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.

"SEA, LAND and AIR"

THE AUSTRALIAN NATIONAL MONTHLY

— OF —

TOPICAL INTEREST

OFFICIAL JOURNAL OF THE AUSTRALIAN AERO CLUB.
THE WIRELESS INSTITUTES OF AUSTRALIA AND NEW ZEALAND.
THE MERCANTILE MARINE WAR SERVICE ASSOCIATION OF AUSTRALASIA.

Edited by S. E. TATHAM.

CONTENTS

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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SEA LAND AND AIR

AUSTRALIA'S NATIONAL MONTHLY

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TOPICS OF THE MONTH

PROTECTION FROM FLOODS

THE obvious lesson to be learned from the heavy damage to property, not to mention the loss of human life, caused by the recent floods which devastated the north and north-western portions of New South Wales is that whatever means can be devised to avoid such a repetition must be adopted at once. It is recognised that man is powerless to prevent the heavy downpours of rain which occur from time to time, just as he has failed to induce the Heaven's to weep when the land is in the grip of a drought. It has been found, however, that by water and fodder conservation, much of the otherwise inevitable damage of a drought can be avoided, and recent events have shown that it is equally necessary to employ the best engineering skill in affording protection to our towns and villages in case of flood. Fortunately man's ingenuity has not been barren of results in this direction, although very little has been done in this country to carry out the protective works which past experience should have convinced us were so absolutely necessary. In many countries of the world, cities, which for obvious reasons are so often located in river valleys, rather than on mountain tops, are susceptible to flood visitations such as we have had here, but the challenge of Nature has not always been allowed to go unaccepted, and in many of the States of America expert engineers have devised and carried out protective works which have paid for themselves many times over. It is only reasonable to assume that what America can do in this direction can also be accomplished here.

To be a complete success the task of constructing works to ward off flood waters must be supplemented by the establishment of a thorough system of communication and transportation throughout the country. Many instances of break-downs in our telephone and telegraph system occurred during the recent floods, and the most practical means of preventing such a repetition is expressed in the demand by various public bodies on the North Coast for the establishment of wireless stations in various isolated localities. It has been demonstrated that where the residents received timely warning of the approaching flood they were able to make preparations which vastly minimised the amount of damage. In the north-west of the State the practical value of aerial transport in bridg-

ing an otherwise impassable distance was proved, and it appears that, pending the completion of the huge drainage works necessary to ward off flood waters, where such is practicable, the combination of wireless communication and aerial transport, if properly organised, is going to prove an inestimable boon to residents in isolated localities. The country owes much to those who brave the trials and privations of life in out-back areas to engage in the great and useful task of building up our national prosperity through rural industry. There is no better way of expressing our appreciation of the services they are rendering than by affording them the maximum protection from the attacks which fickle Nature from time to time launches upon them.

AUSTRALIA'S AIR FLEET

SLOWLY but surely the links are being forged in the chain of Australia's air fleet. The launching of the first seaplane in England a few weeks ago reminds us that visions are now becoming realities, and in a few months a squadron of six 'planes will be available to assist in policing our shores. There are authorities who declare that the day of the warship is past and the day of the flying ship at hand, and while such may be an exaggerated view of the change in methods of defence which to a more or less extent is bound to come, it is satisfactory to know that Australia is moulding her defence policy along the most approved lines. There is another aspect of the question which, though less spectacular, is probably of more direct and material importance in developing Australia's prosperity than even the building of an aerial defence force. That is the tremendous influence which every shilling spent in aerial construction is going to have upon the development of our civil aviation policy. It is unquestionable that the arrival of our air defence fleet will arouse interest in aeronautics to a scope and degree hitherto unapproached. True, we have a policy of civil aviation in the making which gives promise of excellent results, and the inauguration of a number of direct mail services, one of which is definitely arranged, between different centres is evidence that the tremendous social and commercial possibilities of aerial transport are clearly realised. The Government is to be commended for the lead it has given in this matter, and its declared policy of making the aviation industry attractive to private enterprise is certainly a wise and progressive one. No one but a pessimist is now prepared to regard aviation as other than offering the greatest scope of usefulness, particularly in a country of long distances and unexplored regions like Australia. The history pages of this newest enterprise are already bright with the record of deeds accomplished, big in importance now perhaps, but small in comparison to the limitless possibilities ahead. The future is our objective, the present our opportunity. It is because of this that we hail with satisfaction the advent of Australia's new line of defence, even though it coincides with the holding of a conference designed to render war impossible through the abolition of armaments. If this ideal should happily be realised it will be quite a simple matter to utilise the services of our air fleet in the peaceful fields of commercial enterprise.

TOURING IN SOUTHERN CALIFORNIA

BY
ERNEST McGAFFEY

TO the visitor from Australia who is travelling in Southern California, there will be much which will attract his keen interest and give him glimpses of new chapters in out-of-door land. In some respects, he will find himself in familiar surroundings. The sea, always the same, and never alike in all its complexities, will be one of his companions along many of the wonderful coast drives found by the shores of the Pacific. Eucalyptus trees, also, brought here from Australia and planted usually in long avenues at the sides of the highways, will be another reminder of his own country. But in the main, his eyes will rest on the novel, the unique, the bizarre and the surprising.

Typical of the ancient Spanish regime of centuries ago, the old adobe missions still remain, some of them crumbling into ruins, and others partially or almost entirely restored to their primitive condition. The history of these missions is one of fascinating romance and of historical sig-

In the Pine Woods of Southern California, U.S.A. One of the many mountain resorts in that State.

nificance. De Alcala, at San Diego, the San Gabriel Mission, the Mission San Luis Obispo de Tolosa, the Mission San Juan Capistrano, the Santa Barbara Mission, the Mission San Miguel, the San Fernando Mission, the Mission of San Buonaventura, the Mission La Purisima Concepcion, the Mission San Luis Rey De Francia, and the Mission Santa Ines are the principal ones, and are all accessible by good roads.

First-class highways lead to the many mountain resorts in the southern counties, and these will take the visitor through scenes of rugged grandeur which are strikingly beautiful. Snow-capped mountain peaks, waterfalls, mountain streams and lakes, forests, canyons, foothills—and along the snow-drifts of the upper range districts on the afternoon of the same day.

Along the coast highways the visitor will find an infinite variety of life, colour and individuality. The bathing beaches are thronged the year round with crowds of men, women and children, and sea-bathing, music, dancing and enclosed salt-water plunges bring people to the beaches every month, and during the summer season by the thousands and hundreds of thousands. Fishing from the piers and deep-sea angling by means of launches and boats specially built for this sport, also attracts large numbers of rod and reel enthusiasts to these resorts. Entertainment in myriad forms is provided for tourists and travel-

Old town of Mammoth, Mono County, California, U.S.A. The white mountains in the background are in Inyo County.

the valleys leading to the mountains are orchards of orange, lemon and grape-fruit trees, either blossoming or bearing fruit on their heavily-laden branches. There is no winter in Southern California, except in the higher regions of the upper altitudes. To go from the bearing citrus orchards to the snow-line of the mountain ranges is usually a matter of three or four hours' travelling in a motor car. It is a daily occurrence in the so-called "winter" months to eat oranges from the trees in the valley orchards in the morning, and to skate on the frozen mountain lakes, or indulge in snow-shoeing or ski-ing among lers, and sharp contrasts will be found in places which would remind one of Brighton or Margate, and sequestered and select ocean resorts that are far-removed from the "week-end" resorters who gather at the better-known seaside towns and hamlets.

To those who have never seen the citrus orchards in full blossom or fruitage, they present a picture always to be remembered. Whether when in bloom, with their creamy buds unfolding amid dense-hanging clusters of emerald foliage, or when, heavy with luscious fruit, the golden globes shine brilliantly among the green leaves, the

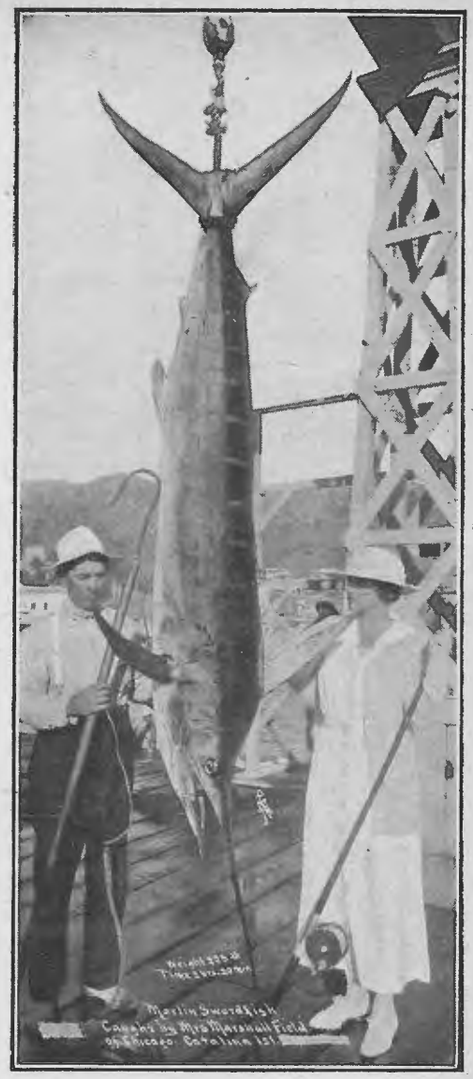
citrus orchards are a compelling vision of beauty seen for the first time. The industry is an enormous one all over Southern California, and date and fig orchards add to the variety.

Another unusual feature of motoring in California will be found in the deserts. In the summer months of June, July and August, they are blindingly hot, as a rule, and good places to stay away from. In the winter and early spring months they are picturesque and strangely alluring regions with myriads of many-coloured flowers carpeting their expanse, especially in the first spring days, with patches and plots of the most vivid radiance. Purple, yellow, blue, scarlet, white, pink and divers other hues will be noted, and the difference between these glowing parterres and the brown and desolate sands of their environment beyond is dazzling and distinct in the extreme. The sign-posts of the Automobile Club of Southern California are found everywhere through the southern counties of the State, and no traveller will ever lose his way, whether journeying through the cities or farming districts, or the deserts and mountain trails.

Taken in its entirety, with its cities, inland and sea-shore towns and resorts, and the setting in which they are held, Southern California affords a wealth of beauty and variety to the traveller which can scarcely be surpassed anywhere. Visitors are cordially invited to call at any one of the twenty-four offices of the Automobile Club in the southern portion of the State for free information as to roads, routes, public camping grounds, fishing and shooting districts, and many other services which the organisation is most happy to give to all strangers.

FISHING AND SHOOTING IN SOUTHERN CALIFORNIA

To those who enjoy sport with rod and reel, or with shot-gun and rifle, Southern California gives a wide variety of out-door recreation to choose from. Anglers and shooters visiting this part of the State should by all means bring along their favourite rods and guns. While it is true that they can rent all kinds of fishing tackle or fire-arms, half of the enjoyment of such forms of out-door relaxation to the seasoned angler or shooter lies in the handling and feel of a well-tested rod and reel, or the drop and hang of a gun



This photograph shows a large marlin swordfish caught off Catalina Island, Cal., by Mrs. Marshall Field, of Chicago. The fish weighed 225 lbs. and took two hours twenty minutes to land.

which its owner has carried with him for such a length of time that he has developed a real affection for it.

To every skilled disciple of Izaak Walton the paraphernalia of his hobby, from fly-book to rod tip, has a firm hold on his fancies. To the wing-shot, the deer-stalker or the shooter of "big game," the make of a shot-gun, its weight, style of boring, pattern, gauge, killing range, etc., or the kind of rifle used, its trajectory, shocking

The world's record catch of swordfish at Catalina Island, Cal.

power, range calibre, sights, kind and quality of ammunition, and other details are matters of prayerful consideration. Indeed, success in any sport of this kind depends very largely on the familiarity with the ''tools'' handled, and the owner's confidence in their reliability.

In this region of Southern California there is perhaps a greater choice of fishing and shooting combined than in almost any other country which could be mentioned. So far as ''big game'' shooting is concerned, it of course cannot compare with Africa, India, or Canada. Nor does it have salmon-fishing in the class which England, Scotland, Ireland or Norway and Canada possess. But for all-round sport with rod and gun during the entire year it is doubtful if it has an equal, much less a superior. When the sportsmen of Canada, for instance, in the mid-western and eastern provinces, are precluded by the long and severe winters from indulging in sport with either gun or rod, the fishers and shooters in Southern California are pursuing their favourite recreations under blue skies, and in weather which is only cool enough to be bracing and delightful.

Perhaps the most unique and outstanding feature of Southern Californian sport is the deep-sea angling. This comprises sword-fish, saw-fish, tuna, yellow-tail, sharks, bonita, barracuda, white sea-bass, the giant jew-fish or black sea-bass, mackerel, albicore, skip-jack and other fish, and the angling is of the highest possible class in deep-sea fishing. Special tackle is usually necessary in this kind of sport, but record tuna of 80 pounds in weight, and one record sword-fish weighing 314 pounds have been brought to gaff and boated with light tackle by expert anglers. The fishing boats in use at Catalina Island, Long Beach, San Diego and other places are ably handled by skippers of long and arduous experience.

Deep-sea angling, while with its premier experts a science, is a sport which any experienced salmon fisherman or trout angler can readily learn in a comparatively short time. Strength, endurance, patience in manipulating a rod and reel, and experience, are the main requisites. A sword-fish of 200 pounds or upwards, or a tuna of 80 to 100 pounds, or a yellow-tail weighing 40 or 50 pounds is a prize which requires strenuous exertions to bring to the gaff, tired out, and many hours are sometimes spent in accomplishing the feat. And sometimes hours upon hours are passed in playing and jockeying with one of these

After a good day with the gun.

monsters, only at the end to be left with a broken hook or a parted line and another thrilling story to tell of ''how the big one got away.''

Of trout-fishing there is almost an endless variety for the dry-fly or wet-fly artist. Rainbow, steel-head, Loch Leven, eastern brook trout, cut-throat, Dolly Varden, brown trout, and the famous and rare golden trout, embrace most of the varieties found. Stream and lake fishing are both excellent in most seasons. All kinds are caught by the fly fishermen, the sport being

Duck shooting in Southern California. Making "a double" over decoys.

best in early spring and late summer and fall. There are very few annoying flies, and the weather conditions are nearly always clear and fine. Camping conditions are ideal in many places. There is good black bass fishing in a number of the lakes and excellent surf fishing in the season. Each class of this angling has its devotees.

Big game shooting is practically confined to deer, with a few bears and mountain lions. On some of the coast islands goats and wild pigs are found. The country is far too rough to admit of the exciting and ''sporty'' recreation of ''pig-sticking,'' and the old boars are stalked and shot with rifles in almost impenetrable jungles on the rocky hillsides. They are dangerous brutes when cornered, and will not hesitate to charge viciously at their pursuers. Splendid heads are found on the largest bucks among the deer tribe, and hundreds of fine deer are killed annually. The mountain lions, or cougar, are stealthy, cowardly brutes, living mostly on deer, and are very difficult to bring to bay excepting with a pack of good dogs. Bears are scarce, but the back country has some left in it.

Wing-shooting is superb in many places, for ducks and valley quail particularly. Snipe shooting, grouse shooting, mountain quail, doves and some wild geese are also found. Grouse are all shot over dogs, as a rule, no ''driving'' being practicable in the country where they are found. Duck and quail shooting, as well as snipe shooting, can all be had in the same months and often in the same country. Many gun

(*Continued on page* 406.)

BOOK REVIEWS

The Motor Car Index.

FROM J. F. Atkinson & Co., of London, we have received an advance copy of "The Motor Car Index," a book which is bound to prove of immense value to the motoring trade generally.

The volume contains the whole record data of British, European and American motor vehicles in general use, including price, specifications, in fact every detail likely to be helpful in forming an estimate of the utility of any machine. A feature of the "Index," probably unique in motoring bibliography, is that it gives in a great many cases, the manufacturers' chassis numbers, an item which will be welcomed by all prospective purchasers of motor vehicles.

The details of the cars made and sold in England during the past ten years are dealt with in section one; section two is devoted to an alphabetical list of 1921 models, while the book concludes with a directory giving information regarding British and foreign motor car makers, concessionaires, and agents.

Not the least interesting feature of this excellent publication is the foreword written by the famous motor expert, Mr. F. S. Edge.

* * *

Aeronautical Directory of the World.

The Aeroplane and General Publishing Co., Ltd., of London, has issued an up-to-date work entitled "The Aeronautical Directory of the World." The book contains an alphabetically arranged list of the names and addresses of all aeroplane and accessory manufacturing firms in the world. A list of the aerodromes established in all countries is also included. The publishers recognise the wonderful potentialities of the aeronautical industry, and in the volume just issued have aimed at supplying information in a handy form to all who require to be well-informed regarding the growth of the industry throughout the world. That the book will command a ready sale is beyond question.

* * *

Modern Wireless Service.

The ramifications of the modern wireless system are something almost beyond the conception of the average person. Those whose business it is to use the service are, of course, familiar with its scope, but as new features are being constantly added, the recently issued booklet "Modern Wireless Service" will be welcomed by all who are interested either directly or indirectly, in radio-telegraphy. The service begins with the installation of the most modern apparatus on ships or land stations, and embraces the supply of skilled operators, and the maintenance of the instruments in a high state of efficiency in practically all ports of the world. The sole and perpetual Australasian rights to the world's principal wireless telegraph and telephone patents are held in the Commonwealth by the publishers of the booklet, and consequently every new invention in wireless apparatus is immediately available to local users.

