airman, losing control of the machine, had crashed to earth, his death being due to a terrific explosion which occurred just before the earth was reached, more than to the crash. The evidence at the inquest disclosed that Hawker was in a bad state of health, medical testimony revealing that the unfortunate airman was suffering from an abscess on the spine. It was stated that sudden

his body being broken; his face and head badly burned. After the explosion the plane careered a short distance across the ground at a terrific speed, and was then consumed by the flames.

The English papers paid glowing tributes to Hawker's many daring exploits, the *Times* remarking in a leading article, "that Australia will lament with England the loss of a master among fliers. To his wife the deep sympathy of his countless admirers here, in Australia, and wherever, throughout the world, men watch the daring conquerors of the air, goes with a full heart."

The aeronautical correspondent of the *Times* says that Hawker was the most romantic figure in British aviation, and was a pilot of incomparable skill and great courage.

The Prime Minister, Mr. Hughes, when told the sad news, said:

"I am shocked to hear of the sud-

den end of this brilliant career—this daring and adventurous son of Australia. The news will cause profound regret to all who know what he has done for the Empire and the Commonwealth. Not only Australia, but the whole world will deplore the loss of this great pioneer of aviation, whose



The Late Harry Hawker.

name will live in history, and be remembered with pride in his native land. To his widow, Australia tenders its sincerest sympathy."

The late Mr. Harry G. Hawker was a Victorian, born at St. Kilda in 1890. He was educated at St. Kilda Public School, where he gained a knowledge of engineering. At the age of 18 he went to England and spent three years studying mechanical engineering. Later he joined the Sopwith Aviation Co., where he soon gained a pilot's certificate, and very shortly afterwards established a world's flight duration record of eight hours twenty-three minutes in the air. This feat was accomplished in a *Sopwith-Wright* biplane.

Hawker's next exploit was his participation in a round-England flight for seaplanes in 1913, in which his mechanic was Harry Kauper, another Australian. The 'plane was what is known as an underpowered one, but the two plucky aviators managed to circumnavigate Great Britain as far as Dublin Bay, where valve trouble developed and in attempting to make a landing the machine got into a side slip and crashed. Hawker escaped uninjured, but his companion broke a limb.

Sometime afterwards Hawker came to Australia with a *Sopwith-Tabloid* 'plane, which he flew in Sydney with great success. On returning to England he nearly met disaster when testing the *Tabloid* machine through getting into what is known as a "spinning nose-dive." The discovery had not then been made that it was possible to get out of such an awkward position, but by the greatest good luck Hawker, after spinning down from 2,500 feet, lobbed, nose first, in a huge oak tree, which broke his fall. The machine was totally wrecked, but its pilot escaped with a scratched cheek.

On the outbreak of war Hawker volunteered for active service, but his services were far too valuable from a constructional point of view to allow him to go as a combatant. To Hawker belongs the distinction of having evolved such wonderful machines as the $1\frac{1}{2}$ *Strutter*, used for bombing purposes, the *Sopwith Pup* and the *Camel*. It is claimed by many competent judges that Hawker's judgment as a test pilot was unequalled throughout the world.

On May 18, 1919, Hawker, accompanied by Commander Grieve, of the Royal Navy, left St. John's in a *Sopwith* 'plane fitted

with a 365 h.p. *Rolls-Royce* engine. They encountered bad weather from the beginning, having to fly through fog and rain for hours with only the instruments to indicate their height, speed and direction. For days after no word of their whereabouts was received and the greatest anxiety prevailed. However, on May 26, news reached London that the two airmen had been picked up by a Danish vessel not fitted with wireless. In describing their experiences, at a banquet in London, Hawker related how, after being five and a half hours in the air, through the choking of the filter the temperature of the water-cooling the engines started to rise and a descent of several thousand feet had to be made to overcome that difficulty. A few hours later the trouble occurred again, and it was then realised that the wisest course was to play for safety. A course was shaped diagonally across the main shipping route, and after about two and a half hours the Danish steamer *Mary* was sighted and signalled to. The signals were answered and the aeroplane landed in the rough water ahead of the steamer. Great difficulty was experienced in getting the two airmen aboard the vessel and the task was a dangerous one by reason of the rough seas which buffeted the two craft about.

When news of their rescue was flashed around the world a thrill of relief was experienced by the millions who had awaited news of the gallant airmen's fate with uneasy feelings. They were accorded a magnificent reception on their arrival in London, being carried shoulder high to their car by Australian soldiers.

Most people thought that such a trying experience would have satisfied Hawker's thirst for adventure, but it was not so. He afterwards competed in all the Aerial Derbies in Europe, and devoted much of his time to motoring, which had long held a fascination for him. He had several narrow escapes from serious disaster while competing in racing events, the latest occurring only a few months ago. Last June on the Brooklands track he covered half a mile in a light car at the record speed of 105 miles an hour.

His death is a serious blow to aviation, not that it indicates failure on the part of man to conquer the air, but because it robs us of one who has done perhaps more than any other living individual to thrill the world with his remarkable exploits.

STEVENSON IN THE SOUTH SEAS

BY

WILLIAM CHURCHILL

ROBERT LOUIS STEVENSON won more than the honour of being regarded by his own people as the first of romancers in the English tongue. He was acknowledged by all Samoa, where his last, and by no means his least happy and fruitful years were spent, to be Tusitala, the teller of stories. It is no light honour; it is not easily won. A man must have tales to tell, the art wherewith to make the telling notable, before he can win the approval of these Samoans, as they sit in the evening circles, in the cool trade breezes, and as the hospitable cigarette passes from lip to lip.

Any Tusitala, for there are several, ranks high in the simple state of the Samoans. Every chief of village has his orator, the man who, in meetings of the people, or in conference with people of other towns, presents the royal purpose. With the feathered wand which is the ensign of his rank, he stands before his chief, and in full voice, and with skill of words, presents his case. He must be an orator, a pleader, a master of speech, able to force the unwilling, to lead the ready, to spur the hesitating, to win by argument where argument holds, by sophistry, by any rhetorical art, so he wins. This much is required of an ordinary village Tusitala. More is necessary when one is the master of speech for a chief. From Savaii to Manona, up the heights of Upolu, and down in the bays of Tutuila, Tusitala meant Robert Louis Stevenson in the speech of the gentle islanders.

In 1888 Mr. Stevenson was hunting the earth for a spot of land and climate which meant life for him, if haply, there were any life left to one so far gone in health as he. He had tried the Mediterranean countries until he saw that health lay not there. He had sought the Adirondacks in the hope of recovering strength, but the balsamic airs of the forests of the North Woods had proved as worthless as the reek of the orange groves. Driven even further afield in search of climate, he came to California in that year. He knew what those

cloudless skies and that transparent air were; that is all set down in the "Silverado Squatters." But for once the climate of a State which is all climate failed to work good. Somewhere on the earth he hoped there might be a place where he could live and breathe with comfort, or at least, with absence of the pain which was racking him. Beyond the Golden Gate lay the islands of the South Sea. He made his choice happily, it proved, for it added years of comfort, even of activity, to the life of a man who seemed scarce worth a month's purchase. He chose the South Sea.

It was then that I made his acquaintance, an acquaintance since renewed and maintained by letters, with such difficulty as lies in the fact that a question might be asked and answered in say half a year, if luck was good. I was called in as being somewhat of an expert in the South Sea, having, indeed, but lately come off several years of voyaging among the islands.

Mr. Stevenson, when I first saw him in his room in the Occidental Hotel in San Francisco, was sitting up in bed, not rightly able to speak for the cold that oppressed him, haggard from the illness that was sapping him, thin, pale and wan. The first sight was something more than of a man with the blankets and counterpanes hunched up about him; it was an impression of flowing black hair, keen eyes and a wonderful interlacing of taper fingers. At this time he was so hoarse that his voice had none of the charm which was really one of the most marked attributes of the man. More pleasant days, and strength growing in the nervous hope that the South Sea might indeed yield him what was nowhere else for him on earth, gave chances to hear that voice as it really was—gentle, deep, sympathetic. But those fingers—long, sinewy, sinuous, never resting, but rubbing each the other as if there were a mania of the nerves in their tips. Those who have never seen Stevenson's hands may form some idea of the fingers from the so-called "water-melon seed" picture, in which one of the forefingers, rest-



It was Samoa that welcomed Robert Louis Stevenson and kept him a contented visitor as long as he lived. Samoan children are seen here preparing kava for their visitor.

ing against the face, seems to reach up into the hair.

At this first meeting he seemed eager for all that might be told of the mysteries of the South Sea. He asked about the voyages of the old voyagers; he sought to know what were the traders of to-day, and this in one breath. Again he caught at the name of "Bully" Hayes, the last pirate of the Pacific, and lumped with him the mystery of "La Perouse." Names of islands and groups were, of course, all new to him, and he asked again and again where they lay and how they were pronounced. But in everything he was, more than anything else, wistful to hear of the unmixed islanders—what was their life and what sort of people they might be.

At odd times, Mrs. Stevenson would come in and caution him not to use his voice so much. Then he would settle himself upon the pillows and say: "Tell me something that takes a long time telling." It took time, this first telling of the South Sea, for which he was every moment more strongly making up his mind; the session was no short one. And this first was followed by others; in which he showed the same zest to learn every fact attainable concerning the island realm that lay in the great ocean on whose verge he was.

He chose the South Sea. It was a generous choice: he chose it all. He selected no particular region of ocean in a sweep that is the very broadest that is to be found on the earth, except where the great southern ocean sweeps unbroken about the Antarctic Pole and frets the ice. He picked out no one island of the thousands, reef-girt and palm-crowned in those warm waters. He took them all in one vision of health, and made his plans to go to the South Sea wherever the winds would carry him. He is not the only man on whom the spell of the South Sea has thus wrought; even the "beach-combers" bear witness to its magic, and here and there some have come out of the South Sea and long to go back.

In the harbour of San Francisco was the schooner yacht *Casco*, owned by Dr. Merritt, of Oakland. In England and here in New York many men had offered their yachts to Mr. Stevenson, not only men who had known him by word of mouth, but even men who had not met him outside of their libraries. But this yacht owner held certain very definite views on the general subject of literature. He looked upon

"Barriers Burned Away" as the highest mark in fiction, and he was oppressed with the idea that men who wrote books must be making a very poor living of it. Furthermore he had never heard of Stevenson, and had never seen one of his books. He was one of the men whom you would like to drop into the middle of the "New Arabian Nights," and watch him trying to make sense out of what he was reading. Anyway, he had the sense of his kind to drive a shrewd bargain when he was asked to give a charter party of the *Casco*. The hire must be all paid into bank beforehand, there must be no loop-hole for bottomry in foreign ports, all costs of repairs must rest on Stevenson, and Dr. Merritt's own sailing master must go as captain in order to see that all went well. Even with all these restrictions the charter was accomplished, and the Stevenson party began to put the *Casco* in readiness for a voyaging to nowhere in particular. The yacht was a roomy, two-masted schooner, cabin aft, galley and lockers amidships, the fore-castle forward, all under a flush deck. She had been in the South Sea once before and had proved herself not only a weatherly boat, but quite comfortable in a sea.

I was present at the ceremony when she went into commission. She was lying in Oakland Creek at her usual berth, and the stores were being rattled aboard. I had brought down a bunch of well-marked charts and several volumes of notebooks of experiences in the South Sea, for the use of the voyagers. The cabin was a scene of disorder: Mattresses were heaped where it was not reasonable to suppose any one could sleep in a sea way; the places where the mattresses should have been were filled with a mixed assortment of clothing and cabin stores. To any one but a seaman it would have seemed a hopeless task to attempt to restore order. The cabin hatch was darkened and Stevenson came down the companion, assisted by his step-son Lloyd Osbourne. Stevenson managed to find an uneasy seat on a barrel of cabin flour, and began to yield up personal property from capacious pockets.

This first voyage stretched away to the south and into the fine weather. The *Casco*, with the Stevenson party aboard—Mr. and Mrs. Stevenson and Lloyd Osbourne—touched at the Marquesas, and then bore away for Tahiti. The log—I had it afterwards and published it—showed un-

interrupted sailing, and little incident by the way. Between the Marquesas and Tahiti there was some rough weather and a topmast was sprung, which delayed them for repairs when they reached Papeete. Here the cook ran away and it became necessary to replace him. The successor seems to have been a very poor cook indeed. Then they bore away northward to Honolulu, a voyage of nasty weather. At Honolulu the yacht was given up and sent back to San Francisco. Here or at Waikiki the party stayed with Mrs. Strong, Lloyd Osbourne's sister. There was for them, as for all who chose to stay at the watering place of the Hawaiian capital, much of pleasure here, and the tarrying was prolonged.

But the dry weather came. Stevenson had not yet seen all the South Sea, but only a little stretch of its eastern edge. He wanted more. Then it was he who formed the scheme of taking a great moral show through the islands. This plan he essayed to carry out with the assistance of Osbourne and Strong. It centred around a stereopticon, which Strong was to manage; a lecture, based on the slides they were able to collect, a feature of the entertainment which Stevenson fancied came in his own line; and a general supervision of the whole affair, which was to be Os-

bourne's share in the enterprise. This plan was reluctantly laid aside, by reason of the incomprehensibility to any South Sea audience of Stevenson's lectures. In place of this scheme they engaged a trading schooner to take them a trip through the Line Islands. Then, for the first time, Stevenson began to look with respect upon a cockroach, for he met with experiences as every one must who chooses a trading schooner for passage along the Line in the Pacific. If there is any objurgation of the cockroach in any of Stevenson's South Sea tales, as indeed there is, it is all founded on this experience in the island trader *Equator*.

The cruise ended in Apia, and there in Samoa the Stevenson family have lived. Once, in our talks about the South Sea, Mr. Stevenson asked if there were any place there where a man might live if the land suited him. It led me to a description of a small plateau on Upolu, in the rear of Apia, a narrow shelf upon the mountain side, where the paths run much like ladders; where there were three springs of water, where the view over the ocean was ever restful, stopped short of the North Pole only by reason of the earth's swelling round. His memory must have stored away the description for the place in mind was Vailima, his home in Samoa.

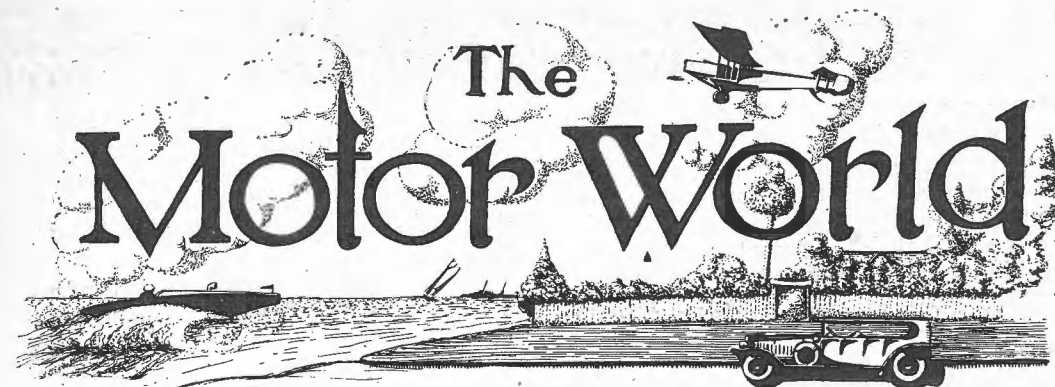
THE PRINCE AT THE WHEEL

I met a man recently who had been privileged not long ago to demonstrate a well-known high-powered car to the Prince of Wales, says "Contact" in *The Motor*. It was an experience to which he had looked forward with a certain amount of trepidation, but which he was destined thoroughly to enjoy. As usual, the Prince set him quickly at his ease, and in a short time he was lost in admiration at the way the Prince handled the speed-monster—which he drove most of the time. My informant has done a fair amount of speed work at Brooklands in his time, and knows a good driver when he meets one. Now he says: "If you want to know how a car should be handled, watch the Prince!"

Yet another piece of motoring philosophy. Ease of control in the car is never acquired by the driver who cannot control his temper! Beware, then, of the "friction driver!"—*Autocar*.

NEW SUPERMARINE AMPHIBIAN

A new amphibian flying-boat, designed and constructed to the order of the Air Ministry by the Supermarine Aviation Works, Ltd., has passed its final acceptance tests and trials most successfully. The shore landing made on one of the R.A.F. aerodromes proved the new type landing gear that has been fitted to be highly efficient. In addition to this, a number of improvements have been embodied in this machine which are the result of the experience gained by the company last year at the trials held at Martlesham Heath and Felixstowe. This amphibian flying-boat was delivered to a representative of the Air Ministry at the works last week, and it was flown by one of the Service pilots from Southampton to Grain, where it arrived safely after having accomplished a successful non-stop flight.



BY
"WILGA"

"Colour Trail" Roads.

THE National Roads Association, New South Wales Branch, has invited the Royal Automobile Club of Australia to co-operate in establishing a "colour trail" from the Queensland border, through Sydney to Albury, by contributing half cost of the work. This would be known as the "Blue Trail," and could be followed by motorists from end to end without fear of going astray, as the blue markings would be visible on telegraph poles and similar prominent objects. Different colours would be chosen for other main roads, as, for instance, red for the Prince's Highway (Sydney, *via* South Coast and Gippsland to Melbourne), and so on.

Royal Automobile Club of Australia.

The interstate reliability trial from Brisbane to Sydney is now set down to leave the capital of the Cinderella State on Tuesday, August 23. Particulars appeared in the July issue of this journal. The fourth day's run (Muswellbrook to Mudgee, 126 miles) is the shortest of the five. The reason is that Mr. Fred D. McMaster, "the genial," of Dalkeith Station, Cassilis, has invited the participants to lunch at his palatial homestead and inspect the wonderful collection of modern machinery that the born mechanic has installed at different points on the huge property—of which more anon. As the writer has travelled in a car up to sixty miles an hour along the excellent road between Muswellbrook and Dalkeith (seventy-six miles), and as the afternoon run (fifty-one miles) is over

good surfaces, marred only by short "V" shaped gutters and several causeways, there should be available for inspection purposes at least a couple of hours.

The Club will co-operate with West Ryde Progress Association in approaching the Railway Commissioners to abolish the present dangerous and inconvenient level crossing at Ryde railway station, and substitute either an overhead bridge or a subway.

The Upper Hunter Shire Council (Scone) desires the Club's efforts to the end of securing a special grant from the Government for the erection of a bridge over Kingdon Ponds, two miles north of Scone, where the crossing is at times not negotiable.

Five Club caution signs have been issued to Campbelltown Municipal Council and Wollongong and District Citizens' Association for erection at dangerous corners.

Blazing the Trail.

The pioneers of this blissful State, when they started out for parts unknown, used the handy tomahawk on the bark of the trees along the route which they travelled to indicate whither they were going, and whither they wished to return.

That was all very well in the "bad old days." To-day we have entered upon a new phase. To make good roads, don't follow the beaten ways.

Mr. Roland Brown, of William Street, Gordon, a large property owner in the northern suburbs, and a frequent tourist throughout New South Wales, in an exclusive interview for *Sea, Land and Air*,

said: "I have noticed on every occasion on which I have travelled through the State—and I make no exception—that, approaching a new road, if there has been one motor car gone along, every other following motor goes in the same tracks.

"My opinion as to the motorists who are clamouring for good roads and complaining of bad roads is that they should learn to read their own roads and give up following the steps of their predecessors. Thereby they would not cause the road to have two gutters in the centre. It is obvious, therefore, for the purpose of forming good roads, that every motorist should try and vary the tracks. Get off the beaten way and make one of your own. Don't be like the horse-drawn vehicles of the olden days which followed Cobb & Co.'s coaches over long stretches of mail routes. By keeping to these worn paths each vehicle becomes a potential road-destroyer.

"Strike out your own track," concluded Mr. Brown, "and get away out of the usual rut. Thereby you will preserve the road and at the same time make it better for the man who is following you.

Where to Go To-morrow?

Sea, Land and Air proposes to advise motorists as to the best routes to take in order to spend pleasant holidays over decent roads and in attractive localities. A one-day trip to Wiseman's Ferry is recommended. From the city, the Parramatta Road should be followed to the ancient town, the tram line to Castle Hill hugged, and the turn to the left past the Castle Hill Showgrounds taken. Or should it be desirable to go by the pretty North Sydney route, the motorist would proceed *via* Pearce's corner to the terminus of the Castle Hill tram, turn to the right at the refreshment house and thus pass the Castle Hill Showgrounds. From there on through Box Hill and Rouse Hill, the road is good and the view of the city and Parramatta River district, as seen from the heights, is something to be remembered. There is one spot opposite Major Phillip Charley's former residence which requires care to negotiate. A bad rut comes in here from a left-hand side road. Thereafter, past the Buffalo Farm established by the State Government, the road is excellent until near McGrath's Hill (35 miles). Here, at the silos, turn to the right through Pitt Town and Maroota (50 miles). A month

ago the writer had great trouble in trying to avoid—generally unsuccessfully—the tracks of predecessors. It was found almost impossible. The furrows or gutters caused by the wheels of cars driven by men who evidently did not know how to use the new formation which the Shire Council had so valiantly provided, were horribly "ploughed in." "Motorists all: be unselfish."

Examine your brakes before descending the decline to the Ferry when you have reached that far, by exercising care at a few bad patches and several sharp turns. Do not fail to go slow down the gorge. You will, on the left, see Sackville Reach, ahead, the McDonald River junctioning with the Hawkesbury River, and on the right the declivity and the broadened Hawkesbury.

Good Roads.

The slogan of the Royal Automobile Club of Australia (Sydney) is "We want good roads." Through its members the Club fights for this principle every day and all day.

Theoretically, good roads should be laid down by experts. Actually these roads should be established and controlled, so far as their construction and maintenance is concerned, by hard-headed business men. Men trained to see ahead and to discard the principle and policy of "penny wise, pound foolish."