Shipping companies have added vastly to the popularity of travel by the installation of wireless services on their vessels, and they, as well as the huge army of actual and prospective travellers will be keenly interested in the information contained in this excellently printed latest addition to wireless literature published by Amalgamated Wireless (Australasia) Ltd.

FISHING AND SHOOTING

(Continued.)

clubs are found, and some of these close to the cities, where the members enjoy very fine duck shooting over decoys. The thousands of miles of fine highways enable motorists to go long distances for game-birds of all kinds and return the same day. Shooting and fishing licenses can be bought at any one of the twenty-four offices of the Automobile Club of Southern California.

Practically every month in the year offers some sport to fishers and shooters, and in some of the fall months all kinds of sport with rod and gun is obtainable. Fish and game are protected, and fish propagation is carried on very extensively by the State Fish and Game Commission, which for over half a century has been the sportsman's one best friend in preserving all kinds of sport to succeeding generations.

WHAT'S IN A SHIP'S NAME?

BY

WALDON FAWCETT

Agitation for name monopolies in shipping, now impossible to obtain because of lack of laws or agreement on subject, develops many interesting points that suggest lack of appreciation on the part of American vessel owners of the worth of distinctive titles for their craft.

A WELL-KNOWN shipowner took the trouble, not long ago, to make a trip to Washington, D.C., to ascertain if there was not some way in which he could obtain the exclusive use, or establish a monopoly in the names he had selected for his vessels. His first idea was that he ought to be able to copyright or trade-mark his original vessel names. When it developed that the ship operator could not qualify for copyright entry or trade-mark registration he turned to the United States Bureau of Navigation, but that institution could not help him.

The officials at the Bureau of Navigation did confide, however, to this progressive shipping man, that he is by no means alone in his aspiration to isolate his vessels' names and prevent duplication. It is one of the interesting symptoms of the development of the American merchant marine that inquiries are coming to Washington all the while as to whether there is not some system of government franchise or license that will entrench a shipowner as sole proprietor of the name that he has coined or selected. Shipping men who have expressed themselves on this score seem to feel that if there cannot be an international arrangement to exclude "repeaters," at least the United States should do something to dodge "doubles" of American registry.

This solicitude with reference to the names of merchant ships is a new development—one more aftermath of the war, it might be denominated. From time out of mind, there has been a demand for name protection on the part of yachtsmen. The owners of pleasure boats, possibly because they have devoted more time to the creation of distinctive names, have been keen for some form of title insurance that would discourage infringement of the unique or peculiarly effective yacht name. Their plea has never been taken very seriously in official circles. A somewhat different attitude may be expected now that practical shipping men are aroused against name reiteration in the case of passenger and cargo ships.

Sentimental Side of Names.

In some instances, it is the sentimental factor, just as in the case of yachtsmen, that has prompted the plea for exclusive allotment of names in the merchant fleet. For example, a well known American line that not long ago conducted an expensive prize contest to obtain a name for a new passenger steamer, the queen of its fleet, was ambitious to reserve the chosen name as its very own for all time. In the main, though, the agitation for name monopolies is due to everyday, practical considerations, notably the confusion that may readily arise when two or more vessels bear the same name. This was particularly well illustrated during the war, when, on certain occasions, reports of the loss of certain vessels caused consternation owing to an assumption on the part of the public that the vessels that had suffered disaster were transports or warships instead of minor merchantmen of the same names. Thus, even though shipping men be seldom inconvenienced by overlapping names, there are always the consequences of mistake on the part of the lay public.

Insofar as the United States is concerned, the snuggling up of our maritime map has had important bearing upon this question of name duplication. In days gone by it did not matter much what name a carrier bore so long as there was no twin cognomen on its trade routes. That is to say, there were no ill consequences, as a rule, if a vessel engaged in the coasting trade of the Pacific coast bore the same name as an Atlantic liner. But with the interchange of vessels between the east and west coast that has grown up since the

opening of the Panama Canal and with the frequent transfers of vessels from the Great Lakes to the ocean trade, new dangers of duplication have been revealed. Sheer increase in the number of American vessels is, last of all, a potent influence in making this question of name individuality a real problem.

As has been said, the United States government is, under present conditions, in no position to help out the shipping man who aspires to novelty in names. Your vessel owner is not a "trader" in the sense that he is bartering ships as articles of commerce. Consequently he cannot qualify as a trade-mark owner. Indeed, what the vessel owner is selling is "service," and it is well established that Uncle Sam will not recognise service as a subject of trade-mark. No more is a ship such a medium as is contemplated for protection under the copyright laws. A shipbuilder, it may be noted in passing, might if he chose stamp on each hull that he turns out an emblem that would be duly recognised and enrolled as a trade-mark, but the shipowner has no redress in this quarter against the contemporary vessel christener who consciously or unconsciously takes unto his craft the same name.

An impression on the part of many shipping men that the Bureau of Navigation of the United States Department of Commerce acts as a censor of new names for vessels arises, no doubt, from the fact that the commissioner of navigation must be consulted when the name of a vessel is changed. However, this latter is a proposition distinct from the former. With respect to the original choice and application of a vessel name the commissioner of navigation has virtually nothing to say. To be sure, if a shipowner chooses a name so lengthy that it will not fit comfortably on a line in the official records, the Bureau of Navigation will call attention to the complications that will ensue and inquire if the shipping man cannot substitute a shorter name. But, generally speaking, it is not necessary to secure the approval of the Navigation Bureau for names. No more does this governmental office undertake to certify or verify the "prior claim" of an originator or first user of a name. It does not even feel called upon to warn the interested parties when a shipowner is beheld in the act of adopting a vessel name that the officials know to be already in use.

Changing Names of Vessels.

With respect, however, to changes in vessel names the situation is quite different. When such revision takes place the Bureau of Navigation must be notified and a fee paid to the Government. Collectors of customs and other federal officials are relied upon to enforce this requirement. Not only is the commissioner of navigation the authority, duly designated by law, to make changes of vessel names, but he is vested with a certain amount of discretion in the matter. That is to say, even though the owner or owners of the vessel request the change to be made, the commissioner of navigation is supposed to consent to switch names only when in his judgment there is sufficient cause for so doing.

The shipping man who desires to remedy duplication or dodge a hoodoo by renaming his vessel must follow carefully prescribed routine. The application for the change in name must be in duplicate, under oath and addressed to the commissioner of navigation at Washington. It will be forwarded to that officer not direct but through the collector of customs at the home port of the vessel as shown by her documents. The application to be acceptable must state the change desired, the reasons therefor, place of build, official number, rig, gross tonnage and the name of the owner of the vessel.

It is requisite that the papers in a case involving name alteration include a detailed list of all liens of record in the customs houses against the vessel that is to be rechristened and in the case of each of such liens there must be submitted the consent in writing of the mortgagee or other beneficiary under each lien to such change of name. Likewise required is a certificate by the collector of customs at each port where the vessel has been permanently documented, showing whether there are liens of record. Furthermore the collector of customs who forwards the application will state whether there are liens of record in his office and must advise Washington as to the date and place of the last inspection of the vessel. In the case of vessels not usually inspected, inspectors of hulls are authorised to make special examinations at the owners' expense and to furnish certificates.

Must Pay Readjuster of Names.

As though all this "red tape" were not enough, Uncle Sam demands to be paid for his trouble and his services as readjuster of names. If all the preliminaries have been complied with and the recommendation of the collector of customs for the desired change of name has been approved at Washington there yet remains the collection of the fee, the Government insisting that not until the stipulated sum has been paid over to the customs collector can the permit for change of name take effect. Fees for the privilege of taking new names for old vessels are on a sliding scale as follows: For vessels 99 gross tons and under, $10; for vessels 100 gross tons and up to and including 499 gross tons, $25; for vessels 500 gross tons and up to and including 999 gross tons, $50; for vessels 1,000 gross tons and up to and including 4,999 gross tons, $75; for vessels 5,000 gross tons and over, $100.

The Government seeks to make sure that no interested person shall remain in ignorance of a change in vessel names. It has already been explained that mortgagees and others holding claims against the vessel must give their consent to the change and in so doing must, of course, take heed of the new status. Then, when permission has been granted at Washington for the change of name, the official order bringing this about must be published in some daily or weekly paper at or nearest to the port of documentation in at least four consecutive issues. Collectors of customs keep, for reference purposes, an index of changes of the names of documented vessels, these lists giving, in each instance, the old and new names and the date of change.

At a time when the Government's war-mobilised merchant fleet is slowly passing into the hands of private owners the procedure necessary for a change of names is of especial interest, because in a large proportion of cases the new owners desire, for one reason or another, to change names. This has been conspicuously true in the case of passenger-carrying vessels. In this connection, also, it should be explained that a vessel, formerly documented, sold to the United States Government and resold to citizens, will be redocumented under the old name. But in the case of a vessel never before documented and sold by the United States Government to citizens, any name may be selected.

In contrast to the original choice of a vessel name, the assignment of an official number for each vessel is, alike to the changing of names, distinctly a responsibility of the Bureau of Navigation. When a new vessel is documented she is assigned an official number which continues as her permanent official designation so long as the craft survives. Even should a vessel be wrecked and ultimately repaired and restored to service her original official number is continued as her formal identification tag. The official numbers run consecutively and at this writing the roster is approaching the number 222,700. In addition several hundred numbers have been assigned to unrigged vessels.

Supervision on the part of the Government of the national system for the identification of vessels has been a gradual growth. The third act of the First Congress of the United States in the summer of the year 1789 provided for imposing duties on the tonnage of vessels and was followed a few weeks later by legislation for the registering of vessels. The succeeding laws designed to invest each craft with a readily-recognisable individuality or designation were the natural sequel of the early Acts. Gradually the scope of the identification system was enlarged until it embraced that assignment of code letters which permits every vessel to be recognised at sea and finally the allotment of the call letters that have been necessitated by the universal use of radiotelegraphy.

Improvement in the United States Governmental machinery for dealing with vessel enrollment by name and number, etc., has measurably increased the value of this system. From the outset, the field force for the administration of the laws relative to the naming and numbering of vessels has consisted of collectors and surveyors of customs with their deputies and inspectors. For a long time though, Uncle Sam did not have ideal means of contact with the shipping public. The entire undertaking was under the jurisdiction of the Secretary of the Treasury and actual administration was delegated to the Register of the Treasury and to the navigation division of the customs service. Then, in 1884, a long step forward was taken by the creation of the Bureau of Navigation, headed by a commissioner. In 1903 there was another long step when the Navigation Bureau was transferred to the Department of Commerce, where it remains to this day, and where it logically belongs.

Not only is the commissioner of navigation the active agent of the United States Government in designating official num-

bers of vessels, assigning signal letters and otherwise providing instrumentalities of identification, but the Bureau of Navigation is the point of contact between American shipping interests and the international clearing houses whereby all maritime nations co-operate to enable vessels to indicate who's who. The latest example of this is seen in the distribution of wireless call letters among the nations of the world in accordance with the arrangements of the international radio-telegraphic conventions and *viâ* an international bureau at Berne. The call letters assigned to the United States are all three and four letter combinations, beginning with the letter N and all beginning with the letter W, and all combinations from KDA to KZZ inclusive. The international call letters assigned to the United States are reserved for Government stations and stations open to the public and limited to commercial service. To the Bureau of Navigation is entrusted the allotment of the call letters for limited commercial land and ship stations. It is quite possible, under this arrangement, that it might happen that an American vessel would be given wireless call letters that would be the same as that vessel's code letters.

Room for Improvement.

Speaking unofficially the experts at navigation headquarters at Washington are ready to confess that there is room for much improvement in the naming of America's rapidly growing merchant fleet. To begin with, they believe that there are many shipowners who do not fully appreciate the sentimental value, or advertising value, or whatever you choose to call it, of the ship name that is appropriate and in conformity with maritime traditions, yet serves to arrest attention and stick in the memory. The specialists feel, too, that it is not merely the operators of passenger ships who may profit by names that will stir the imagination of possible travellers and prospective tourists. Cargo ships may benefit in proportion by unusual and impressive names. And, by the by, the officials—conceding all the while that it is, strictly speaking, none of their affair—feel that many shipowners do not take such simple precautions as they might to avoid commonplace names and repetitions of names. A study of the bureau's publications, notably the list of merchant vessels of the United States, will do much to induce originality in ship names.

Official onlookers never expect to see the time when there will not be a heavy representation of surnames in the roster of the American merchant marine. With the powers that be in the shipping world the temptation is always strong to bestow upon a new vessel the name of an official or stockholder of the owning corporation, or to pay compliment to some individual who is felt to merit the honour. Nevertheless such names are usually devoid of business-building value, according to the specialists who have made a study of what's in a name, from the maritime standpoint. Geographical names, descriptive and suggestive names, are more highly esteemed by the specialists who point, for example, to the effective employment of geographical names by the United States Navy Department, which has consistently bestowed the names of States of the Union on battleships and of cities on cruisers and gunboats.

Name sharps who feel that the right name aids to invest a vessel with distinctive "personality" declare that almost all the nations bordering on the Pacific share a perfect treasure trove of potential ship names in the vocabularies of the natives. For example, it is declared that the Indian names of North and South America include many that are ideal for the designation of ships, but have been singularly neglected. In recourse to such names it is only necessary to avoid names that are difficult of pronunciation, for the unpronouncable name is as much of a handicap in shipping administration as it is in merchandising.

Officials whose duties have brought familiarity with the ethics, principles and ideals of ship nomenclature are, for the most part in entire sympathy with the impulse, so strikingly manifest on the Pacific, to indicate the relationship of sister ships and companion liners by what pass for "family names." The "Empress boats" exemplified this idea admirably. Alliteration may be successfully resorted to for the same purpose, as in the case of the s.s. *Mongolia*, s.s. *Manchuria*, etc. Long before the war, too, the Southern Pacific railroad interests had attested that community of interest in shipping could be intimated by Spanish names, eloquent to Occidental eyes, and to-day the Japanese are manifesting something of the same fondness for homogeneous names for their merchant ships.

THE DIGGERS' LOAN

HOW INTEREST IS STIMULATED

SOME of the organisers of the Diggers' Loan report to the chief organiser their experiences in bringing the loan before the notice of prominent public men in their respective districts.

They seem to find that one very effective means of arousing interest is to address shire and municipal councils whenever invited to do so, and invitations of this kind are becoming almost a general practice. This gives the organiser an opportunity to explain just what the loan is for and the terms upon which it is being offered for public subscription. The result, in every case so far, the chief organiser states, has been that the aldermen and shire councillors have promised their assistance in raising the quota required by the town or district. At Lawson, where an organiser addressed the Shire Council, the opinion was expressed that the Blue Mountains would more than subscribe their share.

The Mayor of Campbelltown did not wait for the official organiser, but immediately on receipt of the appeal of the Lord Mayor (Ald. Lambert), called a special meeting of his council, at which a public meeting of citizens was arranged to determine what assistance the district could give in this effort to raise money to complete the work of repatriating the soldiers.

The amount wanted for this loan is £10,000,000, of which New South Wales' share is £3,600,000. Subscribers may put up the whole of their money at once, in which case they will be entitled to £1 12s. 6d. interest on every £100 on December 15, or they may pay 10 per cent. on application, 20 per cent. on October 3, 20 per cent. on November 7, 20 per cent. on December 5, and 20 per cent. on January 9. Those who adopt this course will earn £3 7s. 6d. interest per £100 by June 15 next. The nominal rate of interest for the loan is 6 per cent., but the average yield will actually work out at £6 12s. per cent. over the whole period of the loan, or 11s. higher than the rate of the Second Peace Loan.

AUSTRALIA AND THE WAR. Comparison With America.

A fierce controversy has been raging in one of the States of America over the work of repatriation, where even at this late date—for America—so little has been done to settle the men who took part in the final stages of the great war. It has been pointed out that America was the most favoured of the nations vitally concerned in the outcome of the struggle. That is to say, while the resources of other countries were being sapped, the United States was reaping a golden harvest by the turn-over for munitions and by lending money to belligerents. She entered the struggle when the battle was practically won, yet her fighters are still clamouring for the redemption of promises, many of which are yet to be fulfilled.

In Australia things were much harder. A young nation practically pooled its all and entered whole-heartedly into a death-struggle with a powerful foe. How her representatives fared is now recorded in history. All the promises made to her soldiers are being rapidly fulfilled. Within a brief space this young country has expended £26,000,000 on land settlement, £12,200,000 on war service homes, and handed over £2,800,000 in war gratuities; and in addition has paid for the repatriation of soldiers a sum equalling £11,300,000, thus spending just on £53,000,000 in keeping faith with those who had sufficient patriotism to fight for home and country.

The Diggers' Loan is necessary to redeem further war gratuity bonds falling due, and the Federal Treasurer is asking for an additional £10,000,000.

The terms are so inviting that the man who would like to save for a rainy day day cannot do better than invest. The prospectus makes interesting reading.

"FREEDOM OF THE SEAS"

THE STORY OF SURFING AND MIXED BATHING

SOME HISTORICAL FACTS.

BY
E. J. HILL

WITH the advent of surf-bathing, a a new item was added to the long category of sports indulged in by the English-speaking peoples, and like our other outdoor sports, there is none more beneficial unless carried to excess.

"Over the top" on a breaker.

Long before anyone outside certain islanders of the Pacific thought that surf bathing could become a national sport, as it has done in Australia, swimming baths had been excavated here and there on the beaches, and the old time bathing machines with shark-proof enclosures were in evidence on at least one beach in New South Wales. The fight by those who, more broad-minded than local councillors and mid-Victorian officials, realised the health-giving properties of live water was, though brief, a fairly stubborn one.