The generously-minded and well-informed Chairman of the Roads and Tours Committee of the Royal Automobile Club of Australia, Mr. D. M. Cooper, is a consistent exponent of the claims for recognition of the practical man, as against the theorist. His balanced opinion is that experts, while being very necessary, should be employed in an advisory capacity only, to make recommendations to business men who should constitute a Main Roads Board. Mr. Cooper has made a close study of the proper method of constructing roads suitable to Australian conditions, and has promised to supply *Sea, Land and Air* with a comprehensive statement of the best methods of making roads which will last, and give the acme of service at a minimum of cost.

The last clauses of the foregoing paragraph gives one cause to think how the Parramatta Road is not standing up to the requirements of heavy traffic. Even on

the day of the official opening of that main avenue, the writer drew attention to the fact that already the road was "wavy" and that workmen were tearing up the surface to lay down water and gas pipes. Would hard-headed business men subscribe to a policy which involved the latter contingency?

Street Signs That Went.

A "Stop, Go!" mechanical traffic sign, worked by a traffic policeman, had a brief strut on the stage, at the corner of Market and George Streets, Sydney. Vehicle drivers liked it as little as the police, and it has gone to the shades.

There is a "traffic umbrella," it shows "stop" on two sides and "go" on the opposite panels, stored away in Sydney. When brought into play it serves to protect the traffic constable from weather conditions.

Some months ago Colonel Cornell, Secretary of the National Highways Association, proposed to adopt the idea. Says the *New York Herald*: "The Police Department, which thinks nothing at all of considering anything under the sun.

is rather for it." Following the suggestion of Colonel Cornell, other suggestors, who know little about traffic and scarcely anything at all about any other subject, allowed it would be a good idea for the policemen to have large canteens strapped over their shoulders or under their chins, on one side of which would be a white space and on the other the word "stop." It was agreed, however, that the thirsty officer would scarcely ever do so.

Another giddy suggestion made by a person who had been standing in the sun, was that the policeman be provided with fans upon which the signals would alternate. This would be simple, and the policeman would feel and look so.

The final suggestion made by a worried individual who was waiting for a tram was that the fretting policeman be provided with great eiderdown stuffed office chairs, with signals on either side. They could, by merely tapping the pavement lightly, turn the chair about and start something in either direction with but the vaguest effort. The eiderdown was objected to on the ground that it was just a whit too soft.

Still another man suggested that when the traffic men were not busy they might spend their time wearing horn-rimmed

goggles, selling shoestrings, dispensing strawberry ice creams, or in between times, holding up wobbly pedestrians and lecturing them on the evils of rum.

Motor Yacht Club of New South Wales.

The first annual ball of the above Club is set down for Thursday, August 4, at the Town Hall.

The annual meeting will be held at the Club House on August 23, at which the election of officers will take place. Commodore J. Milne has consented to again be nominated.

Racing conditions are being revised in order to make more equitable the handicaps of the speed boats in relation to the slower boats; the latter can tool along at the same "bat" all through, while the former may often be compelled to slow up at turns and elsewhere.

The Club hopes to possess shortly a new challenger for the Australian Championship in the shape of a 200-h.p. engined craft now being built. Its speed will not be under 45 m.p.h. The Commodore hopes to take with him to Adelaide (the home of "The Tortoise" holder) a strong contingent of local members to witness the event, which will probably be decided in January.

It is expected that the Club will boast this season five boats at least capable of doing over 18 miles per hour and three which will exceed 25 miles, so that the Laurel Cup donated by Mr. G. S. Pursey will become available. Entrants must be able to finish the 25-mile course (Rose Bay) within the hour to qualify.

Motor Cycle Club of New South Wales.

The Honorary Secretary, Mr. J. A. Fair, advises that the next out-door fixture of the Club will probably be track racing at the Sydney Sports Ground in September—if the track is in good order the probability will be a certainty.

The 24-hour reliability trial to the lower South Coast, *via* Goulburn and return through Wollongong, is to be carried out during the full moon period in November.

The biggest competition in Australasia in which the motor engine has played the leading part, will be a six days' reliability contest of this Club during the Christmas holidays. As Victorian support of interstate competitions (motor cars and motor cycles) has been so niggardly of late, the six days' run will be confined to towns in New South Wales.

Motorgrams.

Mr. C. O. Sherwood, New South Wales manager of the Dunlop Rubber Co., Ltd., is expected to return from his round-the-world trip about the end of August. Mr. Sherwood, on his arrival in England by way of New Zealand and America, was welcomed by his aged father (over ninety years of age) and several uncles well on to the century.

Mr. Kelly, of Chevrolet fame, is now pushing the Acme spring.

POINTS TO WATCH IN MOTORING HOW YOU CAN SAVE EXPENSE

To motor cheaply! It seems almost impossible to achieve, but there is no doubt that motorists are a profligate race, and spend much more than is necessary. Here are a few suggestions for reducing cost, offered by Mr. Leonard Henslowe, author of some well-known and authoritative volumes on motoring matters:

First, to make sure that there are no stiff or binding places, such as brake drums, grease-clogged gearbox, or differential. To test this take your car out on a flat road, and after seeing that the brake is released, push it along. You should be able to push along a freely running car easily by hand. If you cannot, it shows there is binding somewhere, and that power is being lost when driving; friction is expensive.

Next test your carburettor. You no doubt know the work that a carburettor does. Well, the fitting of a smaller jet than the one fitted by the makers when the car was new will often effect much economy in your petrol bill without losing you any power or speed. However, the losing of very slight power on hills, and perhaps a couple of miles an hour on the road, should not make any difference to the motorist who is out for economical running.

Extra Air Valves.

Extra air valves are a great aid to fuel economy. Air costs nothing, therefore use as much of it as possible provided the pulling powers of the engine are not interfered with. The makers of extra air valves, besides supplying full instructions for fitting, generally give directions when and how to admit the air to the best advantage.

The Newcastle Automobile Association's recent hill climb up Wolfe Street, in connection with the benefit to the Y.M.C.A., was won by Mr. C. Rink (Essex). Mr. Rink pushed the Hudson Super Six into second place, and Dr. Allen hustled another Hudson Super Six into third place.

Thornycrofts (Australasia) Ltd., has been formed, and the new firm, which is associated with the head establishment, will carry in Sydney a full stock of parts, etc.

You, of course, know that you consume more petrol climbing a hill than on the level; well, this can be partly made up by coasting down hills. This is a method I have generally found good. I say "generally," because on some of the cars I have driven on test the method must be varied. Switch off your engine, leave top gear "in," put out the clutch, shut throttle, and silently coast down the hill.

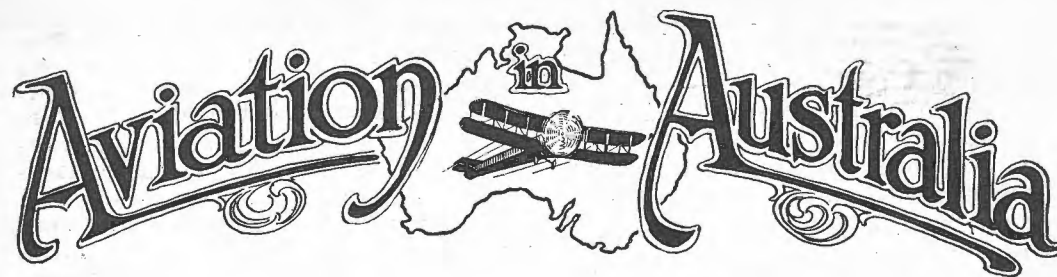
Mind Your Tyres.

Do not open your throttle suddenly for a quick spurt, and do not come to a sudden stop by applying your brakes hard, except in emergency. Here are two ways of using much petrol unnecessarily on the one hand and wearing out your tyres unnecessarily on the other; brake using and tyre wear go hand in hand. If your car has a variable spark lever, use it intelligently by retarding on hills, but do not forget to advance it again—a most common fault.

Tyres are an expensive item, but much economy can be practised here. They should be fully inflated; under-inflated tyres, besides slowing the car, puncture more easily and wear out quicker.

The tyres should be frequently examined for cuts and flints embedded in the tread. By taking out the stones and nails and bits of metal that a tyre picks up in running many punctures are prevented, as the foreign matter is removed before it can penetrate far. All cuts should be vulcanised; a home vulcaniser is an economy.

Open the throttle only to the point necessary to obtain the speed required. More throttle means more petrol. Be as gentle with the accelerator pedal as you would be in playing a piano.

**Aeroplane Carries Fodder to Starving Sheep.**

It frequently happens that when Nature has planned to destroy that which is essential to human welfare, man is able to circumvent her by an invention of his own. This was strikingly illustrated in the recent floods which devastated the west of New South Wales, and threatened extinction to 4,000 sheep owned by Mr. W. H. Mace, which were marooned by the flood-waters on a small area of high ground. It was impossible to take fodder to the starving animals by road or boat, so the owner arranged with the Australian Aircraft & Engineering Co. for a 'plane to visit Moree and carry corn to them. A local man was taken on the first trip to point out the island where the sheep were imprisoned, and consequently only one bag of maize could be carried. On each subsequent trip two bags were taken, and ten trips were made the first day. Several hundred sheep had died prior to the first fodder being conveyed to them, but afterwards there was no further mortality. One of the men who was in charge of the sheep became ill and had to be taken by air to Garah for medical treatment. His companion also showed signs of illness, but refusing to leave, had medicine brought to him by the airman, Captain Wilson. The 'plane also conveyed mail to Mr. Charles Gall, of Dandaraga, who had been isolated by the flood for three weeks. The work of feeding the sheep by aerial transport was costly, but as the sheep were worth about £7,000 Mr. Mace considered the cost amply justified.

Long Aerial Tour.

A long aerial tour, approximately 4,000 miles, over the northern and western parts of New South Wales, has recently been accomplished by Flight-Lieutenant P. H. Moody, of Richmond aerodrome. The outward journey was *via* Bathurst to Con-

dobolin and back *via* Cootamundra and Cowra. The trip extended over four months, and during that time five hundred passengers were carried without a single mishap. The machine used was a *D.H.6*, fitted with a 100 h.p. R.A.F. engine.

One 'Plane Helps Another.

That one aeroplane is able to assist another in time of trouble was demonstrated out west recently. Lieutenant Mustard, who was at Condobolin with an aeroplane, received word that Mr. Howard Jolley and Lieutenant W. Sansom had been forced to make a landing, owing to engine trouble, at the foot of a mountain on the flight from Forest Vale to Condobolin. He immediately flew out with a mechanic and repairs were effected to the disabled 'plane.

Presentation to Parer and McIntosh.

A public meeting was held in Culcairn on the occasion of the landing there of Lieutenants Parer and McIntosh after their eventful flight from England to Australia. A collection was made, and with the surplus which remained after paying for repairs to the 'plane and transport to Melbourne, it was decided to purchase two illuminated addresses for presentation to the airmen. The residents of Culcairn have now received from Lieutenant Parer a letter expressing his gratitude for the assistance rendered on the occasion of their landing there, as well as for the illuminated addresses. Appreciation is also expressed on behalf of the late Lieutenant McIntosh—who was Lieutenant Parer's companion on that memorable trip.

Will of the Late Colonel Watt.

Under the will of the late Colonel Oswald Watt, O.B.E., the New South Wales section of the Australian Aero Club, of which he was President, will receive a bequest of £500. In addition to this amount

a further sum of £500 has been bequeathed to the Club as a whole, as a perpetual endowment.

The second amount is to be held in trust in the name of the Club and invested by the Council in such securities as the Council thinks fit. With the interest accruing the Council will purchase each year a gold medal (to be called the Oswald Watt Medal), which will be awarded to the airman who, in the opinion of the Council, shall have performed the most meritorious achievement in Australia during the year, or to the Australian-born airman who does the same thing outside Australia.

Business on the Wing.

Mr. R. Graham Carey, the well-known aviator, recently completed a month's aerial tour of Victoria and the Riverina in a *Maurice Farman* biplane. Mr. Carey travelled in the interests of E. W. Brown Motors Pty., Ltd., and on one occasion a buyer signed his contract while in the air. The traveller's greatest difficulty was in finding suitable landing places, but the whole tour was completed without mechanical trouble.

Fiji Air Service.

Mr. Leo A. Walsh and Captain A. C. Upham, D.F.C., of the New Zealand Flying School, are at present conducting experiments in the Fiji group to ascertain the suitability of an aerial mail service amongst the islands. The undertaking is the outcome of a request made by the Fiji Government to Mr. Walsh, of the New Zealand Flying School. A full report will be submitted to the Fijian authorities immediately the experiments have been completed.

Sydney-Adelaide Aerial Route.

Captain C. E. Johnson, of the Department of Civil Aviation, Melbourne, is inspecting the proposed aerial route between the two capital cities with a view to establishing suitable landing places. It is intended to select emergency landing grounds north of Breadalbane, Gunning and Jerrawa railway stations, preferably on Government land or reserves wherever possible. Where the required land is alienated, a lease, giving the right to affix ground marks, etc., and a condition that the ground should not be ploughed without

sufficient notice being given the Department will be required.

Flying to School.

Scarcely a day passes without news being received of some hitherto undreamt-of exploit being accomplished by aerial flight. Quite recently three boys were conveyed from Yetman, on the Macintyre River, over seventy-five miles of flooded country to their school at Inverell—the journey occupying an hour and a quarter. Mr. Nigel Love, of the Australian Aircraft & Engineering Company accomplished the feat in an *Avro* plane, and the boys are the heroes of their school. Truly, there is no limit to the uses of aeroplanes.

Aerial Mail Services.

The Department of Home and Territories is negotiating for the purchase of aerodromes in Melbourne, Sydney and other centres. The Royal Australian Air Force is surveying and organising additional routes which will be available for civil aircraft. In addition to the Geraldton-Derby (W.A.) mail service, for which tenders have closed, recommendations are being considered for the establishment of services between Sydney and Adelaide, *via* Cootamundra, Melbourne and Launceston, and Sydney and Brisbane, *via* Grafton and Lismore. A recommendation for the expenditure of approximately £57,000 has been prepared and approved.

It has been stated that the Government's policy is to facilitate the influx of private capital to the aviation industry by offering terms sufficiently attractive to the investing public to support organisations formed to maintain services on approved routes of national importance, and thus ensure useful work for the civilian pilots and mechanics who would be available in the event of necessity, for sudden expansion of the Royal Australian Air Force, and to provide aerodromes in all capital cities and at the junction of aerial routes, and emergency landing grounds at frequent intervals along such routes; and to prepare and issue aerial maps of all approved routes.

Aviation in Queensland.

Lieutenant-Colonel Brinsmead, O.B.E., M.C., Contoller of Civil Aviation, has received encouraging reports of the development and increasing popularity of com-

mercial aviation in the outback areas of Queensland and the Northern Territory. A gratifying feature of the support given by the people in those localities is the gift of landing grounds from property owners. On the Longreach-Winton route these landing grounds will average ten miles apart. During the recent wet weather at Longreach and other places planes were used instead of motor cars—the latter being useless on the boggy roads.

By Air to Australia.

Sir Ross Smith, who is advising Mr. Hughes on the Australian air service proposals, is of the opinion that the journey from London to Perth, by way of the Cape, could be completed within ten days. Two days would be occupied in the journey to Cairo, three to the Cape, and three across the Indian Ocean. Two days would be required in overhauling the machine and loading supplies.

Round Australia Flight.

Lieutenant R. J. Parer is about to start on a round trip of Australia, starting from Glenhuntly aerodrome (Victoria) and calling at Adelaide, Perth, Geraldton, Ninety Miles Beach, Broome, Darwin, Rockhampton, Cairns, Brisbane, Sydney, Melbourne and finishing at Launceston. The purpose of the trip is to raise funds to enable him

to compete for the £10,000 prize offered by Thos. Ince, of American cinema fame, for a flight from Australia to California. Lieutenant Parer has sent to England an order to be supplied with a plane capable of doing the journey.

Insuring Airmen.

In requesting civil aviators to supply the Defence Department with a monthly statement of flights taken, including time occupied, distance flown, mishaps (if any), the Contoller of Civil Aviation, Lieutenant-Colonel Brinsmead, O.B.E., M.C., states: "I have been in touch with many of the Australian insurance companies with a view to inducing them to assist the aviation industry by taking a broad view of the matter and accepting air passenger risks, by arranging for the insurance of aircraft and pilots, third party risks, etc."

The airmen's statements will prove invaluable as an indication of the general safety of aerial travel. A return furnished by the Butler-Kauper Aviation Company for June shows that a total of thirty-five flights was made, occupying twelve and one-half hours actual flying time. The passengers carried numbered fifty-eight, and the machine, piloted by Captain Butler, covered 1,000 miles. Not the slightest mishap marred the whole undertaking.

INDIA'S HUNDRED AEROPLANES

The gift of one hundred aeroplanes from Great Britain to the Government of India, it is to be hoped, will bear good missionary fruit. The machines presented comprised sixty *D.H.9's* with Siddeley-Puma engines, and forty *Avros* with Gnome Monosoupape engines. Of these it is understood that up to the early part of this year, twenty-one *D.H.9's* and twenty-eight *Avros* had been disposed of.

Some of these aeroplanes, the Government of India explain, have been offered to and accepted by local governments and administrations; others have been offered to ruling princes, and twenty *Avros* have been made over to the Royal Air Force for instructional purposes. The remainder will be offered to aero clubs and ex-Royal Air Force officers resident in India, and

to other individuals or companies prepared to establish schools of instruction in aviation.

The machines were handed over free of charge at Karachi, and the recipients have to make their own arrangements for their removal, the only condition attaching to a free gift of these aeroplanes being that they should be used by the recipients themselves for purposes of demonstration or instruction, and should not be sold to third parties.

Applications for these machines, which should be addressed to the Secretary, Air Board, Department of Commerce, Simla, should be supported by the recommendations of local governments or other responsible authorities or persons.

AVIATION IN PARLIAMENT

WEDNESDAY, July 6, 1921.

MR. MARKS: To ask the Minister representing the Minister for Defence:

(1) What action has already been taken by the Government to encourage civil aviation under the following heads:

- (a) Ground organisation?
- (b) Mail and passenger services?
- (c) Developmental services?
- (d) Construction of aeroplanes?
- (e) Generally?

(2) What further action is proposed for the future?

(3) What amount of the vote of £100,000 was expended up to 30th June, 1921?

Answer—

(1) (a) The Civil Aviation Branch is providing aerodromes and preparing emergency landing grounds on the following aerial routes, which cover a total distance of approximately 2,210 miles:

- (i.) Sydney to Adelaide, *via* Goulburn, Cootamundra, Hay, Mildura and Loxton.
- (ii.) Melbourne to Hay, *via* Echuca.
- (iii.) Sydney to Charleville, *via* Narrabri, Moree, and St. George.
- (iv.) Charleville to Cloncurry, Central Queensland.

Subsidies are being paid to the shire and municipal authorities along these routes.

The Department of Home and Territories is now negotiating for the purchase of aerodromes in Melbourne, Sydney and other centres.

The Royal Australian Air Force is surveying and organising additional routes which will be available for civil aircraft.

(b) The Government has invited tenders for the establishment and maintenance of a weekly (return) mail, freight and passenger service by air from Geraldton to Derby, Western Australia, for a period of twelve months, and will subsidise the successful tenderers to the extent of an amount not exceeding £25,000.

(c) Recommendations are now under consideration that tenders be called for the establishment and maintenance of developmental aerial services between:

(i.) Sydney and Adelaide, *via* Cootamundra.

(ii.) Melbourne and Launceston.

(iii.) Sydney and Brisbane, *via* Grafton and Lismore.

(d) Up to the present only one Australian firm has asked for an order for the manufacture of aeroplanes, and their proposal is under consideration by the Air Council.

(e) The Government, realising that a first essential of a successful aviation industry in Australia is public confidence in the safety of this newest form of transport, has legislated for the strict control of all aircraft and flying personnel. Regulations made under the Air Navigation Act were issued on March 28, 1921, and came into force on June 28, 1921.

(2) It is the policy of the Government, *inter alia*:

(a) To facilitate the influx of capital to the aviation industry by offering terms sufficiently attractive to the investing public to support organisations formed to maintain services on approved routes of national importance, and thus ensure useful work for the civilian pilots and mechanics who would be available in the event of necessity for sudden expansion of the Royal Australian Air Force.

(b) To provide aerodromes in all the capital cities and at junctions of the aerial routes, and to provide emergency landing grounds at frequent intervals.

(c) To prepare and issue aerial maps of all approved routes.

(3) The staff of the Civil Aviation Branch of the Department of Defence has been organised for approximately four months of the past financial year, and recommendations for the expenditure of approximately £57,600 have been prepared and approved in that period, but it has only been practicable to expend usefully approximately £6,700 of the amount voted by Parliament for the year ended June 30. By the end of August, it is anticipated that an additional amount of approximately £20,000 will have been expended in giving effect to approved recommendations.



Tenders have already been called for a mail service from:

..... Geraldton to Derby, *via* Carnarvon, Onslow, Roebourne, Port Hedland and Broome.

* * *

The Civil Aviation Branch is providing aerodromes and providing emergency landing grounds on the following aerial routes:

- (i.) Sydney to Adelaide, *via* Goulburn, Cootamundra, Hay, Mildura and Loxton.
- (ii.) Melbourne to Hay, *via* Echuca.
- (iii.) Sydney to Charleville, *via* Narrabri, Moree and St. George.
- (iv.) Charleville to Cloncurry.

* * *

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- (ii.) Melbourne and Launceston.
- (iii.) Sydney and Brisbane, *via* Grafton and Lismore.



WHETHER there were any other survivors, Hamilton did not know. Neither did he care much. He was only half alive himself, and too tired to think.

The island—he supposed it was an island—was a dreary prospect. A grey sea lashed a rocky shore. Above the wave-washed rim, it rose in a quiet slope toward a central hill. Sparse shrubbery thickened toward the peak. It was raining; the dripping trees swayed dismally against a leaden sky, and Hamilton had never been so miserable in his life before. About noon the after-winds of the fatal cyclone abated, and the overhead cloud-mass broke into great racing clots, between two of which the sun cast a ray.