During those years when Captain Cook was on his voyages of discovery which led to this sunny land of ours being made one of the brightest jewels in Britain's diadem, King George III. made sea bathing fashionable in England because his medical advisers ordered him a daily dip. Up till then there had been swimmers in the open, notably the men of Devon, Somerset and Cornwall, but as a fashionable pastime the salt waters of the Channel were looked askance at until royalty led the way. The waters around Weymouth received the royal person. Fashionable doctors ordered fashionable patients the same treatment. Ladies and gentlemen of quality journeyed to seaside places, as previously they had gone to Bath or Harrogate, or other spas.

But there were no neck-to-knee costumes in 1770. There were not even V's, and, according to the London *Bystander*, Majesty itself, Majesty's sons and daughters, the most noble Lords and ladies, the most respectable of the landed gentry and their beter halves bathed in the sea even as Aphrodite might have done or Adam and Eve before their adventure with the apple.

Naturally, the men bathed in one spot and the women in another, and as remotely as possible—hence the custom that obtained before we learnt common sense and started mixed bathing.

One has only to turn back to the early numbers of *Punch* to get some idea of what sea bathing was in "the days that

Coogee Beach (N.S.W.), looking north, showing Beach Street towards the end of last century. To-day the whole of these hills are covered with residences and shops.

Coogee Beach, looking south, in pre-surfing days, showing bathing machines with shark-proof enclosures.

were but are not." The huge hoods over the seaward door of the bathing machines were a survival of the eighteenth century method. Beauty descended from its machine into the water hidden from all view by the hood. Nothing could possibly be seen of Beauty beyond Beauty's head emerging from beneath the hood. But she was robed only by the water. Yet nobody wrote letters to the newspapers about it. Perhaps it was because minding other people's business was not so general as it is to-day.

Then came what one might describe as "the costume period," when Beauty arrayed herself in voluminous and violent coloured bathing dresses more suitable to a sack race than natation. As far as bathing was concerned she was limited to the length of the rope attached to the seaward end of the bathing machine, and after bobbing up and down for awhile retired to the seclusion of that fearsome vehicle to dry herself and dress. Clad as they then were, it is small wonder that women had no wish to be seen by, or mix with, their male relatives or friends. Also, the men were not yet ready for social intercourse while bathing. Their costume, all right amongst themselves, was hardly the thing for calling. Like the gentleman in Kipling's verse, "The raiment that he wore was nothing much before and rather less than 'alf of that be'ind."

Only a few years ago mixed bathing was absolutely taboo at English watering places. Trippers who had visited Ostend and Trouville and other continental bathing resorts spoke of the scenes there where men and women lolled on the sand (the latter with considerably more on than they wear in a ballroom to-day), or entered the water (up to their ankles only, hand in hand, with bated breath. It was "so foreign, you know." With the passing of Queen Victoria, however, and the ascent to the throne of King Edward VII., the Englishman and woman began to realise that life need not be all drab monotony and strict segregation. Suitable bathing costumes for both men and women were evolved and beauty, freed from the tyranny of the bathing rope, and emancipated from the dangerous and clinging toils of that unspeakable bathing gown, can use to-day, what we always really knew she possessed, her legs, and swim in the sea. To-day Beauty competes in cross-Channel swims, the

Olympic games and puts up long and short distance records that are a credit to her. Artistically, of course, the change is nothing short of miraculous. Instead of being a blot upon the seascape, she adorns it, and where else in the world can one see finer specimens of young womanhood than on the golden sands of the beaches, fringing Australia's eastern seaboard.

The freedom of the seas as far as surf bathing in New South Wales is concerned every week-end. The surf bath and the sun bath are to-day a part of our national life, for unlike the icy waters of the English Channel, the North Sea, or the Irish Channel, Australian waters are not of too low a temperature during the winter months to debar anyone who cares about it bathing all the year round. There are many men—curiously enough, mostly well over middle age—and women too, who never miss their morning dip in the long Pacific swell. Handsome

Coogee Beach at the present time, showing the great development that has taken place since surf bathing was allowed.

was not achieved in a moment. As recently as 1904 local Bumbledom even forbade men the joys of surf bathing between the hours of 8 a.m. and 6 p.m. That Beauty would ever dare to breast the breakers was unthinkable. But the men who a few years later scaled Gallipoli's heights were not likely to be beaten by a few narrow-minded local aldermen, even though these latter were backed up by the police. Test cases were fought in courts from Manly and Coogee, and eventually common sense won the day and the surf became the sports ground of local residents daily, and of the tired city toiler of both sexes surf sheds for both sexes adorn the majority of our beaches, and the profit from them forms a comfortable addition, in most cases, to the local council's revenue.

With the advent of surf bathing, and especially mixed bathing, came the creation of live-saving clubs on almost every beach, and on more than one of our beaches the local council maintains a permanent and paid life saver. One cannot speak too highly of these life saving clubs and the work they do. It is no small thing for a young man to give up his Saturday afternoon, his Sunday morning or afternoon, and a portion of each public holiday, to keep watch and ward over those in the water, and to also give up many of his evenings to strenuous drill so that when the call comes he may with his fellow life-savers make no mistake with belt, line or wheel.

Only a few months ago a borough councillor in England made himself notorious by denouncing mixed bathing, and stated that no man would want to marry a woman once he had seen her come wet from the water "looking like a skinned rabbit." We had a similar parallel in New South Wales a year or two ago, when a local mayor decreed that no woman should enter the surf on the beach over which his council held authority unless she wore a skirt. He based his decree on much the same line of argument as the councillor in the old country. Nothing is more dangerous to a woman in the water than a skirt, and before he passed over to the Great Majority the mayor was converted to the neck-to-knee habit, just the same as the borough councillor in England eventually struck his flag to mixed bathing.

One of the chief arguments against surf bathing in New South Wales was that it would bring an undesirable class of people to the beaches and that property would deteriorate. How wrong that argument was has since been amply verified. There are no more orderly or respectable parts of the Commonwealth than our beaches, and as to adjacent property deteriorating, it has improved in value beyond the wildest expectations of those who owned it less than a quarter of a century ago. If in wilder or less civilised parts of the globe trade follows the flag one can certainly affirm also that trade follows the surfers. Manly, Coogee, Bondi and Maroubra and other beaches bear unwavering witness to the fact.

Our fathers won the freedom of the seas by policing them unceasingly for centuries. We in Australia have won the freedom of the surf for the benefit of coming generations, and having once won this right, are never likely to relinquish it.

The Governor of New South Wales, Sir Walter Davidson (centre), inspecting resuscitation work by a member of the Coogee Life Saving Club.

HISTORY OF ENGLAND

THE EARLY TUDORS

BY

ERNEST A. S. WATT

Henry VII. (1485-1509).

WITH the accession of Henry VII. modern history begins. The barrier is a somewhat artificial one, and in trying to unravel and comprehend the perplexing intricacies of the last four centuries—upon which period alone is the focus of the 20th century centred—our minds will continually revert to the doings of earlier days. History is continuous, and it is therefore impossible successfully to grapple with the vast and varied problems of modern times without remembering along what lines our civilisation and political organisation has slowly developed. The State of to-day is not an organism of artificial growth, but the gradual outcome of many centuries of almost silent progress, each of which has to some extent left its impress upon the political machine with which we are familiar to-day.

The delineation of the relative influence of the various exterior forces, which have helped in the process of building up the England we know, also makes our earlier history a matter of vital interest.

We have seen the island conquered in turn by Roman, by German, by Dane, and by Norman. We have witnessed the miraculous net-work of Christianity bring England into close contact with Rome and Paris, those twin centres of civilisation. With France we have seen the connection grow more intimate by reason of the inheritance of certain of our earlier Kings, and by the series of grim and protracted struggles which such interests necessarily entailed.

We have seen Queen Phillipa, Edward III.'s consort, accompanied on her voyage to England by certain Flemish weavers, whose destiny it was to commence the gradual transformation of the country of their adoption into one of the great manufacturing centres of Europe.

In internal politics meanwhile we have beheld the awakening of a proud national spirit, not only opposing the exorbitant demands of the Papacy, but also voicing, though as yet only timidly, the doctrine that the contract of kingship is a mutual one and that the humblest subject has a right to expect from his ruler justice and sound government.

We have seen a great nation, slowly and with grim effort, cast aside its bonds of slavery. We have observed how the Third Estate—so long despised and rejected—succeeded at last in gaining its share of political power, a share, though insignificant at the outset, gradually increased until, after many vicissitudes, the House of Commons became the fundamental keynote of the British constitution.

But the accession of Henry VII. marks the beginning of a new era in the history, not of England only, but of the whole world; for it was during his reign that the renaissance—the new learning—laid its hold on the popular imagination, a movement as vital and revolutionary in one direction as was the almost simultaneous discovery of the new world in another.

Men's minds were brought back to the glorious days of Greek and Roman literature, there to find a new and powerful stimulus to learning, and knowledge ceased henceforth to be the proud monopoly of the priestly order.

The invention of printing did much to stimulate the enthusiasm thus aroused. William Caxton, in 1476, brought the first wooden press to London, and few pioneers have deserved better of succeeding generations than he.

Caxton was an Englishman who had settled in Brussels and there made a fortune sufficient to enable him to finance his great undertaking. The art of printing, though practised for countless generations by the Chinese, was unknown to Europe until 1435, when John Gutenburg set up his wooden press in Mayence. His enterprise proved from his point of view a failure, but Gutenburg, although he died a pauper, lived long enough to see the press he had invented in constant use throughout central Europe.

Caxton was a man of prodigious industry, and during his lifetime his press turned out nearly a hundred volumes. Malory's "King Arthur" and Chaucer's "Canterbury Tales" were amongst the gems of his output, which also included translations of Cicero's masterpieces and many other specimens of classical and foreign literature. This first master printer must have been an unusually capable scholar, for many of the translations he produced were of his own workmanship. It is true that certain of the volumes for which his press was responsible were of a distinctly lower standard than those alluded to, but this is attributable, not to Caxton's lack of discernment, but to the fact that his press had to pay its way by catering to the public taste.

Revolutionary as were the effects of this world-wide dissemination of learning, in the wake of which followed the breakdown of Rome's religious monopoly, equally emphatic and remarkable were the results of the discovery of the New World, and the opening up of fresh channels for seamanship and commercial enterprise.

The world was proved to be round, and the great mariners of the day were not content until they, too, had added their contribution to the new science of navigation.

The sea way to India was discovered and new trade routes sprang up in every direction; men's opportunities being unlimited and their ambitions boundless.

Sebastian Cabot, a Venetian born in Bristol, was the first (in 1498) to reach the mainland of America, and is also credited with being the inventor of the compass, an instrument destined to revolutionise all pre-existing theories of navigation.

Christopher Columbus, the famous Genoese, is still spoken of as the discoverer of America, but what he in 1492 believed to be the mainland subsequently proved to be one of the West Indian Islands.

The first navigator to reach India by sea was Vasco di Gama, a Portuguese, who after a voyage of eleven months reached the Malabar coast and received a kindly welcome at the hands of the native chiefs. None of these great discoveries was the work of Englishmen, but it was not long before our seamen were formidable rivals to those great pioneers of navigation, the Portuguese, the Genoese and the Spaniards. Yet another innovation of the same period, destined in yet another direction to revolutionise the world, was the invention of gun powder, which being everywhere a royal monopoly materially strengthened the power and prestige of the Crown.

In dealing with the reign of Edward IV. we have already spoken of the "New Monarchy," as it was upon his accession that the Crown succeeded in regaining its position of absolutism. This was, of course, partly because the nobility—in consequence of the long wars of the Roses, following immediately upon the protracted struggle with France, was so depleted as no longer to operate as an effective check upon the authority of the King, and partially because the nation, weary of warfare and anarchy, was content to see all power and authority concentrated in the King, as being the only hope of obtaining a sound and stable Government.

After a brief reversion, under Richard III., to more popular methods, the "New Monarchy" under Henry VII. became definitely developed and intensified; his subjects looking to their King as the one sure defence against those rival bands of predatory nobles who had played so lucrative and selfish a part during the long civil war.

The demoralisation of the priesthood, and the flagrant corruption which had by this time permeated the entire church system, played also directly into the hands of the King, as did the failure of the House of Commons to maintain its representative character; whilst the alarming growth of pauperism, already a serious menace to society, made a strong central authority more fundamentally necessary than ever before. Yet after making full allowance for the various circumstances which worked in their favour, the main cause of the dominant position which the Tudors came to occupy lay undoubtedly in the mental characteristics of the members of the Royal House, who certainly possessed in a superlative degree the genius for administration and whose policy was at heart a national one, it being their constant aim to enhance the position of England in the eyes of Europe. Their policy was to encourage and promote the nation's trade and commerce, to which the civil war had given a severe set back, and to bestow upon the people they ruled the blessings of peace and settled government.

The Tudors, too, were good financiers. Money was cautiously spent, the result be-

ing that they were never to any extent dependent upon the caprice of Parliament. It was in this respect that they differed so fundamentally from their successors; the Stuarts being invariably in want of money and always managing to mis-spend what paltry sums they were able to screw out of Parliament. Their policy, moreover, was never a national one, and they in consequence lacked that popular support accorded to the Tudors with unfailing regularity.

Henry VII., a year after his accession, married Elizabeth of York, the daughter of Edward IV., thus uniting the claims of the two great rival Houses and securing England from all danger of a revival of the civil war. His marriage was apparently a loveless one, but as a political expedient it was eminently successful. His consort was possessed of considerable beauty and charm, and enjoyed a popularity which contrasted strongly with the cold inanimate feeling of awe with which his subjects regarded the King. The nation's marked partiality for their Queen was none too gratifying to Henry's cold and jealous nature, and it was not until a year after their marriage that Elizabeth's coronation was allowed to take place. The long-delayed ceremony was greeted with enthusiasm and applause, and the Queen continued until her death to be the idol of her people.

Henry and Elizabeth being within the prohibited degree of kinship, a special dispensation had first to be obtained from the Pope before the marriage could be solemnised. After their union, too, a Bull was promulgated confirming the Pope's dispensation, and threatening with excommunication anyone who dared to dispute the validity of their title. The fact that Henry considered such a safeguard necessary shows that he was fully alive to the doubtful nature of his own claim to the throne.

From the outset of his reign the King showed how clearly he realised the importance of keeping in check the power and authority of the greater nobles, and it was for this purpose, and more especially to prevent the practice of "maintenance"—by which dependents bound themselves to support the interests of the noble whose livery they wore—that the Court of Star Chamber first came into existence. This tribunal was, in theory at least, no innovation, being merely the extension of the criminal jurisdiction which the Council had always enjoyed. It derived its name from the stars painted on the roof of the hall in which it sat and its members at first consisted of the Chancellor, Treasurer and Privy Seal, acting in conjunction with a Bishop, a temporal peer and the King's Judges. Other members of the Council, and even certain peers, not members of the Council, were later on called in to act as Judges, whilst the jurisdiction of the tribunal, at first strictly limited, gradually extended, the court being eventually empowered to pronounce any sentence short of death. The jury system formed no feature of the Star Chamber procedure, and, as the Judges were the King's personal nominees, its jurisdiction proved an easy means of ridding the Crown of all supposedly dangerous enemies. In course of time as its scope was thus gradually extended, the new tribunal became a dangerous instrument of tyranny in the hands of the Crown, all suspected persons being dragged before its bar and summarily convicted, often on fragmentary evidence.

Despite the immense number of trials which took place, to Henry's infinite credit remarkably few executions sullied the records of his reign.

The King's leading characteristic was undoubtedly his inordinate fondness for money, and no method, however complex, was beneath his dignity if only it helped to contribute towards the Royal revenue. Henry's craven cupidity proved, however, an asset of infinite value to the people he ruled; for, the very idea of war being hateful to a King who grudged every penny spent upon armaments, it followed that England was assured both of enjoying the fruits of peace and economic government.

Though there was in Henry's character little worthy of admiration, or even respect, it is undeniable that he was essentially the type of King that England at this juncture needed, a strong man, capable of bestowing upon those he ruled the inestimable blessings of peace and settled government, so essential if the nation were to recover from the strain of the recent devastation.

Henry's foreign policy aimed at avoiding hostilities at almost any cost, and, unambitious though such conduct may seem, it was none the less eminently to England's advantage. Yet, whilst according him full

credit for maintaining amicable relations with his neighbours, at a time when peace was of the utmost value to the people he ruled, it is impossible to acquit him of a charge of gross ingratitude towards the Duke of Brittany. Not only had the duchy been his one sure harbour of refuge during those long years of planning and plotting, but in his successfhl invasion of England he had owed much to the Duke's generous sympathy and assistance. Yet, when shortly after his accession the independence of Brittany was seriously threatened, the King made but an empty show of coming to his late benefactor's assistance. He certainly did invade France, but on his arrival there he allowed himself to be bought off by French gold. The expedition to Boulogne, which ended thus ignominiously, stands out as the one war-like effort of the reign, and Charles VIII., by reason of Henry's desertion of his whilom benefactor, was enabled to accomplish the annexation of the duchy, thus completing his father's life-work, and bringing the whole of France directly under the domination of the Crown.

At home, during his earlier years, Henry's position was assailed by one rebellion after another.

The Act of Attainder, passed by his first Parliament against Richard's main adherents, was the direct cause of the first outbreak, commonly known as Lord Lovel's rebellion.

It was to enable him to deal with the more formidable of his enemies that Henry, somewhat illogically, dated his accession from August 21, 1485, the day before the Battle of Bosworth. If Richard were in reality the usurper that Henry claimed him to be, the new reign should certainly have been dated from the death of Henry VI., or, at least, from the murder of Edward IV.'s two sons.

Lovel's rising, however, did little more than threaten danger, for upon the promulgation of an offer of free pardon to all who should surrender, the movement ignominiously collapsed, only the ringleaders being put to death.

Two other rebellions followed, which were in a sense curiously similar, both being led by men of lowly origin who posed as being Princes of the Royal blood with ostensibly better claims to the throne than Henry himself. The first of these imposters was Lambert Simnel, announcing himself the Earl of Warwick, son of the Duke of Clarence, Edward IV.'s brother. The real Earl of Warwick was at the time still a prisoner in the Tower, whither Richard III. had first consigned him.

Simnel was in reality but a figure-head, the real instigator of the rebellion being the Earl of Lincoln, whose mother, a sister of Edward IV., had married de la Pole, Earl of Suffolk. The Earl's participation in so hair-brained an undertaking is difficult to understand, the Earl of Warwick having, in the ordinary course of events, no possible claim to the throne during Elizabeth's life; whilst, even if the illegality of Edward IV.'s marriage be conceded, an Act of Attainder had effectually destroyed Clarence's title, Lincoln himself thus possessing a better claim than Warwick could possibly be heir to.

Lincoln met with considerable success in Ireland, and, after seeing his puppet crowned in Dublin, landed at Furness with a paltry following, consisting for the most part of German mercenaries and Irish volunteers. He failed, however, to find in the northern counties the support he expected, and in the Battle of Stoke (1487) his tiny army was hopelessly outnumbered and almost annihilated, Lincoln himself being killed. Lambert Simnel was taken prisoner at Stoke and Henry showed his contempt for his would-be rival by making him a scullion in his kitchen, a post from which he afterwards rose, by good behaviour, to the position of Royal falconer.

The rebellion may appear at this distance of time but a farcical episode, and it was certainly ill conceived and clumsily executed, but at the moment it seemed likely to assume formidable dimensions and its prompt suppression was due to the super excellence of Henry's spy-system and the vigilance and activity of his executive.

The next rebellion proved much more difficult to deal with. This time the leader was Perkin Warbeck, who claimed to be the Duke of York, the younger of the two Princes supposed to have been murdered in the Tower at the instigation of Richard III.

The general verdict of history is emphatically in favour of Warbeck being an imposter, but the fact has never yet been conclusively proved, and more than one reputable historian has expressed himself convinced of his bona fides.

Warbeck landed at Cork in 1492 and,

after a friendly reception in Ireland, was invited to Paris by Charles VIII., who doubtless realised that the presence of the Pretender in his capital would prove a powerful lever in persuading Henry to accept his overtures of peace. The artifice proved successful, but by the terms of the Treaty of Etaples, the sequel to Henry's expedition to Boulogne, Charles was compelled immediately to oust Warbeck. Flanders now became his harbour of refuge, the Impostor being enthusiastically welcomed by the Duchess of Burgundy, who was apparently quite convinced of his identity with her long-lost nephew. An attempt on Kent in 1495 proved a fiasco, and the following year witnessed his expulsion from Flanders, the "Great Intercourse," signed that year between England and Burgundy, containing a stipulation that Henry's rival should immediately be compelled to quit the boundaries of the duchy.

Warbeck's next move was to Ireland, and, after failing there, proceeded to Scotland, where he was warmly welcomed by King James IV.

Two fruitless invasions of Northumberland followed, and then James too came to terms with the King of England and requested his luckless guest to quit Scotland.

Warbeck now returned to Ireland, where for some months he eked out a perilous existence, without revealing his identity.

Cornwall had meantime become the scene of rebellion, the Cornishmen refusing to participate in a subsidy levied to meet the expenses incurred by reason of the recent war with Scotland. The rebels were defeated at Blackheath in 1497, but despite their failure Warbeck deemed this to be a propitious moment again to tempt fortune in England. He landed at Penzance and was laying seige to Exeter when the King's army compelled him to withdraw. His tiny force—for he had gained but few supporters—was hopelessly outnumbered and after reaching the New Forest, the Impostor found himself compelled to surrender, his one stipulation being that his life should be spared.

A year later he escaped from the Tower, a feat which resulted not only in his own execution, but also of the luckless Earl of Warwick, who was convicted on very shadowy evidence of having also attempted to escape. This unfortunate young Prince was only twenty-two years of age at the time, and had spent the greater portion of his existence in close captivity. He was apparently a more than usually harmless individual, his birthright being in reality his one offence.

Warbeck was compelled upon his capture to write an abject confession of his imposture, acknowledging himself to be the son of a Jew from Tournay who had settled in London. This document he was forced to read aloud as he sat in the stocks, for the benefit and entertainment of the many thousands who flocked to witness his discomfiture.

In dealing with Warbeck's story, mention has been made of the Scottish invasion of England in 1496. A truce had long existed between the two countries, but its terms were frequently violated, and only Henry's rooted objection to warfare prevented an open rupture.

Between Scotland and France a close alliance still existed, and it was the friendly attitude of Charles towards England that induced James IV. in 1496 to listen to Henry's overtures of peace and seal an amicable understanding between the two nations by his betrothal to Margaret Tudor, the elder daughter of Henry VII. The marriage was celebrated seven years later, the young Queen being even then only in her fourteenth year. The match was of course intended to ensure the maintenance of amicable relations between the two countries, but in this respect it was destined to prove a lamentable failure, King James being himself killed in 1513 in the Battle of Flodden Field whilst fighting against his consort's brother, whilst twenty-nine years later his son, James V., only survived by a few months the equally disastrous Battle of Solway Moss.

It is to the marriage of James IV. and Margaret Tudor that the Stuarts owed their title to the English throne, King James I. of England and VI. of Scotland being their great-grandson.

Yet another Royal marriage, which like the Scottish alliance, was contracted expressly for the purpose of maintaining peace, was destined to be productive of great results. This was, of course, the betrothal of Henry's eldest son, Arthur, to Catherine of Aragon, the daughter of Ferdinand and Isabella, which took place in 1501. Five months later Arthur died and, the parents of both parties being unwilling to abandon the matrimonial contract, it

was decided that Arthur's younger brother, Henry, should take his place. A Bull of dispensation was accordingly obtained from the Pope, but owing to the Prince's tender years the marriage did not actually take place until after his accession to the throne, he then being eighteen whilst his bride was twenty-four. Thus was that marriage embarked upon which was destined to lead eventually to the breach with Rome and the establishment of the Church of England.

In Ireland Henry made a half-hearted attempt to restore order. That island had known no peace for many centuries, civil war and turbulent unrest having never ceased. Not only was the ancient feud between Anglo-Norman and Native Irish still at its height, but Norman was against Norman, and native against native. The Feudal System had worked badly in Ireland, the Crown possessing no manors of its own within the boundaries of that country and the King not being, as in England and elsewhere, the principal land-owner.

For an army he was therefore dependent upon the levies of his more important vassals, and, in sheer self-defence, it had become England's policy to encourage the more powerful chieftains to be ever at each other's throats.

To have strengthened the position of the Norman settlers would have been a more reasonable policy, but from the outset the English Kings were more jealous of their own kith and kin than apprehensive of the native Irish. To prevent any degree of union between the two parties Edward III. had passed the Treaty of Kilkenny, which even went so far as to forbid the Norman faction speaking the Irish tongue. This Statute was confirmed in Henry VII.'s reign, and the fact that the clause appertaining to language was then omitted is not without significance. England's only safeguard was to egg one chieftain against the other, and her administration being variable, inequitable and capricious, it is small wonder that Ireland remained in a perpetual state of seething disorder, only those within the pale being amenable to English law. The Wars of the Roses had been fiercely contested in Ireland, and it was only natural that both Lambert Simnel and Perkin Warbeck should find many supporters there.

The palpable readiness of so many Irishmen to side with the House of York—for Richard of York had, just prior to the Civil War, played the rôle of Lord Deputy with marked success—suggested to Henry's mind the necessity of crippling the authority of the Irish Parliament without delay.

Sir Edward Poynings was for this purpose appointed Lord Deputy; and the important Act of 1494, by which the King hoped to crush Irish independence, bears his name. Poynings's Act forbade the Irish Parliament to meet without the consent of the English Council and at the same time made the validity of its enactments contingent upon the latter's subsequent approval. This Act remained until the Irish rebellion of 1798.

Henry subsequently tried the curious and interesting experiment of selecting as Lord Deputy the very chieftain who had so far proved his most dangerous enemy. The administration of the Earl of Kildare cannot, however, from any point of view, be termed a success, though he certainly was successful, by overawing his rivals, in maintaining a semblance of peace. During his tenure of official power of office the interests of the Deputy's family and their various dependents were abundantly considered and catered for, whilst the power and prestige of the few pro-English chieftains were of course in every way possible curtailed and belittled.

Henry was doubtless genuinely desirous of improving Ireland's condition, but the various rebellions retarded the development of any definite policy, and it was left to his son to restore some semblance of law and order into the affairs of this most distressful country.

At home Henry managed to avoid all possibility of friction with his Parliament. His revenue was carefully expended and every possible expedient adopted to add to the funds of the Royal Exchequer.

Many confiscations took place during the reign, often for offences comparatively trivial, and upon evidence which was far from being either reliable or unprejudiced.

Even Lord Stanley, the Lord Chamberlain, who in the Battle of Bosworth had saved the King's life, was fated to fall a victim to this vicious system, his immense estates being confiscated and he himself executed, solely upon the strength of Perkin Warbeck's testimony.

"Benevolences"—that much detested form of taxation—were more than once re-

sorted to, whilst colossal fines were exacted from all whose fidelity the King had reason to suspect. During the later years of his reign, too, vast sums were raked into the Treasury by the unprincipled ingenuity of Dudley and Empson, two crafty lawyers, who by means of long obsolete statutes succeeded in adding considerably to the Royal revenue. Under these circumstances it is not surprising that Henry amassed what was considered an immense fortune.

The Statute of Treasons, in 1497, was the one notable addition to the Statute Book. Hitherto upon a change of dynasty the King's subjects were liable to be treated as traitors by the successful rival, and, in putting an end to so intolerable a state of affairs and making it possible for a subject to accept the sovereignty of the King de facto, without the possibility of incurring the danger of a subsequent prosecution for treason, the new Statute established the law of treason upon an equitable basis.

It may be well here to add that in the reign of Edward VI. the law upon this subject was still further ameliorated by Parliament's decision that at least two witnesses were necessary to support a charge of high treason.

Henry possessed none of the attributes of a popular monarch, yet although he was cold, callous, unsympathetic, and overfond of money, he was essentially the type of King England needed and the value of his services towards the nation he ruled it is well nigh impossible to estimate.

When he died England was still far from being a rich country, but her trade and commerce had already multiplied exceedingly and the seed had been sown which was in the near future to ensure her a prominent position amongst the great powers of Europe.

Henry deserves immense credit for realising the possibilities of defence by sea, for it was in his reign that ships were first expressly built for purposes of warfare. Owing, however, to the fact that peace was maintained throughout his reign and to the King's rooted aversion to spending money, such ships were but few, each seaport being still liable to be called upon to furnish its quota of ships for the King's service in the event of any national emergency arising.

It was also chiefly owing to Henry's rigid sense of economy that he failed to play his part in the great discoveries and ventures of the day.

It is true that he supported the Cabots in their expedition which led to the discovery of Newfoundland, but the importance of their achievement was not at the time by any means fully appreciated, and, the voyage from a commercial point of view proving a failure, the King was not encouraged to disburse further sums upon enterprises of a similar nature. Even Christopher Columbus's dazzling offer of the "New World" failed to tempt him to invest further in what seemed to him a profitless undertaking. Yet far from stigmatising the King for a lack of foresight in this direction, as some historians have thought fit to do, it would be fairer perhaps to credit him with a wise appreciation of the fact that England at this period of her existence was not in a position seriously to challenge the dominancy of Spain.

Henry died in 1509, at the age of fifty-three. During his reign of twenty-four years he had known little or no repose, and it was largely owing to his strong hand, his iron will and his remarkable sagacity that his dynasty was now firmly seated upon the throne, and that England was destined for the next century to enjoy the blessings of peace and good government, without which her wonderful career, progress and aggrandisement would have been impossible.

There is little that savours of the picturesque or heroic about Henry's character and he never made the slightest attempt to woo the confidence or admiration of his subjects, but for all that his reign stands out as an epoch of great importance in our history, and to his strong rule and his determination to maintain peace England owes a debt which can scarcely be overrated. Considering the countless difficulties he had to face and the strenuous opposition he was compelled to encounter, it is indeed remarkable how few executions took place during his reign, his methods in this respect forming a happy contrast to those which his son and successor found himself compelled to employ.

In fairness to the latter, however, it must be remembered that the breach with Rome and the consequent probability of warfare with Spain added very considerably to the dangers of sedition, and made it incumbent upon that King to suppress with an iron hand the very faintest symptoms of internal dissension.

A TRIP TO THURSDAY ISLAND

BY

T. J. HENRY

IT was on the well-known and favourite liner *Taiyuan* that the writer sailed from Sydney on a tour of the East. One of the first acquaintances made on board was that of the wireless officer, "Sparks" —the cognomen by which all wireless officers are known aboard ship.

From this gentleman was learned a great deal about the mysteries of *atmospheric* and other recondite principles, and the writer was allowed to place the telephone receivers to his ears. All that could be heard, however, was an erratic scraping sound. This, it was explained, was due to some far-off storm cavorting round, and that we would probably run into it a few hours later. About eight p.m. we ran into a squall, and "Sparks's" reputation as a meteorologist was made for the trip.

A general view of Thursday Island.

The Great Barrier Reef.

The fourth day out we entered the tropics and coincidently the area protected by the Great Barrier Reef. This runs as a continuous structure, a "moat defensive set in the silver sea" from about opposite Rockhampton almost to Thursday Island, nearly a thousand miles. The Great Barrier Reef is a typical coral formation and the most wonderful natural breakwater in existence. It is ever growing, without rest, without haste, hence in time out-cropping spurs now completely submerged will reach high enough to constitute fresh dangers to shipping. Constant marine surveys, however, will guard against this. The Reef is not one smooth unbroken wall facing the coast and fending off "the long wash of Australasian seas." It is, roughly speaking, from seven to ten miles wide, and made up of innumerable ramparts more or less parallel and united by intricate tentacles. It throws out frequent arms often miles long and has a secondary set of fringing reefs, atolls and spurs, which toward the north, where the water is always warm and growth more rapid, almost block the channel in places. For the most part the Barrier is invisible unless at dead low water, but at intervals, where islands are in course of "making," dark, cruel edges show margined by narrow ribbons of foam. Here and there meagre rows of cocoanut palms have taken root—the advance guards of coming growth.

Navigation is especially anxious toward the northern end, but the captains and pilots know every inch of the perilous way, guiding lights and beacons being in unbroken series.

Moreover, if it is not possible to traverse the more dangerous channels by daylight the steamers anchor until dawn, and thus assurance is made doubly sure. The whole of the coast of Queensland is a treat to the eye. Great bare, bold promontories or graceful green-clad capes, sweeping uplands on which long grass waves in the wind in ripples like fields of barley, or high inland mountains looking blue through the misty veil of distance, while crescentic beaches fronted by islets of singularly spectacular charm, succeed each other in practically continuous panorama.

An especially impressive region is Whit-Sunday Passage. We traversed it before reaching Townsville. On our left lay the ever-varying high-towering front of the mainland, on our right, a chain of islands which resembled the domed and castellated summits of almost submerged mountains. For over twenty miles the islands, clad with luxuriant tropical vegetation, spread irregularly parallel to the mainland. The Passage is rarely more than three or four miles wide, and in places draws in until it is little wider than the entrance to Sydney Harbour.

Townsville.

We stopped from early morn till midnight in Townsville. This is a growing and lively town of nearly 25,000 inhabitants, who are buoyed up with the belief that in due, and not too distant, time it will be the chief port of Queensland. Several large vessels were loading frozen meat during our stay. The harbour is little more than an open roadstead, but is well recessed between long promontories which protect it north and south. Magnetic Island, a picturesque watering place, lies athwart the bay and forms a natural break-water. In addition there is a chain of outer islands, and away beyond all the Great Barrier Reef. An artificial breakwater has also been constructed close in, so that Townsville is fairly protected from heavy seas. The chief danger is the cyclone. The town lies in the hurricane zone, and in 1903 received a visitation which blew down about half of the buildings. The business district lies on a low flat space crowded down to the edge of the harbour and Ross River by high basaltic hills. To the north the view is rather picturesque. An immense rock shoots upward nearly a thousand feet. It is something like a crouching lion, resembling on a smaller scale the celebrated Arthur's Seat which stands in majesty on the outskirts of Edinburgh. This "Castle Rock" is too steep and rugged for building upon, but there are gracefully rounded foothills on which are schools and private mansions with the large many-verandahed public hospital as the central edifice.

Thursday Island.

On the ninth day from Sydney we called at Thursday Island, and the writer was glad to renew acquaintance with this outpost of Australia, having once spent a week there. A falling-off was found in the business aspect between now and olden days. Then the place was the chief centre of the pearl fisheries, and "Thirsty Island," as it is sometimes called, was the rendezvous of hundreds of sloops and schooners on each of which divers were engaged. The population indeed was largely Japanese, and it may be better that most of these have deported. But the little town is sadly decadent. What was once a street lined with shops has now only a few small establishments, the rest are either empty or used as dwellings by persons of the nondescript and complex races, peculiar blends of black, yellow and white. The white inhabitants total about four hundred, which is certainly a lot less than it used to be. The pearling centre has moved to Broome. The trade at Thursday Island is now chiefly in *Beche-de-Mer*. This strange sea-slug is caught on the Great Barrier and adjacent reefs. When cleaned and dried it varies from six inches to over a foot in length, according to quality. A year or two ago the best varieties fetched up to £350 a ton. But the rate has fallen much below this in recent months.