Hamilton then felt better, and the island looked more prepossessing. Having rested, he went to look for human company. He found none, but enough miscellaneous wreck and merchandise to assure him that he would not starve, at least. With a little ingenuity, he could build himself a hut and furnish it with cabin fixtures from the wreck. For the rest, although the lonely island was apparently an uninhabited speck out of the regular course of marine traffic, he would no doubt be picked up sooner or later by a searching steamer, for there were seventy lives to be accounted for.

Seventeen survivors, including Hamilton, were picked up later, some on an island fifty miles to the west, some on a coral cay to the east, and Hamilton on his island.

But that is not the story.

As soon as the castaway knew that he

was alone, he let possible rescue rest with chance, and proceeded as if he were destined to spend the rest of his days on the island.

At night, thought was his enemy; during the day, action was his friend. He built himself a rough hut and stocked it with all the preserved food and useful merchandise washed ashore, and worked so hard that when the dreaded darkness came even thought found its machine too exhausted for torturing service. Then sleep was a kind of nine-hours oblivion.

Sometimes he climbed the hill and scanned the encircling horizon, but as nothing rewarded his eyes, and the blank sea stirred thoughts unpleasant, he gave up scanning and applied himself more industriously than before.

His trouble began when the essential things were accomplished. He had a house, plenty to eat and drink—even wines. He could have lived in idleness for two years at least. But there was no joy in the thought. As soon as he ceased to work he found himself gazing at the horizon and yearning for the modern haunts of his fellows, and found it more difficult to sleep at night.

Then came the third stage—the ultimate adaptation of man to conditions. Hamilton saw that without employment all roads led to madness. He devised a hook and line, and fished; made a bow and arrows and shot wild pigeons at dawn and dusk; studied the resources of his island, found they were numerous, and made plans to utilize them. Had he had a mate he would have been comparatively contented.

At the end of four weeks he had practically forgotten the possible arrival of a searching steamer; in fact, one morning after a swim in the clear sunny waters of a cove, he caught himself half-wishing that rescuers would stay away and leave him in the peace which he had developed within himself.

Then the trivial thing happened!

Late one afternoon he was in the scrub hunting for wild pigeons. Deciding that the hour was too early for the dusk-settling of the birds, he sat on a rock at the base of a tree and prepared to smoke a pipe. He had an unlimited supply of tobacco and he had found matches in a waterproof case amongst the wreckage. He sought an object against which to knock the old tobacco out of his pipe, and chose the trunk of the tree. He raised the pipe to tap out its contents and—stopped!

For a full minute he stared at the thing which had arrested his action. Slowly its significance dawned upon him. His whole being thrilled with joy, fear, excitement. The thing was a plain two-inch nail, driven half its length into the trunk of the tree, about five feet from the ground. The exposed head was rusty, but—it was a nail. It was a thing manufactured by a man. A man had driven it into this tree. Ergo, there was, or had been, another man on the island. Hamilton stared at the thing. The pipe hung unlighted between his fingers, and the match had dropped to the ground.

That instant the peace which had crept into his life was destroyed. At sight of that nail he was again the creature of civilization. The little steel thing jutting from the tree was as a god, and his every sense worshipped what it stood for.

A nail—in the middle of a scrub on a speck of an island somewhere in the great wilderness of the South Seas! How did it get there? Why was it driven in this particular tree? For what purpose in any tree? One thing was certain. A man had driven it in and for some reason. Therefore, there were probably other relics of the man. All Hamilton had to do was to find them!

Strange that he had seen none. Staggeringly strange that, if there were any, the first he should come upon should be the visible portion of a two-inch nail

driven into one of thousands of trees. Later he lighted his pipe and smoked. But soon the pipe was out, and Hamilton was squatting on the ground, staring blankly at the nail. His brain was in a riot. The dusk thickened. It was only when darkness came and he could no longer see the nail, that Hamilton awoke from his reverie. Then he set a mark that would identify that particular tree and returned to his hut, but he did not sleep at all that night.

At daybreak he was again standing before the tree. Later, as the sun struck through the scrub and warmed his shoulder blades, he pulled himself together, realising that for one hour he had been gaping at the nail without being conscious of the passage of time. He had hypnotised himself into a kind of trance. He knew that it would be unwise to allow this phenomenon to occur again.

Hamilton lit his pipe and held council with himself. It was broad daylight—a clear, sunny morning. The first shock and the surprise of the discovery were past. Now it was time to apply reason to the presence of that nail.

In the first place, how did the nail get there?

Half an hour later he sprang to his feet with a curse. Once more he had come to his senses, to find himself staring at the little round head of the object sticking out of the tree. He resolutely turned his back on the nail and went to the hut. When he had cooked and eaten breakfast, he felt for his pipe. It was missing. He had last had it—?

He went back to the tree, wondering as he did so why his heart beat so rapidly and his feet went so willingly. Then he became frightened. That little but highly significant nail was exercising an influence over him. When he found the pipe he wanted to sit down and stare at the thing again. Fear repelled him, while the nail drew him. Fear won. He had learned a lesson. This time he smoked and reasoned in the hut. He thought of the incident of Robinson Crusoe and the footprint in the sand, and Crusoe's terror at the discovery. But Crusoe had found his man—Friday. So the terror of the footprint was laid.

This nail was worse than a footprint. If there had been a footprint to go with it, or even a stray hammer-head, or any-

thing connecting it with the flesh and blood that had placed the nail where it was, he would have dismissed and forgotten the matter as trivial.

"I never understood the terror of that footprint before," he mused. "If Crusoe hadn't found the answer he would have gone mad—probably."

For himself, Hamilton decided that if he could not find the man who had driven that nail, he must at least discover why he had driven it. No doubt there were other relics of a former human inhabitant. In his first survey he had possibly overlooked them, simply because he had decided on the very first day that no one had ever before set foot on that island. Much relieved in his mind, Hamilton began a re-examination of the island. Its shore line was four miles around. He first followed the coast back to his starting-point. He found no sign of his predecessor. Then he made an inner circle through the scrub about two hundred yards from the shore. Again he found nothing. At the end of the first day's search he found himself standing before the nail. It was near dusk. A wild pigeon whirred past his head. The man started violently and took to his heels. When he reached the hut he gave way to an attack of "nerves."

Next day he resumed his exploration, travelling in closing circles toward the central hill. Day after day he vainly pursued the examination. At the end of a week he walked slowly around a rock, his eyes studying the ground. Then he climbed to the top of the rock and scanned the encircling sea-horizon. He had examined every square foot of the island and had found no evidences of a past or present man other than himself, except that two-inch nail half driven into the tree-trunk. It was such a trivial thing. Its very triviality magnified its importance in his neurasthenic mind. The failure to account for it irritated the castaway's sense of isolation.

He decided to forget it, but it would not be forgotten. He gave up his search for human relics and kept away from the tree, but at night the nail came into his dreams. He did not dream of it exclusively, or all the time, it flitted in and out of his sleep.

One night he slept like a child, dreaming of nothing heavier than butterflies. All at once he found himself sitting bolt upright

in the darkness, and his brain was filled with interrogation points.

Who?—When?—Why?—?

He lay awake the rest of the night. Next night it was the same. Then he made a discovery. As long as he tried to exclude the nail from his thoughts, sleep would not come. But the moment he yielded and let his fancies play around the nail, a delicious peace stole over him and he fell into a—was it sleep, or a kind of trance?

He dreamed while in this condition, and it was always about the nail. Once, in a semi-humorous vision, he saw a speck appear on the horizon. He watched it approach the island. It was a small boat rowed by a man. As it came nearer he saw that the man was dressed like a sailor. The curiosity which was consuming Hamilton like a fever influenced even his dream actions. When the sailor beached the boat, Hamilton hid himself and spied. He saw the man take a hammer and a single nail from the boat and steal up the slope toward the tree.

As the sailor passed Hamilton's hiding place the castaway saw, without surprise, that the man from the boat was the Devil himself, despite the sailor disguise. The Devil skulked past the dreamer's hiding place with a grin on his face, the hammer in his right hand and the nail daintily held between the thumb and forefinger of his left. The Devil went to the tree, drove in the nail half-way, then fell down on the ground in convulsions of silent, diabolical laughter. Later the fiend, still shaking with mirth, returned to the boat, got in, and rowed away. The man in hiding watched until the boat became a speck on the horizon and finally disappeared.

The morning after this odd dream, Hamilton went to the tree and himself indulged in a fit of silent laughter. It was a subtle jest, this. Only the Devil himself could have conceived the idea of sailing over almost uncharted seas to drive a nail in a tree on an uninhabited island and leave it for the utter bewilderment of a lone aftercomer.

There came a day when Hamilton sat in his hut with his head in his hands. His face was lined deeply, and the hair over his temples had become streaked with grey. The realisation had at last come to him that, if a solution of the mystery of the nail did not occur soon, he would become mad. How did that nail get there?

Suddenly he started to his feet, uncovering his face with an abrupt movement. He stared straight before him with eyes that were ablaze with a strange idea. His countenance was radiant. He uttered a cry of triumph, dashed out of the hut and made for the tree with the nail in it.

Arrived there, he picked up a sharp-pointed stone from the ground, fell on his knees at the tree-base and feverishly began to dig.

* * *

A month later a searching steamer sailed in the track of the missing boat. Hamilton's island was the last of the group to be visited, and he was the last to be picked up of seventeen survivors.

The officers of the searching steamer knew there was a man on the island before they landed. They could see his hut, and presently they saw the man himself. A junior officer commanded the boat that went to bring him off, which also carried the ship's doctor and the carpenter.

The castaway seemed mildly glad to see them. He was a withered old man and very slight in build. He had peculiar white hair, like frosted silver, tarnished.

"I know you," he said to the landing officer. "You are the Devil. But I have your secret!"

The officer stared at the man. The ship's doctor whispered something in the officer's ear. The white-haired castaway misinterpreted the action.

"That's all right," he said. "I'll show

you. In fact, I'll be glad to. It has—er—" He knitted his brows—"preyed on me. Very glad to be able to show you. Come along!"

Wondering, the junior officer, the doctor and the carpenter, followed the man along the beach, past the hut and up the scrubby slope. His pace quickened as he neared the tree with the nail in it. He turned an excited countenance over his shoulder and raised a finger, bidding the others come silently. He tip-toed the last twenty yards to the tree, sank upon his knees at the base and, clasping his hands, began to pray aloud—to the nail!

The junior officer and the doctor exchanged glances. The latter sadly shook his head. But the carpenter crept forward and stared long and with increasing amazement at the inch of steel sticking out of the tree-trunk. Presently, while the white-haired man babbled softly, the carpenter lifted his eyes to the officers.

"Now, how did that get there?" said he, pointing at the nail.

The castaway's babble abruptly ceased. He looked up at the carpenter with a childlike smile.

"Very annoying—isn't it—that nail?" he murmured, and rolled over on his back.

"He's sound asleep, poor devil!" said the ship's doctor, rising from an examination of the prostrate Hamilton.

Then, having found no traces of any other human being on the island, they took the castaway aboard.