We shipped a lot of sandal wood, which is used in making incense for the Joss-Houses of the Flowery Land. This wood is grown on the mainland of Australia. It was good to see that we could export our timber; but it was not pleasing to notice as we returned from China that in Borneo we took on a considerable consignment of red serai cedar for use in Australia. One would have imagined that we could produce all the hard building woods we required for ourselves.

The island is hardly two miles in diameter and can be circumambulated in a few hours by anyone possessed of sufficient physical energy. It is a mere dot on the map. Yet it does not lie in solitude in the warm tropical waters. It is one of a miniature archipelago, each unit of which is named after one or other day of the week—there is Tuesday Island, Friday Island and so on, but as Sunday Island exists elsewhere nearer the New Zealand coast, none in Torres Straits has appropriated the Sabbatical title; but in compensation there is a Good(e) Island. To reach Thursday Island the steamer had to thread its way among quite an array of islets. But if the main island is geographically insignificant it atones for this by its beauty. It is no bald, bare rock, but rises in seven gracefully rounded hills, each clad with verdure and adorned with palms. The view from any of the hill-tops is also attractive. The island is so completely echeloned by others that it seems poised in a wide sinuous river quite away from the great ocean.

The mariners who patrol these seas become quite attached to the route. A touching story was told by a retired chief engineer who was a fellow passenger. An uncle of his who commanded one of the same line of steamers, and had made the trip many times, was taken ill when his vessel was traversing the long passage between the mainland and the Great Barrier. He felt that he was dying and asked that he be buried on one of the Percy Islands so that "he could watch the ships go by." After his demise the ship was duly stopped, a burial party took the brave old salt ashore, and as he had directed laid him reverently to rest where in spirit "he could watch the ships go by."

NEW ZEALAND AFFAIRS

BY

HENRY BATESON (Our Special New Zealand Correspondent)

THINGS are remarkably quiet in New Zealand at the present time, chiefly owing to the tightness of the money market. This position applies to most businesses. The shipping slump is especially noticeable, many of the coastal fleet are laid up, and the *Moeraki* and two or three other large Union Company steamers are idle.

Wireless Amateurs.

The position of wireless amateurs has been made quite clear within the past week or so. There have been many complaints about the strict restrictions which are enforced. An aerial, for instance, cannot be more than 100 feet in height. This is only one of the restrictions. In an official statement the Postmaster-General says the restrictions are enforced in order to stop interference with official stations. There are a number of wireless experimenters in the Dominion allowed to have large plants not in accordance with the regulations, and who are allowed to work over a large area, but it is generally recognised that these men are doing good work.

Lifeboat For Wellington Heads.

It is stated by people who should know that Wellington will shortly have a lifeboat station at the Heads. The writer is of opinion that this boat should have been there years ago, but a bitter warfare has always raged between the two parties as to whether a lifeboat could live in the giant seas which sweep in from Cook Strait. Now, however, a number of societies and unions are combining to have a lifeboat placed at the heads. They have presented the Prime Minister with a full statement of the case, and have made a number of suggestions to him, but an answer is not expected until his return in September.

Aviation Notes.

The Whangarei-Auckland aerial mail service has proved a very costly experiment. For the first two months only £20 was received, while the expenditure amounted to about £2000. The air-line, of course, was merely run as an experiment, but it is considered that the Postal officials showed bad judgment in selecting it. Whangarei is quite close to Auckland, and is adequately served with a daily rail service. People were not prepared to pay to send a letter by air when they could send it almost as quickly by rail.

AERIAL EXPLORATION

IN NORTH-WEST QUEENSLAND

BY

HUDSON FYSH

DURING the last two months two pioneering trips of more interest than usual have been undertaken by the Queensland and Northern Territory Aerial Service, of Longreach, Queensland. This Company has been operating since the beginning of February, and has among its objects the opening up of country which at present has very poor means of communication. The headquarters at the railhead of Longreach is at the door to the magnificent and undeveloped West, a country of limitless possibilities. The land is still very much in the rough, and in the far west the pioneer is at work opening up new lands for stock raising, and incidently leading a lonely "way-back" life, connected as he is, with the nearest railway

The start of the trip from Elderslie station, fifty miles west of Winton, North-west Queensland. On the left: Lieutenant P. J. McGinness (pilot), Sergeant A. Beard, mechanic, and C. J. Brabazon, Esq. (centre).

perhaps two hundred miles away, by a road which is only fit to travel on during the dry season. One can imagine how people in the south would deplore being cut off from the outside world for over two weeks just because six inches of rain had fallen. Yet this is what is happening in the west, even in the more thickly populated districts, and it results in much inconvenience in business and anxiety in the case of sickness.

The most important tour was that undertaken by Mr. P. J. McGinniss (pilot) and Mr. A. Beard (mechanic), who carried out a successful trip into the Northern Territory. This is the first trip of a commercial character made by any machine into the Territory, and its successful accomplishment will go a long way in establishing confidence in aviation for pioneering purposes in the inaccessible districts of Australia.

Messrs. McGinniss and Beard left Longreach on May 16, and after a run of one hundred and sixty miles to Elderslie station, picked up Mr. C. J. Brabazon, who was making a tour of Walgra station and Austral Downs in the Northern Territory, the homestead of the latter being situated thirty miles across the border.

At 10.20 a.m. the machine left Elderslie, arriving at Boulia at 1.5 p.m., after a splendid trip of one hundred and ninety miles over the open rolling grass downs of the west. This was the second occasion the machine had visited Boulia and the party pushed on to Walgra station. On May 19 Urandangie, twenty-four miles from the Territory boundary, was reached. Here the machine had a great reception and forty-four passengers were carried during the races.

On May 21 Austral Downs was reached after a run of eighty-five miles along the Georgiana River. The country travelled was all open downs with belts of timber along the rivers and isolated patches running out into the vast open downs.

Camooweal, fifty miles north of Austral and just across the border, was visited, and the 'plane took up thirty passengers. Many people made long journeys to see the machine. The policy of the Company is well-known in the "back country," and the people look upon these initial pioneering flights as a forerunner of the time when the arrival of machines carrying passengers and mails will be of frequent occurrence.

Exploration by Air.

The machine returned to Austral Downs on May 24, and preparations were made for the trip into unexplored regions the following day. Mr. Brabazon and Mr. Rudd, manager of Austral Downs, were the passengers. They had in view the exploration, for water and pastoral country, of an area to the west of the junction of the Rankine and Georgiana Rivers and to the south-west-by-west of Austral Downs.

This is probably the first occasion in Australia in which an exploration trip over practically unknown country has been undertaken for a definite commercial object, and the performance must be looked upon as another well defined step in the advancement of aviation in Australia.

Some miles west of the junction of the Rankine and Georgiana Rivers, and running in a line north and south, the fine Mitchell and Flinders grass plains came to a termination in a wall of timber. The region is waterless most of the year, and consists largely of what is known in the west as "desert-country." This country is considered inferior to the Downs for stock carrying, but often proves a valuable holding when worked in conjunction with the more open and better grassed areas. The stunted timber, edible shrubs and spinifex patches of desert country often form a fine "fall back" in time of drought.

The flat nature of the country over which the flight was made, coupled with the absence of water except at very uncertain periods of the year, makes this locality practically impenetrable except with camels. Even then one could pass within a few miles of water, or an area of good Downs country, without being aware of its existence.

It was a clear morning when the party started on their journey towards Central Australia. The visibility was splendid and the machine sailed along at a height of 2,000 feet. The Downs country was soon left behind, and the flight continued over the timbered "desert country," a south-westerly course being followed. In twenty minutes the western limits of the selected country was passed. Unlimited stunted timber with intermittent sandy ridges and level country stretched away to the western horizon.

Several times during the out journey the machine was brought down to 1,000 feet, and the occupants examined the ground, distinguishing with ease the nature of the soil, grasses and timber.

After covering one hundred miles in an hour and a half against a head wind, the machine was sent up to 5,000 feet to obtain an extended view of the country to the south-west, west and north-west. On the clear morning the view was a splendid one, and open areas of country could be distinguished for a further fifty miles. Away to the south-west a small patch of open downs, perhaps ten miles across, could be seen, and to the north-west the Frew Range, eighty miles away, was visible.

The machine had a fast run back to Austral Downs after being in the air three hours and twenty minutes, and covering well over two hundred miles.

By the usual means of transport the journey would have taken from a month to five weeks of hard travelling, in addition to heavy expense and a wait for an opportune time after the rains to commence the trip.

During the whole flight no trace of water was seen, and the nature of the country was established beyond doubt.

Future Exploration Work.

In Central Australia there still exist areas which are either unexplored, or have only been traversed by isolated camel teams. The various aspects of these parts, in drought, in normal times, and when swept by floods, during which many of the small lakes and lagoons in the central districts become huge sheets of water covering many square miles of country, have yet to be seen.

An aeroplane, working in conjunction with a ground party, would prove invaluable for finding water and picking up other physical features. Then aerial photography, which proved its worth for survey purposes during the late war, could be utilised to advantage.

Much important exploration work is awaiting the aeroplane in the Northern Territory, and it is hoped that this initial exploration flight will be a forerunner of others.

On May 28 the machine landed back at Elderslie after being absent thirteen days, and having covered two thousand one hundred miles in thirty-one hours fifteen minutes.

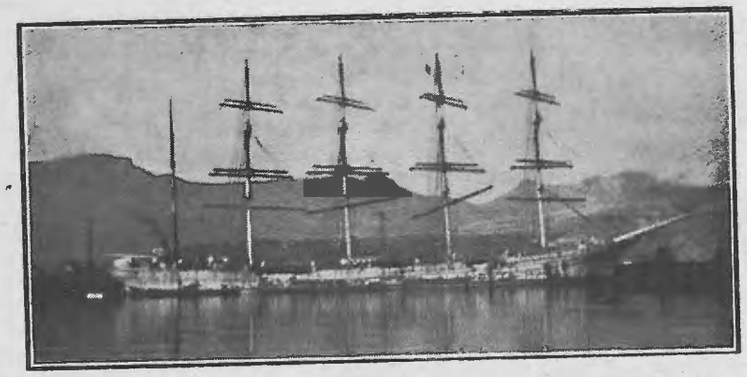
Subsequently Mr. Brabazon wired from Austral Downs, indicating that he had had another excellent trip from Urangangie to that centre; the 'plane averaging seventy miles per hour. The flight afforded him a view of new country west of Georgiana River, and convinced him that aerial travel has no equal as an annihilator of distance.

World's Largest Sailing Ship.

THAT the day of the sailing ship as a messenger of commerce is not yet over is demonstrated by an inspection of the *France,* the largest sailing vessel afloat, which recently arrived at Lyttelton (N.Z.) after a voyage of one hundred and ten days from Newport (Wales).

The *France* is of 5,633 tons gross register, and her dimensions are, length 418ft. 8in., beam 55ft. 8in., depth 24ft. 9in. The vessel was built at Bordeaux (France) in 1912, and is classed 100 A1 at Lloyds. A feature of her equipment is the most up-to-date appliances for the quick handling of cargo, which enables loading to be discharged and taken on quite as expeditiously as is done in large steam propelled ships.

The *France* is equipped with wireless, and her crew includes a number of cadets. From every point of view she is unquestionably well fitted to enjoy the distinction of being the largest sailing vessel afloat.



The "France," the largest sailing vessel in the world, lying at Lyttelton (N.Z.).

* * *

New Service to India.

It is the intention of the Commonwealth Government to inaugurate, about the end of the present year, a fast four-weekly service between the main Australian ports and Colombo and the chief Indian and Suez ports. The service will be conducted by steamers of the "Bay" line, and ample refrigerating space will be provided for the carriage of fruit and other perishable goods.

It is understood that several enterprising Australian firms are prepared to seek and develop new trade in the Indian and Suez spheres. The new service will give ample facilities for this aim, and it is hoped that its inauguration will mean a big increase in Australia's commercial activities in the East.

Value of Sailing Ships.

The President of the Canterbury (N.Z.) College Engineering Society, Professor R. J. Scott, in a recent address, declared that in future "we must rely on that great, free, practically unutilised source of power, the wind, for conveying our products to America and European markets."

Professor Scott adduced figures showing that under present conditions it is more profitable to use sails than steam for the carriage to market of products such as wool and meat. He explained, however, that he was not referring to the old style of windjammer, but to an altogether new type of ship which, in addition to carrying sails, will be provided with oil engines to propel the vessel during a calm, and to work the cargo winches, refrigerating machinery, etc.

Professor Scott declared that a ship of the kind mentioned would require only a crew of twenty-five, and the various other economies in working which it would be possible to effect would mean a handsome profit to the owners.

* * *

Oil Burning Steamers.

Lord Pirie, head of the great shipbuilding firm of Harland & Wolff, recently warned shippers not to continue turning coal burning steamers into oil burners. He based his warning on the fact that unless some extraordinary discoveries of new oil-bearing fields are made, or the world makes up its mind that in order to obtain the needed supplies of oil fuel no more coal shall be burnt in the raw state, the time is not far distant when oil burners will find it impossible to obtain oil.

In the course of his statement, Lord Pirie contended that it was absurd that low-powered steamers should be oil fired. It would be better to replace their steam machinery by oil engines, which would mean a great saving in space, reduced working expenses, and a much lower consumption of oil. Such advantages would not, of course, be manifest in big liners of the *Mauretania* class.

* * *

Manila Service.

The agents for the E. & A. Line, Messrs. McDonald, Hamilton & Co., have made arrangements for their steamers to call regularly at Manila on the southward journey in future. This arrangement will prove a boon to those interested in trade between Australia and the Philippine Islands, China and Japan. Previously E. & A. liners called at Manila on the northward voyage only.

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Veteran Pilot Retires.

Captain W. T. Liley, "father" of the Victorian pilot service, is to retire next month after nearly thirty years' continuous service.

Captain Liley's career is a most interesting one. He went to sea as an apprentice on the clipper *Sir Francis Bancroft* in 1868. Through becoming frost-bitten in a blizzard in the English Channel he was forced to leave the deep sea service for a time, and for some years engaged on different English coasters. Later he served as an officer on the coast of China, and on two occasions the steamers on which he was engaged were boarded by pirates. In 1881 the *Brisbane,* on which Captain Liley was proceeding as a passenger from Hong Kong to Melbourne, was wrecked on a reef outside Darwin. Captain Liley navigated a ship's boat for thirty miles and brought assistance to the wrecked vessel. In the same year he began his long association with Australian shipping, a career marked by many notable feats of seamanship. It stands to Captain Liley's credit that for twenty-six years he has piloted vessels of all rigs, from clipper sailing ships to the largest ocean-going liners, through one of the most treacherous channels in the world without a single mishap.

* * *

Steamer Founders in Fog.

The steamer *Alaska,* 3,709 tons, bound from San Francisco to Portland (Oregon) early last month, struck a reef off the Californian coast in a fog, and sank almost immediately.

At the time of the disaster the *Alaska* carried passengers and crew numbering two hundred and forty, of which it is believed thirty-six perished. The doomed vessel sent out a wireless call for assistance, and two steamers rushed to the spot. Rescue work was difficult in the heavy fog, and the frenzied rush which passengers made for the lifeboats when launched was responsible for one capsizing; a happening which entailed the loss of life referred to. The wireless operator is believed to have remained at his post until the *Alaska* foundered.

Old Wreck Blown Up.

The sunken schooner *Eliza* which has lain in Hobson's Bay not many yards distant from the new pier at Port Melbourne for fifty-one years, was recently blown up by gelignite.

While lying in the stream at Port Melbourne in March, 1870, the *Eliza* caught fire, and in order that other vessels might not be endangered, was sunk by a torpedo from H.M.S. *Nelson.* The removal of the wreck will be welcomed by pilots, for it has been a source of much trouble to them when berthing vessels at the new pier.

* * *

Missing "Canastota."

A quantity of wreckage consisting of charred debris, including benzine cases and casks of tallow, has been washed ashore at Lord Howe Island. The casks are marked P.A.T. over New York, and are believed to belong to the steamer *Canastota,* which has been missing since June 13 last, on which date she sailed from Sydney *en route* to New York, *viâ* Wellington.

The information regarding the wreckage was conveyed to Sydney by wireless from Captain Weatherall, of the *Makambo,* which afterwards brought the casks, etc., on to Sydney.

* * *

The "Coogee" Refitted.

The steamer *Coogee,* an account of whose long list of misfortunes appeared in the June issue of *Sea, Land and Air,* has again been refitted, and sailed from Melbourne for Launceston on August 10. It is proposed to utilise her in the work of repairing the cable between Tasmania and the mainland. For some years the *Coogee* assisted in the ferry service between Geelong and Melbourne.

Assisting Distressed Vessels.

Under the Navigation Act now in operation, arrangements have been made to facilitate rescue operations in the case of distressed vessels.

The Deputy Director of Navigation in each State will be in charge of the organisation. The Act requires navigators to report any unusual occurrence by wireless, the particulars of which will be forwarded immediately by radio to the Deputy Director of Navigation, on whom will devolve the responsibility of notifying owners, agents and all concerned, as well as making arrangements for rendering assistance.

Arrangements have been made whereby officers of the department can be communicated with by 'phone at any hour of the day and night, thus ensuring a minimum of delay in rendering assistance to distressed vessels.

* * *

Schooner's Rough Voyage.

The five-masted schooner *John W. Wells,* which arrived in Sydney on August 10 with a large cargo of timber from Port Townsend, had a particularly trying time on the trip from Melbourne to Sydney, which occupied fourteen days.

Shortly after leaving Melbourne she encountered a succession of heavy gales which drove her off the coast and carried away half-a-dozen of her sails. While off Sydney Heads some days before being able to enter, Captain Holmes, of the *John W. Wells,* reported to the Navigation Department by wireless that distress signals had been observed by two officers and one of the crew of his vessel. Several vessels picked up the message and made a search of the locality, but nothing was found.

QUICK-ACTING BRAKES

The ordinary designer undoubtedly finds himself in rather a quandary when he settles the brake layout of a motor cycle, comments an English contemporary. If the stock amount as sold to the public is equipped with powerful, quick-acting brakes, quite a number of the firm's customers will "crash" before they have developed into adepts, for rash brakework on a two-wheeler spells spills. The real solution is to design brakes which will not lock the wheels until tremendous muscular force is applied. In a sudden emergency the half-novice makes a quick, instinctive grab at his brakes, and if that automatic snatch locks the wheels, a spill results. If this nervous grab merely applied the brakes mildly, and sustained muscular effort were needed to stop the machine altogether, he would be given a fraction of a second in which to collect his wits. This brief interval would save him from a spill on the one hand and a collision on the other. Technically, such an arrangement of the brake leverage is quite possible.

MYSTERIES OF THE OCEAN

SHIPS THAT HAVE DISAPPEARED

BY
S.R.

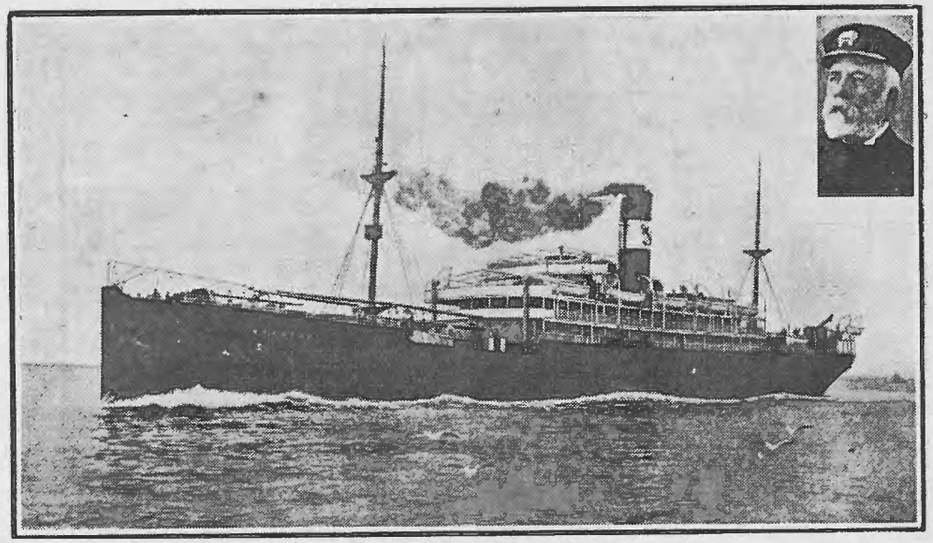
"LOST with all hands!" How tragic the words in which a shipwreck is thus epitomised. This brief but pregnant sentence is of fairly frequent repetition in Australian maritime records, and now there is only too much reason to fear it has to be placed against the name of one more vessel.

The disappearance of the *Canastota* is a grim reminder of previous disasters of the kind—of ships swallowed up by the sea without leaving a vestige of wreckage, much less any survivors to tell the tale.

The tragedy of the *Waratah* is one that will not easily be forgotten. Sailing out of Sydney on her second and last voyage to London on June 26, 1909, the *Waratah,* then not twelve months old, and under the command of Captain J. E. Ilbery, reached Durban on Sunday, July 25. With two hundred and seven souls on board she left the port next day bound for Capetown, where she was expected to arrive on July 29.

"Waratah's" Last Message.

At 6 a.m. on July 27, ten hours after



The Lund Liner "Waratah."

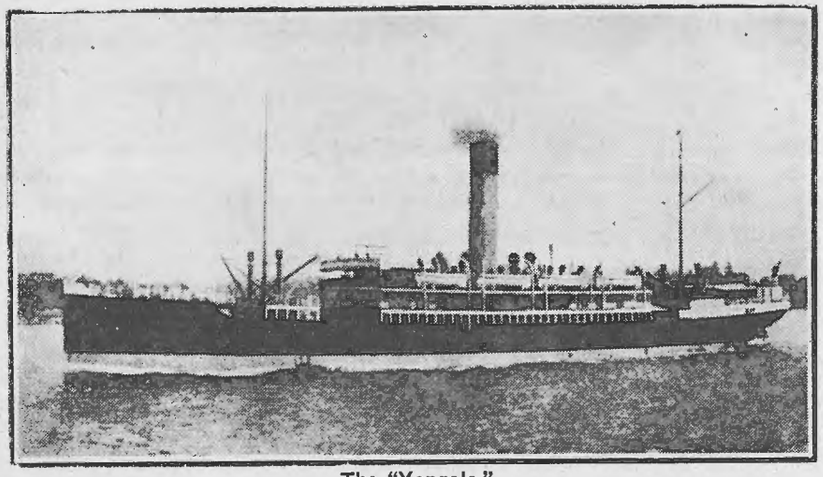
The mystery of whose disappearance off the South African Coast in 1909 has never been solved. Inset is a portrait of the ship's commander, Captain J. E. Ilbery, who was Commodore of the Lund Line, with which he had been associated for half a century.

One instantly recalls the losses of the *Waratah, Yongala* and *Koombana*—three catastrophes that live vividly in public memory by reason of the dreadful toll of human life involved. Four other vessels, the secret of whose fate lies buried fathoms deep, were the *Taramung, Quiraing, Nemesis* and *Rosedale.* All these disasters, with the exception of the *Waratah,* occurred in Australian waters, and represent the more memorable of these mysterious disappearances over a period of thirty years.

leaving Durban, the *Waratah* was signalled by the steamer *Clan Macintyre,* also bound for London, *viâ Durban.* After an exchange of greetings the *Clan Macintyre* signalled "Good-bye—a pleasant passage," to which the *Waratah* responded, "Thanks, the same to you. Good-bye." It was on the following day, July 28, that the South African coast was swept by the great gale in which the *Waratah* is supposed to have gone to her doom. At all events the Court of Enquiry in London was satisfied that

it was in that storm the vessel was lost. In the absence of direct evidence, the Court could not say what precise form the catastrophe took, but the fact that no wreckage had been found indicated that it must have been sudden. The Court inclined to the opinion that the ship capsized, but what chain of circumstances brought about this result must for ever remain undetermined.

Another unsolved mystery was the disappearance of the Adelaide Steamship Company's *Yongala* off the Queensland coast in 1911. Fully manned and equipped in excellent trim, the *Yongala*, under Captain W. Knight, left Brisbane on March 21 in continuation of her voyage from Melbourne to Cairns, *viâ* ports. She reached Mackay on March 23, and sailed again at 1.40 p.m. the same day with forty-eight passengers and a crew of seventy-two—one hundred and twenty all told. She was off Dent Island about five hours later, but after that was never seen or heard of again. We know, of course, that the ship was caught in the storm that raged with such violence on the Queensland coast at that time, but how or where she went not a living soul was left to reveal.



The "Yongala."
Which disappeared off the Queensland Coast in 1911.

Did the "Yongala" Explode?

At the Marine Board inquiry several theories were advanced by well-known shipmasters as to the cause of the disaster, but the Board, to quote its own expressive words, "With no desire to indulge in idle speculation, simply finds that after becoming lost to view by the light-keeper at Dent Island, the fate of the *Yongala* passes beyond human ken into the realms of conjecture, to add one more to the long roll of the mysteries of the sea."

One notable theory as to the particular form of disaster which overtook the *Yongala* was that put forward, though not until over two years afterwards, by Mr. Hunt, Commonwealth Meteorologist, whose opinion was that the ship was caught in the vortex of a typhoon and exploded. Captain Smith, of the steamer *Cooma,* told Mr. Hunt that he had seen a door of one of the cabins that had been recovered, and that it presented all the appearances of having been blown out by some powerful explosion. "That is probably what would have happened if the *Yongala* had been caught in the vortex of a powerful cyclone," said Mr. Hunt. "With the prospect of a rough time before him the captain would have had all movable fixings made fast, and doors and hatches closed and secured in preparation for the pending storm. These necessary precautions, however, would create just the conditions that would cause a violent explosion if the vessel were caught in the centre of a typhoon. There would be a rapid reduction of air pressure outside the vessel, and the air inside the hull finding no outlet for expansion would blow the vessel asunder."

Nine months after the calamity a bottle that was picked up was found to contain the following message:

"S.S. *Yongala.* Terrible storm 8.30 p.m. It's a case of good-bye. J. West, C. Cook."

Reference to the records showed that J. West was the chief cook of the *Yongala.*

The "Koombana's" Fate.

Twelve months to the day after the *Yongala* tragedy, the steamer *Koombana* belonging to the same Company was reported missing. A fine seaboat of 2,182 tons, commanded by Captain T. M. Allen, the *Koombana,* with passengers and crew to the number of one hundred and thirty, left Port Hedland (W.A.) on March 20, 1912, bound for Broome. She was never seen again. Her end was just as mysterious as that of the *Yongala* and the *Waratah,* but there is no doubt that the vessel came to grief in the *willy willy* which swept the Western Australian coast on the night of March 20, and wrought so much havoc both ashore and afloat. The general belief was that she foundered in the neighbourhood of Bedout Island.

The North Coast of New South Wales has an evil reputation for shipping casualties, and many of the memorable sea tragedies with which it is associated flash across one's memory. It is proposed, however, to refer only to those ships that have mysteriously disappeared. In this category comes the steamer *Rosedale,* 164 tons. Leaving the Nambucca River for Sydney on September 15, 1911, the vessel ran into a strong gale soon after clearing the Heads. She passed Smoky Cape at 2.45 p.m. the same day, but after that all is conjecture as to what became of her. All that is known for a certainty is that the old North Coast trader—she was built in 1877—found a resting place at the bottom of the sea, and that with her went twenty-six lives.

Historic Gales.

Just as the "Dandenong Gale" and the "Maitland Gale" take their names from the vessels that were lost in those memorable blows, so also is the "Nemesis Gale" known as such because of the big maritime disaster for which it was responsible.

Bound for Melbourne laden with coal, the *Nemesis,* under Captain A. Lusher, sailed from Newcastle on Friday, July 8, 1904, and ran right into a sou'-westerly gale. On the Saturday night a ship was seen in distress off Port Hacking. That it was the *Nemesis* there is not the slightest doubt, and the rockets which were being fired at frequent intervals showed that assistance was urgently needed. The signals continued until nearly midnight, then they suddenly ceased.

When day dawned not a sign of the vessel was visible, but the wreckage that came ashore at Cronulla beach proclaimed clearly enough what her end had been. Of the thirty-one people on board not one was saved.

Another vessel, whose mysterious disappearance has never been solved, was the *Quiraing.* With twenty-five persons on board, and Captain A. Forrester in command, she departed from Newcastle on June 22, 1902, with a cargo of coal for Port Chalmers (N.Z.). Human eye never again saw her, and not a trace of wreckage was ever picked up.

Yet another coal-laden vessel from Newcastle that met a fate known only to the thirty-two persons who shared it, was the steamer *Taramung,* commanded by Captain J. Page. It is just thirty years since this ship was lost. After having cleared Nobby's, bound for Melbourne, the *Taramung* was never heard of again, but the general belief was that she went down off Jervis Bay.

NAVAL APPOINTMENTS

LIEUTENANT-COMMANDER: Charles H. Rolleston, to *Tingira,* for temporary service, August 15.

Lieutenants: John W. C. O. Shelton, to *Penguin,* additional, temporarily, July 23; Cecil O. Butler, to *Australia,* additional, and for P. and R.T. duties, August 1.

Engineer Lieutenant: Edward C.Mackey, to *Brisbane,* temporarily, July 28.

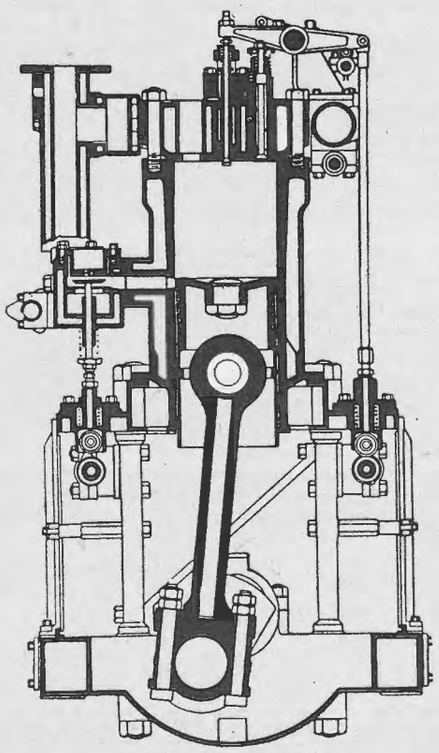
Surgeon Lieutenant-Commander: William E. Roberts, to *Penguin,* additional, for Naval Wing, Prince of Wales Hospital, Randwick, July 29.

Surgeon Lieutenants: Horace P. Margetts, O.B.E., to *Penguin,* additional, July 29; David S. Prentice, to *Anzac* for *Marguerite,* for Flotilla duties, July 29; Thomas A. Kidson, to *Penguin,* additional, July 29, and *Penguin,* additional, for duty, Naval Wing, Prince of Wales Hospital, Randwick, undated; Mansell F. Emrys-Jones, to *Australia,* July 27.

THE MARINE DIESEL ENGINE

ITS HISTORY, PRINCIPLE OF OPERATION AND LUBRICATION

THE Diesel engine takes its name from the inventor, Dr. Rudolf Diesel, an eminent engineer, who conceived the idea of an internal combustion engine which would differ from the steam engine, aptly termed an external combustion engine because the combustion of the fuel to generate power occurs in an entirely separate apparatus. By employing the principle of fuel combustion within the engine, he hoped to obtain greater fuel economy than was possible by the use of the external combustion principle.



Craig Marine Diesel Engine

Briefly, the history of the Diesel engine is as follows: The first engine was built in 1893. In an attempt to run it after completion an explosion occurred, which nearly cost the inventor his life. A second engine, built with modifications suggested by the first failure, was also unsuccessful.

Fully believing that his hypothesis was correct, Dr. Diesel built a third engine in which were realised the possibilities conceived by him at the outset.

In 1898, the first commercial Diesel engine was presented to the mechanical world. Since that date, the Diesel engine has been gradually developed into a highly efficient engine, and has been made adaptable for both marine and stationary purposes.

Principle of Operation.

The Diesel is an engine in which the combustion of fuel for the generation of power occurs within the cylinder, as distinguished from the steam engine in which steam, that has been generated in an entirely separate apparatus, by the application of the heat of combustion, is used.

The direct contact of the source of power, in the Diesel engine, and the elimination of intermediate apparatus, makes possible a high degree of thermal efficiency.

The principle of operation of the Diesel engine is briefly, as follows:

Air which has been drawn into the cylinder on the suction stroke, in the combustion chamber of the engine is compressed (by the compression stroke of the piston) to a pressure of approximately 500 lb. with a resulting temperature of about 1,000 deg. F. By means of an external air compressor, air is compressed to a pressure of 1,000 lb.

This air is injected into the fuel valve of the engine, together with the required amount of fuel, and the fuel atomised as a spray by the high pressure air jet, passes into the combustion chamber of the engine.

Ignition, as a result of the prevailing temperatures, is accomplished, and the expansion of the gases forces the piston down.

The Diesel engine is built either on the two-stroke cycle principle or four-stroke cycle principle. In the two-stroke cycle principle a complete cycle of suction, compression, ignition and exhaust is accomplished during two strokes of the piston, *i.e.*, one downward and one upward stroke.

In the four-stroke cycle principle, four strokes of the piston, two downward and two upward strokes, are required to complete the cycle.

Features.

The distinguishing features of the Diesel engine from other internal combustion engines are the high compression pressures and high temperatures of the air into which the fuel is injected and ignited, differing from some other internal combustion engines which use an electric spark for ignition, the manner in which the fuel is introduced in the cylinder, and the fact that any grade of fuel can be used in it.

Due to the high pressures and high temperatures which are encountered, unusual strength and rigidity in the construction of the engine is necessary, as well as considerable skill in its operation and maintenance. Unlike the steam engine, it is economical in its requirements and in the number of attendants necessary to operate it.

Field of Service.

In the field of stationary engineering a great many Diesel engines, in units from 200 to 500 h.p., are employed in power stations, mills and all kinds of factories.

They are generally employed where there is a scarcity of water, or where the water is bad.

In marine service, this type of engine is fast becoming prominent both at home and abroad. Motorships are not uncommon in these days. One of the influencing factors which has retarded the progress of the Diesel engine—particularly in the marine field—is the lack of capable operators. This will be removed by time and education.

LUBRICATION—INTERNAL.

Small Engines.

As the Diesel engine will be prominent in ship propulsion affairs of the future, it is to be reckoned with and analysed in relation to correct lubrication, for upon correct lubrication the ultimate success of any large engine depends. Too much importance cannot be attached to this matter, as many designers and operators have learned from experience.

It is essential, that the formation of carbon in the cylinders and about the pistons be minimised. This can be accomplished only by the selection and use of the right oil, in the right place, applied in the right way.

The creation and maintenance of high compression under which the engines operate, depends not only upon well-fitted pistons and accurately bored cylinders, but also upon a correct oil seal. Because of the heavy service conditions resulting from the high pressures and high temperatures, an extra heavy-bodied oil must be used for cylinder and piston pin lubrication.