NAVAL NEWS

SUCCESS OF AUSTRALIAN OFFICER

ON completion of a course of instruction of Naval officers qualifying as specialists in torpedo, which is periodically carried out in H.M.S. *Vernon*, the first place in the qualifying examination was taken by an officer of the Royal Australian Navy, Lieutenant C. Farquhar-Smith.

The distinction of taking highest place in this examination normally earns for an officer of the Royal Navy the award of the Ogilvy Medal, carrying with it a grant of £10, to be expended on professional instruments or books. In this instance it was found that, owing to the terms of the Trust Deed, neither the medal nor grant

could be awarded to an officer belonging to one of the Dominion Navies. The Naval Board has consequently approved of a prize to a similar value being awarded to Lieutenant Farquhar-Smith out of Commonwealth Naval Funds.

It is satisfactory to note that the Australian Navy continues to be well represented at or near the head of the list in the results of examinations in which R.A.N. officers compete jointly with officers of the Royal Navy.

Lieutenant Farquhar-Smith has recently arrived in Australia and is now serving in H.M.A.S. *Anzac* as Torpedo Officer of the Destroyer Flotilla.

BOY SCOUTS REVIEWED

Boy Scouts to the number of 1,500 assembled in the Sydney Domain on July 9 where they were reviewed by His Excellency the State Governor, Sir Walter Davidson, who was accompanied by Dame Margaret Davidson, Major Egerton, and Sir Adrian and Lady Knox.

The boys were drawn up beneath an array of flags, and they made a strikingly picturesque scene as they formed into a hollow square. There were sea Scouts, land Scouts, bugle, and fife and drum bands and signallers; each suburb sporting a distinguishing coloured band on the top of their stockings. The lads were impressed with the importance of the occasion and stood to attention with an erectness and dignity that would not have disgraced the most seasoned Digger.

To the accompaniment of bugles the Union Jack was broken on a flagstaff, erected by the Scouts, as the Governor and party appeared. His Excellency was delighted with the soldiery bearing of the boys and at the conclusion of the inspection made the following decorations:

Order of the Honorary Silver Wolf, G. P. Stott; Certificate of Merit, J. Heale (1st Granville Troop); Assistant Scoutmasters, J. R. Black (1st Granville Troop), J. Murrell (1st Wollstonecraft Troop), H. Pullen (1st Penrith Troop).

The parade was in charge of Acting Commissioner Raymont Moore, M.M., Deputy Commissioner Johnstone, and Assistant Commissioner Spain.

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24	0	9	4	0	5	4	0	5	6
25	0	9	4	0	5	4	0	6	3
26	0	11	0	0	5	9	0	6	9
27	0	11	0	0	6	0	0	7	6
28	0	11	6	0	6	4	0	7	6
29	0	12	0	0	7	0	0	7	6
30	0	14	6	0	8	0	0	8	4
31	0	15	9	0	8	0	0	8	4
32	0	15	9	0	8	3	0	10	0
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PRACTICAL TESTING FOR THE WIRELESS EXPERIMENTER

BY
JOSEPH G. REED

TO operate an experimental radio station efficiently a knowledge of the inductance and capacity values of coils and condensers is essential.

With this object in view, the writer constructed a capacity testing outfit shown in Fig. 1. A calibrated variable condenser must be available, and for those who possess a small twenty-three plate *Murdoch*

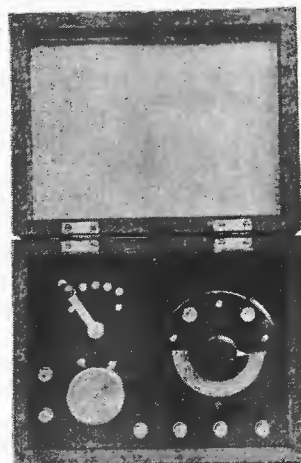


Fig. 1a.—Front View.

condenser—as used in the above-mentioned set—the graph in Fig. 2 will provide a sufficiently accurate calibration. *Expanse* condensers, with individual calibration curves, can be obtained from Austral Electric Limited.

In addition to the condenser, switches and buzzer, a set of non-inductive resistances is required. These are wound on a spool turned from hard rubber or close-grained wood to the values shown in the diagram (Fig. 3) of connections. Single silk covered Eureka wire of the following lengths and gauges is used for the various resistances:

Coil ..	5 ohms	20 ohms	100 ohms	375 ohms	500 ohms
Length ..	8ft. 6in.	22ft. 7in.	40ft.	76ft.	101ft.
Gauge ..	No. 24	No. 26	No. 32	No. 36	No. 36

To wind the five and twenty ohm coils it is an easy matter to double the wire and stretch it across the room during the winding process, but with the other coils, measure off *half* the required amount of wire, wind it on another spool, then take the loop between the coils and wind on to the resistance bobbin both wires in parallel until the original half length is ex-

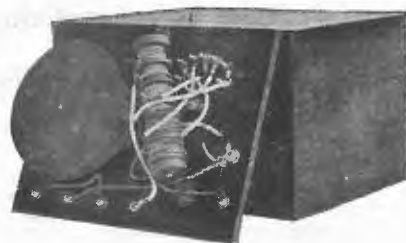
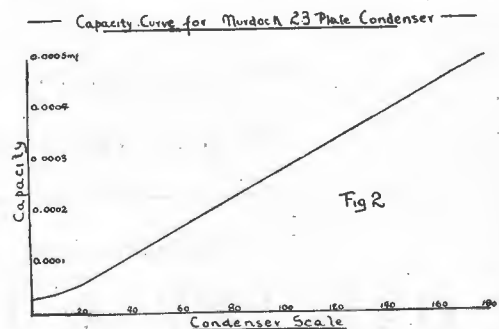


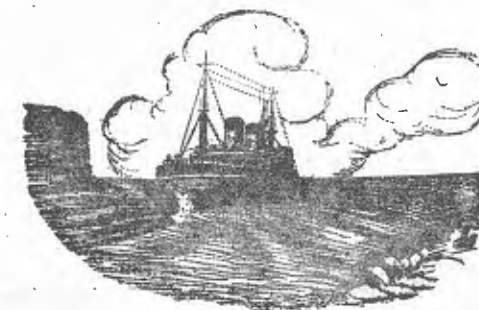
Fig. 1b.—Back view of panel.

hausted. Cut off the remaining wire level with the free end, and an accurate non-inductive winding of the full required resistance is obtained. Bind the wire down with a few turns of waxed thread or tape to prevent it from working loose.

The leads to the radio switch are covered with short lengths of one-eighth inch rubber tubing to guard against accidental short



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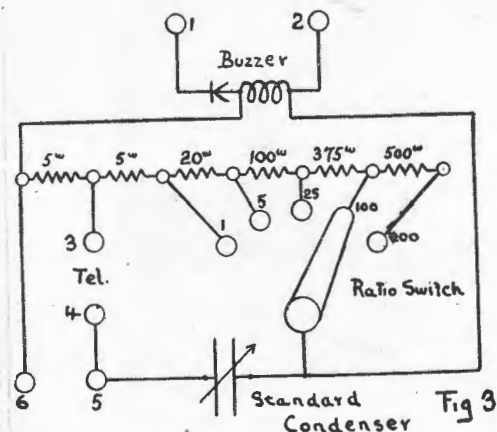
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circuits. If the experimenter wishes to build an outfit of different capacity range or is unable to procure all the gauges mentioned, suitable wire can be chosen from the following table which gives the resistance of Eureka wire in ohms per foot:

Gauge	No. 20	No. 22	No. 24	No. 26	No. 28	No. 30	No. 32	No. 34	No. 36	No. 40
Resistance ..	0.22	0.37	0.59	0.88	1.31	1.86	2.45	3.38	4.94	12.4

Connect the apparatus as shown in Fig. 3 and number the contacts of the ratio switch 1, 5, 25, 100 and 200. These are the numbers by which the capacity of the standard condenser must be multiplied when making tests.

To test an unknown capacity connect it to terminals 5-6, and with the buzzer in operation vary the condenser and ratio switch until zero or minimum sound is heard in the telephone receivers connected to terminals 3 and 4. Refer to the graph



and note the capacity of the variable condenser for the particular setting and multiply by the figure shown on the ratio switch. The result is the value of the unknown capacity.

When measuring the capacity of an aerial always connect the earth to terminal 5, otherwise the capacity of the body to earth will effect the result. If the experimenter cannot spare a variable condenser exclusively for use in this outfit, the assembly can be modified and a pair of terminals provided for connecting up the standardised condenser when required.

The buzzer should preferably be high toned and quiet in operation so that excessive outside noise cannot interfere with the sound heard in the telephone receivers.

Above, the measurement of capacity with low frequency currents has been dealt with. This method is very accurate where the

capacity is lumped, and the results hold good for all usual frequencies up to several million per second. When dealing with circuits like wireless aerials, where both the inductance and capacity are distributed, measurements must be taken, using cur-

rents of radio frequency to obtain any degree of accuracy.

A knowledge of the antenna constants will be found extremely useful if permission to transmit is obtained, for the experimenter will thereby be able to design apparatus to work at any particular wavelength with maximum efficiency and minimum interference to other stations.

A wave meter is necessary for this work, and failing the possession of one, the condenser from the capacity testing outfit used in conjunction with the two following inductances will provide a good substitute covering a range from 150 to 600 metres.

	Diam.	Turns.	Wire.	Inductance.
Coil A ..	9.7 Cm.	20	#22 D.C.C.	52 m.h.
Coil B ..	9.7 Cm.	50	#22 D.C.C.	223 m.h.

The wavelength calibration is given in Fig. 4. Connect the wave meter combination to a sensitive crystal and telephone head set and proceed as follows to determine the distributed capacity and inductance of your antenna.

Excite the aerial according to the diagram in Fig. 5, and with the wave meter coil near the earth lead, note the emitted wave. Then insert a similar coil to coil A of the meter set in series with the antenna and re-excite as per Fig. 5a and again measure the radiated wave.

By reference to the graph in Fig. 6 the ratio of the antenna inductance to that of the loading coil, corresponding to the particular ratio of natural and loaded wavelengths, is obtained. An example will make this clear:

$$\begin{aligned} \text{Natural wavelength 1} &= 200 \text{ metres.} \\ \text{Loaded wavelength 2} &= 340 \text{ metres.} \\ \text{Wavelength 2} \\ \text{Ratio } \frac{\quad}{\quad} &= 1.70. \\ \text{Wavelength 1} \end{aligned}$$

$$\text{Corresponding to a ratio of 0.80 for } \frac{\quad}{\quad}$$

Where L1 = aerial inductance,
and L2 = loading inductance ∴ the

$$\text{aerial inductance} = \frac{52}{0.80} = 65.0 \text{ m.h.}$$

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Using the formula wavelength 1 = $1,200\sqrt{LC}$ for distributed oscillators, the capacity is found to be 0.000428 m.f.

Supposing the natural wavelength is too high and it is desired to reduce it to 150 metres by means of a series condenser, then by use of Fig. 6a the desired capacity can be ascertained.

$$\text{Ratio} \frac{\text{Wavelength 2}}{\text{Wavelength 1}} = \frac{150}{200} = 0.75.$$

Corresponding to a capacity ratio $\frac{C2}{C1}$ of 0.85.