After careful study and investigation of the attending conditions, and from close observation of results attained in practice over a long period of time, Gargoyle D.T.E. oil extra heavy is recommended for internal use in these engines. This oil is of sufficient body to withstand the high temperatures which exist in the cylinder, to maintain a sealing film between piston rings and cylinder wall, and to withstand the conditions of extreme pressure under which piston pins operate. With the correct use of this oil, carbon deposits are minimised.

It is important that the cylinders and piston rings be properly lubricated, and it is of equal importance that they must not be over-lubricated. Hence, perfect control of the oil feeds at all times is essential for correct lubrication. Oil, for internal lubrication, is applied by mechanical force-feed lubricators. With this method of oil application, perfect adjustment and control of the oil feed is always at command.

Large Crosshead Engines.

The internal lubrication of large Diesel engines is essentially the same as that of the small engines. Mechanical force-feed lubricators, with leads to one or more points around the cylinders, are used to control the oil feed to the cylinders. The size of the cylinders determines the number of feeds. In the large sizes, four and six feeds are frequently used. A check valve is usually placed in each lead to insure a supply of oil for immediate use when the engine is started.

The rate of oil feed is determined by the adjustment of the mechanical lubricator, the proper adjustment being determined by experience and experiment.

Gargoyle D.T.E. oil extra heavy is recommended as the correct oil for the internal lubrication of these engines, and also for the cylinders of the air compressor.

Lubrication—External.

There are several systems and combinations of systems for the external lubrication of Diesel engines. They comprise the principles of the mechanical force-feed lubricator, the circulation system and wick-feed oilers. Sometimes main bearings are ring-oiled.

A gravity circulation system is generally employed for the application of oil in the external lubrication of the Diesel engine, *viz.*, the main, the crank-pin and the cross-head pin bearings in this system, the oil is in circulation and the oil losses are small.

In a correctly designed circulating system, strainers, filters and coolers are incorporated, and the oil is taken care of automatically. With this system of lubrication, a high-grade oil can be used economically and will reduce friction and consequently the wear of moving parts to a minimum.

Oils.

The correct lubricant for the external lubrication of Diesel engines depends upon the type of engine and the lubrication system employed.

With mechanical force-feed lubricators or with wick-feed oilers, Gargoyle D.T.E. oil extra heavy should be used. With the enclosed type engines, where the force-feed circulation system is used, or where the main bearings are ring oiled, Gargoyle D.T.E. oil heavy medium is recommended as the proper oil to meet the conditions.

NEGLECTED OPENINGS

Germany is competing with the United States in the South American motor market, which is neglected by British suppliers, writes a correspondent in the Trade Supplement to the London *Times*.

The development of South American markets for motor cars, trucks, and tractors is of immediate importance to this country, and probably Argentina offers the best opportunities. In Argentina good roads are confined to the neighbourhood of the principal cities, and these offer markets for high-class cars which cannot be operated with advantage either on the pampas or on country roads. Their use is therefore restricted to definite areas, such as those around Buenos Aires, Bahia Blanca, Cordoba, La Plata, Mendoza, Santa Fe and Tucuman. However, this is a valuable market for good light medium-priced cars in the immense agricultural regions not yet served by macadamised roads.

These fields, which are being explored by German agents, are at present dominated by United States exporters. It is said that upwards of 80 per cent. of the cheap cars imported from the United States are bought by farmers and others in these back-country districts, although British products would find a ready sale if introduced to the market.

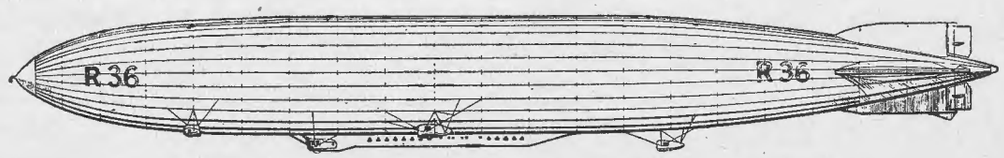
Motor trucks and tractors are in general demand for agricultural, ranching, mining and manufacturing industries. Argentina, with its vast level stretches of agricultural land, and its sparse farm population, promises to become a valuable tractor market, as recent developments have created a new interest in farm machinery. If the situation is considered, the possibilities of the industry will be seen at a glance. For example, the province of Buenos Aires is in the pampas regions; it is well watered, admirably supplied with railways, and is a centre for agriculture, cattle and horse ranching. Corn, including wheat and barley, alfalfa, and linseed are largely cultivated, and farmers are asking for tractors which will handle four, six or eight ploughs.

Other South American Republics complain of British apathy. They are ready to buy, yet our manufacturers appear to boycott their markets. Brazil last year imported 24,475 motor vehicles. Venezuela, possessing 1,800 miles of fairly good roads, is in the market for motor cars and motor cycles, which United States exporters are unable to supply with sufficient rapidity; Germany is in the field eager to show that her industrial machinery is unimpaired, whereas Great Britain remains practically unrepresented. Recent advices from Chile show that similar conditions prevail in that progressive Republic, and complaints of British indifference to trade are made freely.

BRITAIN'S FIRST PASSENGER AIRSHIP

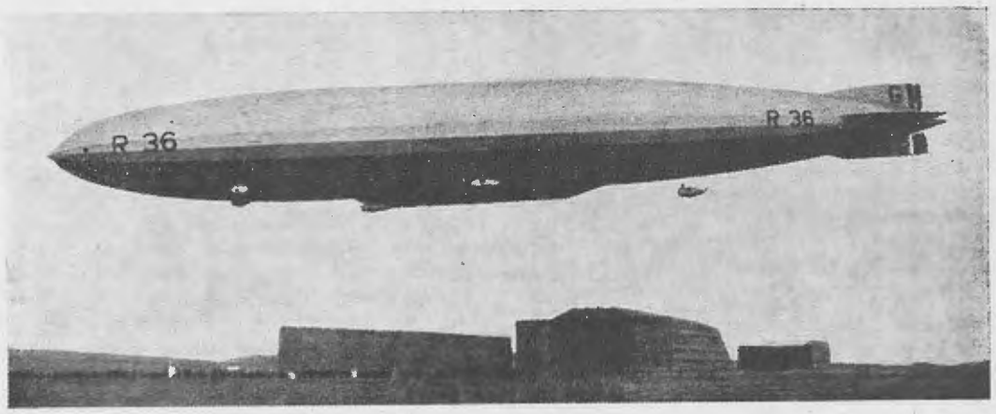
THE "R.36" (G.F.A.A.F.)

LAUNCHED a few weeks ago, as recorded in *Flight* at the time, the *R.36*, built at the Inchinnan works of Messrs. Wm. Beardmore & Co., Ltd., is of more than ordinary interest inasmuch as she is the first British airship adapted for passenger carrying on a generous scale. In the detail design of the airship there is little new to record, the design having been got out as long ago as 1918, and there is little doubt that with the experience gained during the intervening years considerable improvements could be effected. This is in no way a reflection on the skill of the designers, or on the capability of the constructors, but merely a result of the rapid progress which characterises all aircraft designs.



The "R.36" side elevation approximately to scale. The overall length is 672ft. 2in. and the diameter 78ft. 9in. The height from the bumping bags under the cars to the top of the hull is 91ft. 7in.

When the change occurred in the airship policy of the Government, the construction of the *R.36* was not sufficiently far advanced to preclude her conversion into a passenger airship, and consequently it was decided to do this and to use in this manner an airship which had cost large sums of money to build and which would otherwise have to be wasted. It is to be hoped that some sound scheme for making practical use, not only of the *R.36*, but also of our other airships, will be put forward in time to avoid the destruction of these excellent craft, and to provide at the same time some valuable and much needed experience and data for the running of commercial air services under conditions similar to those which would obtain in practice. There is little doubt that for long-distance non-stop journeys the airship scores over the heavier-than-air type of craft, and while to organise an "all-red" route to India and Australia or South Africa would be a difficult undertaking with aeroplane, and, or seaplanes, a few mooring masts and one or two more

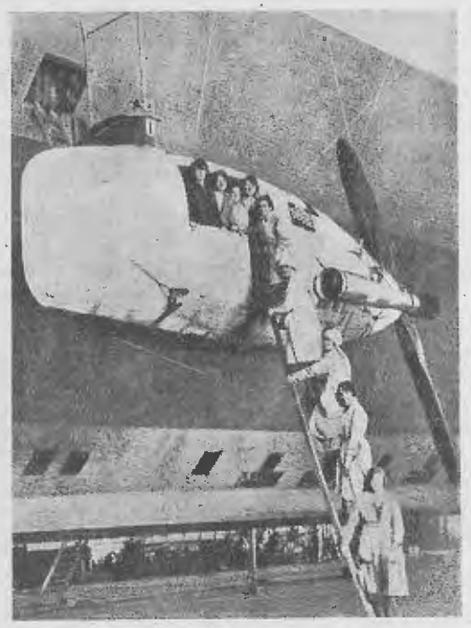


First British passenger airship "R.36" on her trial flight from the Inchinnan works of Messrs. Beardmore & Co., Ltd.

permanent bases would be practically all that would be required to start an airship service to these Dominions overseas. To discard the airship entirely without giving it an opportunity of "making good" as a commercial craft would be folly, even if those in authority have come to the conclusion that the type does not justify its existence for naval and military purposes.

Capacity.

With an overall length of 672ft. and a maximum diameter of 78ft. 9in., the *R.36* has a cubic capacity of close on 2,200,000 cubic feet, the hydrogen being contained in 19 gasbags. The gross lift is about 64 tons under standard conditions. The struc-



The "R.36" (G.F.A.A.F.), port amidship power car. The employees going up to work on the airship give a good idea of the size of the power "egg." Note the retractable radiator and the trapdoor in the side of the hull, through which the engineers in charge of the engine gain access to the hull during flight.

ture weight of the airship is approximately 35 tons, which leaves a lift of about 29 tons for water ballast, fuel and oil, crew, passengers and cargo. At a cruising speed of 50 m.p.h. the fuel and oil consumption would probably amount to slightly under 700 lbs. per hour, or approximately 1,450 lbs. per 100 miles, allowing for a slight head wind. This gives a fuel and oil consumption of 0.65 tons per 100 miles, and the duration of the journey will then, of course, depend upon the number of passengers and the amount of cargo carried.

General Construction.

As already mentioned, there is little that is new in the detail construction of the airship, owing to the fact that it is of fairly old design. The hull is of a good streamline form, with well shaped ends and a short parallel centre portion extending from frame No. 13 to frame No. 23, or approximately 200ft. in length. In cross section the ship forms a polygon with twenty-five sides, all except the bottom being of equal dimensions. These twenty-five sides are formed by longitudinals, built up lattice fashion, of Vickers "Duralumin." Alternately the longitudinals are secured to the corners of the main transverse frames, and to king-posts crossing the sides of the frames at right angles. The bottom of the polygon is formed by the base of a triangular section girder running the whole length of the hull and forming a keel or corridor giving access to all parts of the ship. Between each pair of main transverse frames is an intermediate frame, which has no king-posts projecting inward, and which, therefore, does not interfere with the gasbags. These occur between consecutive main frames and are separated by the transverse wiring in the plane of the latter.

In order to prevent the gasbags from touching the outer covering, netting is placed in the rectangles formed by the longitudinal girders and sides of transverse frames. The whole outer surface of the airship is covered with a very fine Egyptian cotton fabric, thoroughly impregnated with dope, and painted to withstand all weathers and afford the greatest protection for the gas against sun rays.

In addition to the usual ropes, frames, etc., for handling by a ground party, the *R.36* is provided with mast mooring gear, the front bays of the structure having been specially reinforced and strengthened for this purpose. A trap door in the extreme nose gives access to the interior, a corridor running from the nose along the keel to steps leading down into the passenger cabin and front control car. This corridor also communicates, through trap doors in the sides, with the five engine cars slung from the hull on cables and struts.

The Engine Installation.

The power plant consists of five engines installed in five separate engine cars. The arrangement of these may be gathered from the accompanying illustrations. Between the nose and the control car and slightly nearer the latter, are two power cars, slung from the hull by cables and braced by struts, each containing a 260-h.p. Maybach engine. These cars are spaced widely apart laterally, being in fact approximately under the longitudinal girder on the side of the ship. About half way between nose and stern are another two power cars, similarly placed, each housing a 350-h.p. Sunbeam *Cossack* engine. Finally, some distance aft of the cabin and on the centre line of the airship, is a fifth car, also containing a Sunbeam *Cossack*. The two Maybach engines have direct drive to their airscrews, whereas in the case of the other three engines reduc-

The "R.36" (G.F.A.A.F.): The control car forms part of the forward portion of the passenger cabin, some of the windows of which can be seen on the right.

tion gearing and clutches are incorporated in the installation.

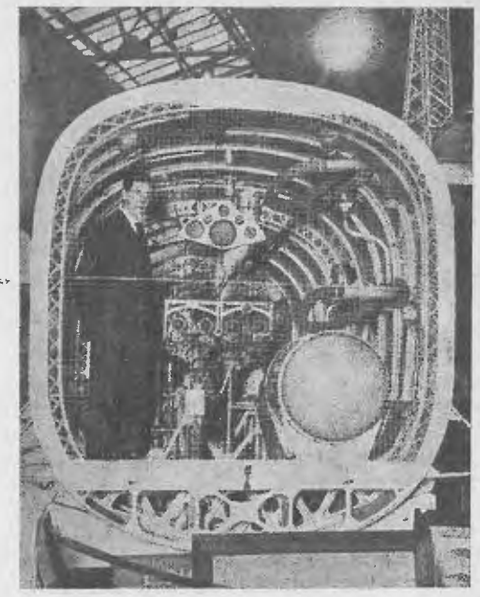
Petrol System.

The petrol tanks are carried in the central keel or corridor, and the petrol leads are so arranged that any or all engines may be supplied from any tank. Two petrol mains run from the nose of the airship through the whole length of the hull, and from these mains filling lines run to each tank, which can be filled from either of the two mains. From each tank in turn petrol leads run to gravity tanks in the power cars, pumps being provided for transferring the fuel from tank to cars, and also, for purposes of trimming, from one tank to another. The whole system is designed with a view to ensure that any local damage will not interfere with the regular supply of petrol to any of the power units.

A water main also runs through the airship, by means of which ballast bags, as well as the containers for the radiator water, can be filled from the water main on the mooring mast, thus greatly facilitating filling up. The water bags are placed in the central keel, so distributed as to allow of trimming the airship under any conditions. In conjunction with trimming by discharging ballast, the gasbags are provided with automatic gas-valves and some of them with hand-operated gas-valves, so that it will be seen that ample means exist for maintaining the trim of the ship: discharge of water ballast, discharge of gas from balloonettes, and transfer of petrol from one tank to another.

Tail Unit.

Although in the illustration the tail of *R.36* appears similar to that of older airships, there is a considerable structural difference. The fins, vertical as well as horizontal, are built as cantilever beams, calculated to support their loads without the aid of external bracing. Anyone who has seen the tail of *R.33* must have been impressed by the great amount of exposed



The "R.36" (G.F.A.A.F.): Front view of one of the power cars with streamline cowling removed. The engine is 350 h.p. Sunbeam "Cossack."

wiring which supports the fins and tail plane. In the *R.36* this external wiring has been done away with, and has, we believe, resulted in a very considerable saving in resistance.

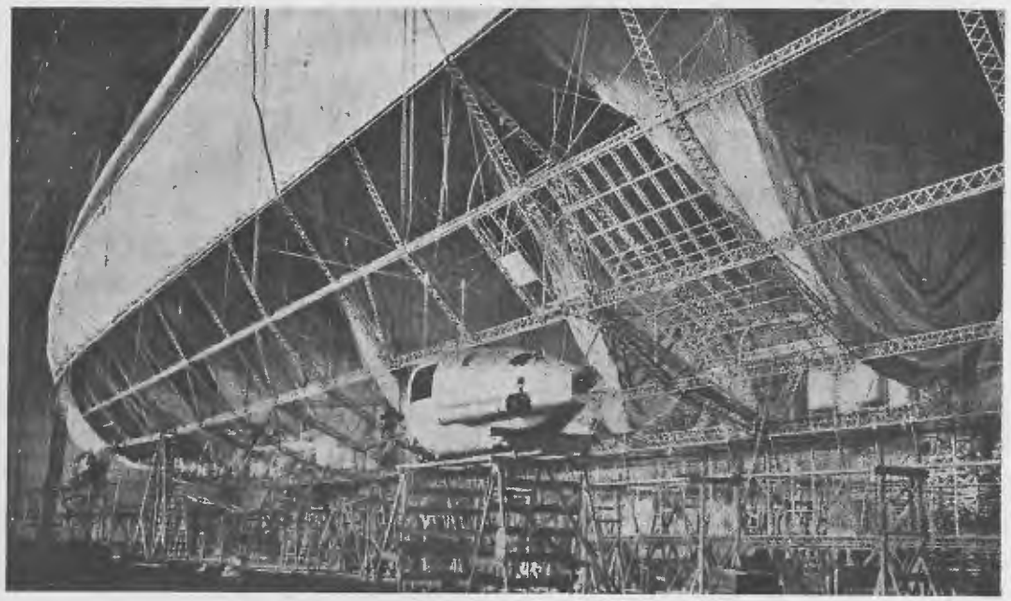
The Control Car.