The series condenser must therefore have a capacity of $0.000428 \times 0.85 = 0.000364$ m.f.

Having determined the distributed inductance and capacity of your antenna, the following formula will be found handy for

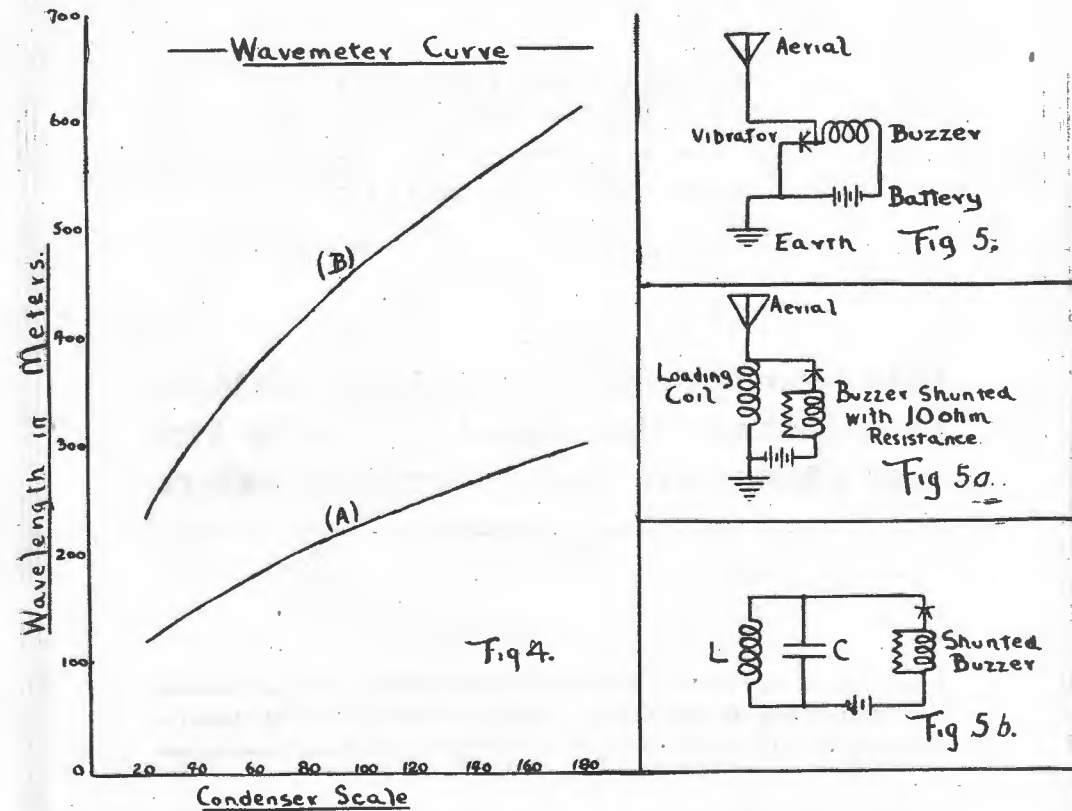
approximate calculation of the resultant wavelength of a loaded aerial, viz: Wave-

$$\text{length 2} = 1885\sqrt{\left(\frac{L1}{3} + \dots\right) C1}$$

The wave meter can also be used to measure the inductance of turning coils of small value with a fair degree of accuracy. Connect the unknown inductance to a known condenser, excite it with the buzzer, as per Fig. 5b and measure the resultant wave length from the formula:

$$L = \frac{\text{Wavelength 2}^2}{1885^2 \times C}$$

The capacity of the condenser used must not be too small, otherwise the distributed capacity of the coil will seriously effect the result by making the inductance appear too high.



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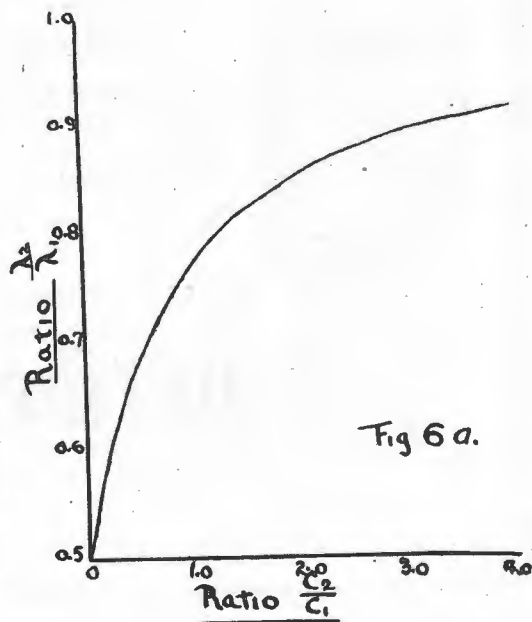
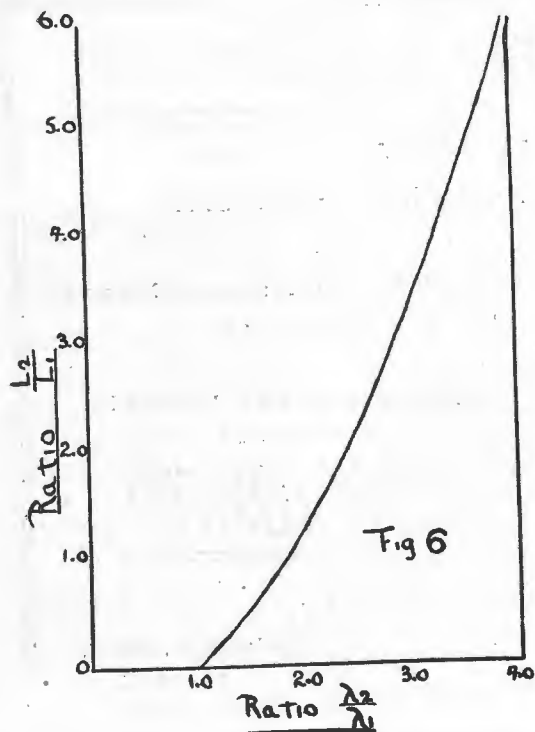
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In conclusion the writer strongly advises all Experimental Wireless Associations and Institutes to include a capacity tester and wave meter in their equipment. By so

doing they will materially assist members in the design and construction of efficient apparatus, in addition to introducing them to the mathematical side of wireless.

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WIRELESS TIME SIGNALS AT SYDNEY OBSERVATORY

BY
F. BASIL COOKE, F.R.A.S.

It will be necessary to preface the description of the wireless installation at Sydney Observatory and its connection with the reception of time signals by giving some idea of the object thereof.

Messrs. Dodwell (Government Astronomer, Adelaide) and Curlewis (Acting Government Astronomer, Perth) have been detailed by their respective State Governments to definitely establish the

Wyndham, but the results are not yet available.

The expedition was fully equipped with astronomical apparatus for determination of local time, latitude, etc., as accurately as possible, and it was therefore necessary to establish a comparison of clocks between Greenwich (Eng.) and the local time.

In the past this has been carried out by cable, but is now achieved by wireless.



The Experimental Wireless Receiving Instruments at Sydney Observatory.

border between South Australia and Western Australia. The border line as defined in the Federal Constitution is longitude 129° E. However, the South Australian Government has kept in mind the litigation which occurred some years ago between that State and Victoria relative to the position of the boundary line and has pressed for the establishment of permanent marks which shall define the western boundary of the State beyond dispute. This is now being done.

Messrs. Dodwell and Curlewis have completed their experiments at the northern extremity of the boundary line at

In order to assist the work of Messrs. Dodwell and Curlewis, arrangements were made whereby the high power wireless stations at Annapolis (U.S.A.), Bordeaux and Lyons (France) have sent a pre-arranged series of time signals over a period of twenty-one days. These signals were observed at Deakin at the southern extremity of the boundary line, and at the same time were observed at Greenwich Observatory. As the signals are being carefully and accurately determined at Greenwich, advantage has been taken of these scientific signals by the Sydney Observatory for an exact re-determination of

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its own longitude. At the same time this work at Sydney is providing an excellent check to the work of the expedition whereby on completion the whole system of the re-arrangement should balance.

In regard to the observation of the signals it will be of interest to know that Annapolis (U.S.A.) has been transmitting on a wave length of 16,000 metres for a period of five minutes daily from 5.55 a.m. to 6.0 a.m., Bordeaux on 23,400 metres from 6.0 a.m. to 6.15 a.m., and Lyons on 15,000 metres from 6.15 a.m. to 6.30 a.m., the time quoted being Sydney time. Adelaide has also been transmitting on a 600-metre wave from 6.30 a.m. to 6.42 a.m. (Sydney time).

The actual time signals in each case were only of five minutes duration and consisted of a system of dots, every sixtieth being missed, and were so arranged that they gained approximately 1 in 60 on the standard time. The determination of comparison is by the method of coincidences as per the Cooke method detailed in monthly notices of the Royal Astronomical Society.

The results were as follows: During the whole period of twenty-one days Annapolis was only heard on two occasions at Sydney, but so faintly and with so much static interference as to render the results useless. The signals from Bordeaux, contrary to all expectations and although heard every day, were too faint to be of much importance. As a contrast the signals from Lyons were very clear and distinct throughout and a splendid series of results has been obtained which should prove of great scientific importance when worked up on receipt of the necessary data from Greenwich.

To enable the reception of these signals it was necessary to provide a thoroughly efficient receiving station at the Sydney Observatory. This work was entrusted to the writer, who had previously been engaged on similar work.

The astronomical part of the work at Sydney, *i.e.*, the observation of local time, etc., is being conducted by Mr. W. E. Raymond, F.R.A.S., whose expert knowledge of this subject is appreciated the world over.

From a casual glance the set at the Observatory would hardly convey to an observer the intrinsic technicalities involved, and indeed the greatest merit of the ap-

paratus is the absence of superfluous gear, only essentials being retained.

It should be kept in mind that the observations described have been worked to the one-hundredth part of a second, and it will be obvious that a minimum of adjustments has been a special feature in the design of the set.

The clock shown in the accompanying photograph is directly controlled electrically from the Standard Sidereal Clock in the basement of the Sydney Observatory. Amplification is achieved by a bank of three valves; the detector valve being of the oscill-audion type, while the two amplifiers are V.24 type, being magnetically coupled for audio amplification. Each valve is under separate control in respect to filament current and plate potential.

The square box on top of the valve cabinet on right, is the variable grid condenser alongside which can be seen the variable 'phone (or bridge) condenser, having a capacity of 0.001 mfd.

The "A" battery is seen immediately to the left of the clock, the "B" battery being enclosed in a special cabinet beneath the table.

In front of the "A" battery is the secondary condenser, which is so designed to give a minimum capacity of 0.00008 mfd. and a maximum capacity of 0.0015 mfd. To the right of this condenser lie the special Baldwin type mica diaphragm 'phones. The "De Forest" honeycomb coils are clearly visible, to the left of which is placed the 600-metre tuner (for Adelaide signals), also the primary condenser with the same variation of capacity as the secondary condenser, and the primary and secondary loading inductances required in order to get up to the Bordeaux wave length.

In the near future several of the high power stations of the world will be issuing daily a scientific series of time signals, and experimenters in Australia will have an excellent opportunity of availing themselves of practically an unlimited field of scientific research.

It is the writer's intention to shortly demonstrate before the New South Wales Division of the Wireless Institute of Australia how this very interesting and useful work may be undertaken by keen wireless enthusiasts, as the time is now ripe for experimenters to achieve something really scientific.



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LIST OF WIRELESS OFFICERS ATTACHED TO VESSELS OF THE AUSTRALASIAN MERCANTILE MARINE

Revised to July 6, 1921.

SHIP.	OPERATOR.	SHIP.	OPERATOR.
Aldinga		Kaituna	W. A. Hawkins
Apolda	J. W. McKay	Kaiwarra	L. H. Jones
Arafura		Kanna	K. H. McSwan
Arahura	G. M. Gormlie	Kanowna	W. J. Washbourne
Araluen	H. H. Black	Karoola	R. R. Pilmore
Aramac	W. C. Lucas	Karori	M. Webb-Watts
Aravatta	F. L. Scott	Katoa	A. E. Lawrence
Aroona		Katoomba	T. A. Jones
Atua	N. Leeder	Kauri	H. S. Chown
Australbrook	J. F. McGinley	Kawatiri	E. H. Heather
Australcrag		Kekerangu	R. P. Ginders
Australford	H. G. Reilly	Koromiko	J. G. Henderson
Australglend	H. A. MacDonald	Kowarra	H. Fullerton
Australmead	S. V. Blight	Kurow	J. B. Gibson
Australmount	G. Vincent	Levuka	A. W. Watt
Australpeak	J. B. Ponsonby	Loongana	
Australplain	A. Stuart	Macedon	F. Ouvrier
Australpool	E. J. Glaisher	Mackarra	S. L. Piler
Australport	E. J. Giles	Macumba	S. G. Jones
Australrange	E. F. Hayes	Maheno	G. H. Hugman
Bakara	G. Maxwell	Makambo	J. A. Cooper
Baldina	A. W. Hooper	Makura	{ F. A. Hunter (s) W. Reithmuller (j)
Bambra	R. C. Williams	Malayan	
Barambah	M. L. Robertson	Manuka	J. A. Heavey
Barunga	H. E. Young	Maori	G. Illingworth
Bingera	J. H. Hawkins	Mapourika	F. E. Duggan
Bombala	C. W. Donne	Marama	{ C. P. Griffiths (s) J. M. Camps (j)
Boonah	F. A. Cook	Mararua	W. C. Brown
Booral	T. V. Tressler	Marella	W. H. Harris
Boorara	T. Alexander	Marsina	A. Cuthill
Bulla	R. T. Stephen	Mataram	C. H. A. Kidman
Calulu	R. C. Dymond	Maunganui	
Canberra	H. W. Barnfield	Melusia	S. F. Stafford
Carina	W. Hill	Merriwa	J. H. Pullen
Changsha	B. Boni	Miluna	D. N. Quinn
Charon	J. E. Cleary	Minderoo	J. G. C. Higgins
Cocee	A. W. Benn	Mindini	R. Jordon
Cooma	V. M. Brooker	Moana	
Delungra		Moeraki	L. G. Devenport
Dilga	H. F. Giles	Mokoia	
Dimboola	R. W. Alexander	Monowai	
Dinoga		Montoro	A. L. Dixon
Dongarra	H. J. Byrne	Morinda	F. C. Davies
Dromana	F. Stevens	Nairana	H. A. de Dassel
Dumosa	H. Beckett	Navua	
Dundula		Ngakuta	S. G. Bargrove
Eastern	J. F. Hutton	Niagara	{ N. W. Marshall (s) V. E. Stanley (j)
Emita	F. A. Woodall	Ooma	A. E. Sheppherd
Enoggera	F. G. Lewis	Oonah	A. R. Catford
Eromanga	A. H. Jeremy	Paloona	G. M. Whiteside
Erriba		Parattah	K. L. Simpson
Eudunda		Rakanoa	G. Donnelley
Eureka		Riverina	A. H. Beard
Flora		Rotomahana	
Gilgai	A. S. Dening	South Africa	S. R. Dixon
Gorgon	M. A. Prudence	St. Albans	T. Bannister
Hwah Ping	H. F. Hartley	St. George	A. J. Sawyer
Kaipoti	E. A. Miller	Suva	L. S. Lane
Kaikorai	J. Elmore	Tahiti	{ E. M. Bain (s) M. Marsden (j)
Kaimanawa	L. E. Ternes		
Kaitangata	N. W. G. Scott		
Kaitoko	F. G. Forrest		

(Continued on next page.)

(Continued from last page.)

Taiyuan	J. W. Wilkin
Talava	K. J. Dines
Talune	
Tarawera	H. Kirk
Tofua	L. R. Dickson
Toromeo	M. Sedgers
Ulmaroa	H. Tuson
Victoria	P. C. Gillon
Waihemo	C. Williamson
Wahine	
Waihora	E. A. Hunter
Waikawa	V. P. Nevins
Waikouiti	R. R. Robinson
Waimarino	F. L. Dawes
Waiotapu	T. H. McWilliams
Wairopi	R. W. Barnes
Wairuna	F. N. Davidson
Waitemata	D. W. Higgins
Waitemo	J. R. Gilligan
Wanaka	E. W. Coldwell
Westralia	M. A. Ryan
Whangape	A. O. Sutherland
Waimgatui	J. H. Bennett
Wodonga	G. Pow
Wyandra	W. J. Martin
Wyreema	T. Chalmers
Yankahilla	
Zealandia	A. G. Ross

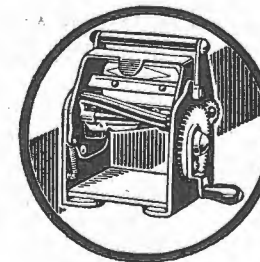
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NEW SOUTH WALES DIVISION

THE Fifty-second General Meeting was held at Wireless House, Clarence Street, Sydney, on Tuesday, July 12, at 8 p.m.

After the reading and confirmation of minutes the Honorary Secretary read some extracts from various journals concerning wireless matters generally which appeared as topical news. It is proposed to continue this practice as much as possible.

The following new members were elected:

Member: Mr. W. F. Bardin.

Associate Members: Messrs. T. E. Dickenson, E. J. Harrington and F. R. Lyons.

A short discussion then took place on matters relating to the syllabus, and details were arranged for the next general meeting.

By courtesy of Amalgamated Wireless

(Australasia) Ltd., a demonstration of wireless telephony was then given under the direction of Mr. W. D. Bostock, who went to considerable pains to explain various types of circuits and the evolution of the present day apparatus. At the same time some very interesting forecasts of future development were made. By means of a small loop aerial arranged in the lecture room on the second floor of the building, signals were received from the basement in the nature of gramophone music and speech which was clearly audible throughout the room. The demonstration was of particular interest and gave members an excellent idea of how successful research has been in this field up to the present time. At the close of the demonstration a hearty vote of thanks was conveyed to Mr. Bostock.

SOUTH AUSTRALIAN DIVISION

The monthly General Meeting of this Division was held at Alfred Chambers, Currie Street, Adelaide, on Wednesday, July 6, Mr. Hambly Clarke presiding.

The minutes of the previous meeting were read and confirmed. A letter was received from Mr. Maddick, a member of the Victorian Divisional Council, consenting to act as representative of this Division at the Conference with the Radio Authorities.

One application for membership was received.

It was decided that a transmitting licence should be applied for, and if granted that a transmitter should be installed at the Secretary's residence until the Division could obtain a Club room where the apparatus could be installed in their own laboratory.

An interesting lecture on Dalton Atomic Theory was then delivered by Mr. B. M. Dunstone.

Members are reminded that the Annual General Meeting takes place on Wednesday, September 7, at Alfred Chambers, and a full attendance is urgently required.

WESTERN AUSTRALIAN DIVISION

The Annual Meeting of this Division was held on Wednesday, June 22, Mr. W. E. Coxon presiding.

The President, in his retiring address, dealt with the work of the past year, during which some important events concerning wireless in Australia have taken place. He stated that since the last Annual Meeting, the control of wireless telegraphy had

been handed over by the Department of the Navy to the Postmaster-General's Department. The issue of licences to private individuals was still a burning question. Before the war both sending and receiving licences were issued. Although the regulations had not been altered, transmitting licences were not now issued, except under very special circumstances. Licences both

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for sending and receiving were granted in America, England and other places, where there were far more public stations than in Australia. The whole of the institutes in Australia were now linked up, and each State represented a division of the Wireless Institute. Membership badges had been designed and made available during the year. Some two or three months ago, in order mainly to assist the authorities in detecting unauthorised stations, it was decided that members of the Institute should fly an approved pennant issued by the Wireless Institute. It was interesting to note that Divisions in Eastern States had adopted the idea, and also the style of pennant introduced in Western Australia.

A number of instructive lectures and demonstrations had been held and it was noteworthy that the first lecture and demonstrations had been held, and it was ed in Western Australia had taken place during the year. He forecasted that the time would come when the use of the wireless telephones would render the learning of the Morse almost unnecessary.

The resignation of Mr. W. Dean, as Honorary Secretary, was accepted with regret. The President eulogised Mr. Dean's work during his term of office. Mr. Dean had been the first Secretary, and had held the position every year since. He was now unable to attend the monthly meetings and therefore felt that he should hand over the secretarial work to some other member.

A deputation was appointed to wait on the Acting Prime Minister and to place before him certain matters of importance to wireless experimenters.

At the next ordinary meeting the evening will be devoted to two lectures—one by Mr. T. Webb, and the other by Mr. C. S. Middleton.

The election of officers for the ensuing year resulted as follows: Honorary President, Professor Ross; President, Mr. B. M. Holt; Vice-president, Mr. Vincent J. Matthews; Technical Adviser, Mr. Walter E. Coxon; Honorary Secretary and Treasurer, Mr. T. Webb; Assistant Honorary Secretary, Mr. N. E. Turnbull; Council Members, Messrs. W. R. Phipps, S. C. Austin, C. Rossiter, A. Silby, C. S. Middleton.

AXIOMS FOR MOTORISTS

Cars that are equal to one hill are not necessarily equal to another.

If gadgets be added to gadgets, the holes on the dashboard are equal to a strainer.

If gadgets be taken from gadgets, the remaining holes are equal to a worm-eaten bit of mahogany.

If equals be added to unequals (i.e., a coachbuilt body to a Ford chassis), the whole looks unequal.

If equals be taken from unequals (i.e., a chauffeur from his unmechanical master), the remainder of the car, if any, goes to the repairers.

Things which are halves of the same thing can sometimes be welded.

Two "straight lines" cannot enclose a space, but they sell well if the quality be maintained.

All right angles are equally beastly. *Autocar.*

WHEN MELBA SANG "HOME SWEET HOME"



Dame Melba, the world renowned prima donna, sang "Home, Sweet Home" into the microphone of a high power wireless telephone set recently. The cartoonist of *The Aerial* has portrayed the possible effect on wireless and navigating officers at sea.

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THE MERCANTILE MARINE WAR SERVICE ASSOCIATION OF AUSTRALASIA.

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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