As already mentioned, the front portion of the large passenger cabin is formed by the control car, which is well provided with windows so as to give the commander as unhindered a view as possible. In this car are situated all the controls, such as those of the elevators and rudders, the hand-operated gas-valves, etc., as well as all the instruments necessary for communication between various parts of the airship, navigation, etc. The wireless cabinet is also installed in this car with the most up-to-date wireless telegraph and telephone instruments, including direction-finding sets. It might be mentioned that, after the manner of surface ships, there is an auxiliary set of rudder and elevator controls in the stern of the airship, by means of which the ship could be controlled in case anything went wrong with the standard controls from the "bridge." Altogether, the impression one receives in going over *R.36* is that everything possible has been done to duplicate all essential functions so as to reduce to vanishing point any risk of total breakdown. In this respect it cannot be denied that the airship has a great advantage over heavier-than-air craft. There is not only ample room, but, comparatively speaking, ample time for any repairs or adjustments which it could reasonably be expected to effect during a journey.

The Passenger Accommodation.

We now come to what is perhaps the most interesting feature of the *R.36,* the passenger accommodation, the most interesting because this is the first airship built in this country to be designed with all the luxuries of modern long-distance travel. As will be seen from the illustrations, the passenger car is situated below the hull proper, attached to it but isolated from it in every way so that the risk of fire from the striking of matches or similar causes is to all intents and purposes eliminated, provided, of course, that ordinary care is exercised.

The passenger car is arranged somewhat on the lines of a Pullman car. A passageway runs down the whole length of the car, with the cabins on each side. Each



The "R.36" (G.F.A.A.F.): View showing forward part of the hull partly uncovered, with one of the port wing engine cars in place.

cabin has a table and two comfortable chairs. At night the cabins are divided off into compartments by curtains, and the beds, which are designed to fold flat against the walls in the daytime, are let down, providing very comfortable sleeping-quarters for the fifty passengers for whom the cabin is designed. Needless to say, there are all "modern conveniences" and large pantries and galleys are situated conveniently amidships, whence the serving of meals can be carried out with the maximum of efficiency. The car is fitted throughout with electric light and switches are placed in convenient positions in each cabin.

The carpets, hangings and upholstery-work have been all tastefully carried out in light blue, and the whole effect is very pleasing. Large windows are provided in each cabin, so that all the passengers obtain an excellent view. This is further improved by the fact that the sides of the cabin slope outwards, and that, therefore, it is particularly easy to look downwards, much more so than if the walls had been vertical.

In addition to the passengers the airship carries a crew of four officers and twenty-four men, whose quarters are in the keel. The officers are: The captain, first officer (pilot), second officer (pilot), and engineer officer. The crew is composed as follows: Two coxswains, seven riggers, thirteen engineers, and two wireless officers.

It may be of interest to mention that in large airships such as the *R.36* the crew is divided into watches, as is the old-established custom of the sea. The only exception to this is the captain, who is not necessarily continuously on duty. Thus when the flying is difficult he remains on duty, in the same way as the captain of a steamship remains on the bridge in bad weather or when near the coast.

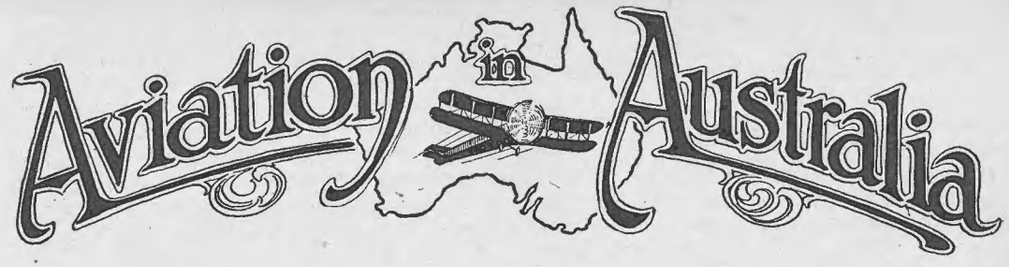
"R.36": Interior of the passenger car, showing the method of suspending beds and of unfolding mirror so as to make a table for the daytime. Bed folded away is seen on the extreme left of picture.

Performance.

It may be of interest to examine briefly some of the journeys which could be performed by the *R.36,* fitted as she now is with five engines of a total power of 1,570 h.p. and assuming a cruising speed of about 65 m.p.h. For instance, the journey to Stockholm could be made in 20 to 24

hours with two tons of mails or goods and 30 passengers, allowing 100 lbs. of luggage for each passenger. Under the same conditions the trip to Marseilles could be made in 15 to 18 hours, and London to Cairo in about 72 hours. Later, when mooring masts and other facilities have been provided, it should be possible to make the journey from England to India in about six days, as compared with the 21 days taken by the ordinary overland route.

In view of these figures, which are not the result of guesswork, but are based upon facts, it is scarcely to be doubted that sooner or later airship travel will occupy a prominent place, especially over long-distance routes where aeroplanes or seaplanes would have little reserve left for paying load, even granting that their engine reliability were such as to make the journey possible. We have heard from several people who should be in a position to know, concludes *Flight*, that on a properly organised route it should be possible to carry passengers at a rate very little higher than that charged for first-class steamer travel. If this prove to be so, it is not to be doubted that airship travel will become very popular, for surely it would be impossible to imagine a more delightful method of covering long distances under the most comfortable conditions than that afforded by the modern passenger airship, of which the *R.36* is the forerunner as far as this country is concerned.



Aerial Mail Services.

EARLY next year two regular air services carrying mails and passengers will be in operation between Adelaide and Sydney and Sydney and Brisbane; the two schemes having been approved by the Federal Cabinet, and the Department of Defence is now calling for tenders, particulars of which are advertised in this issue of *Sea, Land and Air*.

Sites have been chosen for aerodromes at Hay and Narrandera, and landing places between Cootamundra and Sydney are now being prepared. This portion of the route is over difficult country, and it is proposed to establish grounds at intervals where landings can be made with safety in case of engine trouble. The aerodromes at the various country centres, such as Parkes, Forbes, Mudgee, Lithgow, etc., except for the statutory control provided by the Air Navigation Act, will be under control of the local governing bodies, and cordial offers of co-operation from the various councils in the work of establishing aerodromes have been received by the authorities.

The form of tender for the two services mentioned is similar to that in connection with the pioneer service in Western Australia—for which Major N. Brearley, D.S.O., was the successful tenderer—the stipulation being made, of course, that the machines shall be airworthy, and that space shall be reserved for the carrying of 100 lbs. of mail matter. The contractor shall be free to carry passengers or not as he thinks fit, and any revenue derived from this or any other source will be all profit, as the subsidy paid will approximate the running cost of the service.

The principal reason which actuated the Federal Government in choosing the north-western coast of Western Australia for the pioneer air service was that the route is over good country, there being only two small stretches, totalling about sixty miles, where a forced landing could not be effected without difficulty. Furthermore, communication between these localities and Perth is very poor, the residents having to depend on vessels plying to Java and Singapore, which means that a return trip to Perth occupies between three and four months.

It is hoped that when the practical value of aerial communication is thus demonstrated, private enterprise will launch out with similar services in other localities where rail communication is impracticable.

Trans-Pacific Flight.

Reference was made in the June issue of *Sea, Land and Air* to the reported intention of the United States Navy to construct a huge aeroplane for the purpose of attempting the trans-Pacific flight.

Further details, supplied by our American correspondent, are now to hand indicating that the machine, a triplane known as the *Giant Boat*, has been under construction for the past year. The wings and hull were being built at the Naval aircraft factory at Philadelphia, while the motors and propellors were being turned out at East Greenwich, Conn., and Baltimore respectively.

It was proposed to begin assembling the craft at the end of July, after which exhaustive tests were to follow. When these were completed the flight was to begin—the following route having been mapped out: San Diego, Cal., to Honolulu, Hawaiian Islands, 2,100 miles; Honolulu to Wake Island, 1,800 miles; Wake Island to Guam, 1,100 miles; Guam to Manila, P.I., 1,200 miles. This embraces a total of 6,200 miles.

The *Giant Boat* will have a wing spread of one hundred and sixty-seven feet, and will be fitted with three propellors, each driven by three four-hundred horse-power motors developing a total of 3,600 horse-power. The driving gear will be so ar-

ranged that any motor may be disengaged without interfering with the operation of the propellor. The result of this attempt to win the prize offered by Mr. Thos. Ince, of moving picture fame, will be watched with interest. The Australian airman, Lieutenant R. J. Parer, will also be a competitor for the prize. The flight around Australia which he was forced to temporarily relinquish some weeks ago, was planned with the object of raising funds to purchase a suitable machine for the trans-Pacific journey.

Tender for Aerial Mail.

Two tenders for the Geraldton-Derby (W.A.) mail service were received by the Defence Department, and on the recommendation of Lieutenant-Colonel Brinsmead, Controller of Civil Aviation, that of Major N. Brearley, D.S.O., of Western Australia, was accepted. The tender is for the amount of £25,000, which was the subsidy approved by the Cabinet as the maximum, and complies with all the stipulated conditions. The tender provides for a commencement on or before October 30, 1921.

Sight-seeing from Aeroplane.

The Mayor of Townsville (Alderman W. H. Green) recently undertook a flight over Mount Elliott for the purpose of endeavouring to locate the lake which is believed to exist on the summit of the mountain. The object was not achieved, but the flight gave Alderman Green an opportunity of viewing the city and surroundings from the air, and thereby gaining a knowledge of their scenic beauty, which, as he afterwards declared, "it was impossible to realise until seen from the skies."

* * *

Progress of Aviation.

Civil aviation in Australia is now on a footing which affords scope for considerable development in the near future. The prospects of at least three regular services indicate that aviation will shortly take its proper place in the transport system of the Commonwealth. There are a large number of firms and individuals engaged in aviation in Australia, and out of a total of forty-seven applications for the registration of machines, twenty-eight were granted, five are pending and six withheld. The remaining eight were, at time of writing, still awaiting inspection by the officials of the Civil Aviation Department. Applications were received for licensing one private and seven public aerodromes, three of which were granted, the remainder being under consideration. A total of sixty-eight applied for pilots' licenses, and out of the first fifty-six examinations conducted fifty-three passed the practical and technical tests and strict medical requirements. Of the fifty-six examined forty-eight formerly belonged to the Australian Flying Corps or the Royal Air Force.

* * *

Around the World.

The machine which Sir Ross and Sir Keith Smith will use if the round the world flight which they have in mind is undertaken, will almost certainly be a Vickers *Viking* amphibian machine, fitted with 450 h.p. *Napier Lion* engines. This 'plane is already constructed, and was awarded first prize of £10,000 by the British Air Ministry in a competition last September. The machine can rise from and alight on either land or water, and if necessary can be hoisted on board a ship. For such a large machine its speed and climbing capabilities are remarkable.

* * *

University Helps Aviation.

The decision of the Melbourne University to devote £3,000 to the study of aviation will be welcomed on all sides. It is essential that if our Universities are to keep pace with the times the science of aero-dynamics should not be neglected. Quite apart from the value of aviation for war purposes, it is beyond question that aerial transport is going to play a vitally important part in our commercial life of the future. It is not considered that aeroplanes and airships will mean the abolition of trains and steamboats, but no one will gainsay that there are numerous services which can be carried out by air with a rapidity that is impossible by any other means. Therefore the development of aviation is part and parcel of the growth of our modern transport system. The action of the Melbourne University follows the lead set by the Sydney University, which recently spent £4,000 on aircraft for experimental use.

* * *

Royal Australian Air Force.

Determined efforts are being made to secure the required number of men for the establishment of the Royal Australian Air Force. The total required is about eight hundred, and includes all classes of skilled

tradesmen. The equipment for the force will consist of aeroplanes, seaplanes and flying boats, a big proportion of which has been presented to Australia by the Imperial Government, and is already here. The headquarters of the Force will be at Laverton, Victoria.

* * *

The Man of the Air.

The promising future of commercial aviation in Australia is due to a large extent to the persistent advocacy of a progressive policy by Lieutenant-Colonel H. C. Brinsmead, O.B.E., M.C., Controller of Civil Aviation. He has had innumerable difficulties to overcome, but fortified with a superabundance of energy and boundless optimism he has stuck to his task, and although his labours are still incomplete, he is able to contemplate with satisfaction the progress that has been made. Lieutenant-Colonel Brinsmead was born in England and came to Australia twenty years ago. Previous to enlisting with the 6th Infantry Brigade at the outbreak of war he was a copra planter in Tonga. He fought at Gallipoli, and was in command of a party at the evacuation. Later he was given a commission, and the following year gained his captaincy.

Lieutenant-Colonel Brinsmead was severely wounded at Pozieres. For conspicuous ability as Adjutant he was awarded the Military Cross, and after spending three months in a flying school he was appointed staff officer for aviation and continued as such until hostilities ceased.

The next distinction which fell to the lot of Lieutenant-Colonel Brinsmead was his appointment to the military section of the British Delegation to the Peace Conference at Paris. At the conclusion of the Conference he was appointed a member of the inter-Allied Commission of Control. The Order of the British Empire was shortly afterwards conferred on him for his services as Staff Officer for Aviation. Such in brief is the career of the man who is now directing Australia's air activities. Lieutenant-Colonel Brinsmead is a practical optimist, and visualises a time in the near future when we will have a regular air service of at least three thousand miles.

* * *

A Link With London.

Sir Ross Smith has been appointed Australian expert on a special Board to prepare a scheme for Empire airship communication. The Board proposes to examine every phase, including primary costs, personnel, depôts, depreciation and probably financial results. It is practically certain that when the scheme is finally approved and the service undertaken Australia will be brought within ten days' journey of London.

* * *

Controlling Traffic from Air.

The Sydney Royal Automobile Club has received particulars from the Automobile Association of England of the method adopted to ensure the speed and comfort of the huge army of road users who proceeded to the English Derby.

A committee consisting of representatives of the Police Department and traffic associations drew up a special traffic map, and utilised the airship *R33*, fitted with wireless, to act as an observation station. Messages were transmitted to Colonel Laurie, of Scotland Yard, who, with his staff, was located on the grandstand, and the speed of the traffic was regulated in accordance with the intelligence received from the airship. For the first time on record motor cars were able to accomplish the journey between the metropolis and racecourse in an hour, thus proving the absolute success of aerial controlled traffic.

* * *

Flying in Fiji.

The aerial survey in Fiji, briefly referred to in the August issue of *Sea, Land and Air*, is declared by Mr. Walsh, of the New Zealand Flying School, to have been an entire success. Mr. Walsh, who was accompanied by Captain C. S. Upham, also of the New Zealand Flying School, spent three weeks in the islands. The flights were conducted in a new supermarine four-seater flying boat, fitted with a 160-h.p. *Beardmore* engine. It was the first time the majority of Fijian residents had seen an airship, and they were tremendously interested. The natives, to whom aviation was an even greater novelty, were wildly excited when the machine set out on its first flight. Everywhere the aviators were received with the greatest enthusiasm, and only in a few remote places where nothing had been heard of the trip were the natives alarmed, fleeing to cover as soon as the aeroplane appeared.

The aviators found the Fiji climate suitable for flying, and it is considered that

the early establishment of an inter-island aerial mail service, conducted by flying boats, will be decided upon by the Fijian Government.

FEEDING STARVING SHEEP.

Interesting Story of Aerial Enterprise.

The notable feat performed by the two *Avro* 'planes in conveying fodder to the starving sheep marooned by the flood-waters on an area of high land near Garah, can only be fully appreciated after reading the story told by the two pilots, Captains Pentland and Wilson, who had charge of the aeroplanes during the feeding operations.

The journey from Sydney to Moree, a distance of about three hundred miles, occupied six and a half hours, the 'planes having to fight against a strong head wind most of the way. The next morning the journey was continued, and on arrival at Garah a start was made to carry the corn to *Avro Island,* the name applied to the area where the sheep were imprisoned. Two bags were carried on each trip after the first one, on which the pilot took with him a guide in addition to one bag of maize.

The flying conditions were good, and the 'planes maintained a regular service, having to take off and land in the main street of Garah, there being no other ground available. The distance from the town to *Avro Island* was thirty-three miles, the last six of which were over country covered by water. The flying time varied from fifty-five to seventy-five minutes. A certain quantity of the grain was lost through being trampled into the soft ground by the starving animals in their frantic rush to pick it up. A number of the sheep perished before the first load was conveyed to the island, and there was further mortality during the wet, cold days following, when many of them, which were in a weak state, died. With the advent of fine weather and an improved supply of corn the condition of the sheep gradually improved. When the 'planes ceased operations the two thousand four hundred which survived out of the original four thousand five hundred were in a vastly improved state, and there was no danger of any further mortality amongst them. By far the greater proportion of the number which perished did so before the 'planes commenced operations, and the remainder succumbed during the wet spell. It is beyond doubt that none at all would have been saved had it not been for Mr. Mace's enterprise in chartering the 'planes to carry the fodder which it was impossible to convey to them by other means. During the operation of the service the 'planes carried mails to several of the selectors who were absolutely cut off from communication by land for several weeks.

From Our Queensland Correspondent.

(Val Rendle, late Lieut., R.A.F. and A.F.C.)

Mr. Howard Jolley had an unfortunate accident to his Boulton and Paul *P5* at Berrigan, on the Queensland border south from Cunnamulla, last month. It is thought that the machine while landing touched one of the rabbit-proof fences which abound in the district, causing it to land heavily, damaging the undercarriage and breaking a longeron.

The B. & P. *P5* was subsequently packed up and transported to the Shaw-Ross Aviation Co.'s workshops at Port Melbourne for repairs.

It seems a great pity that the 'plane had to be transported such a distance for repairs, as one would have thought that in the enterprising district the accident occurred there would have been at least one man who could have effected the necessary repairs, instead of Mr. Jolley having to subsidise the railways in transport matters.

* * *

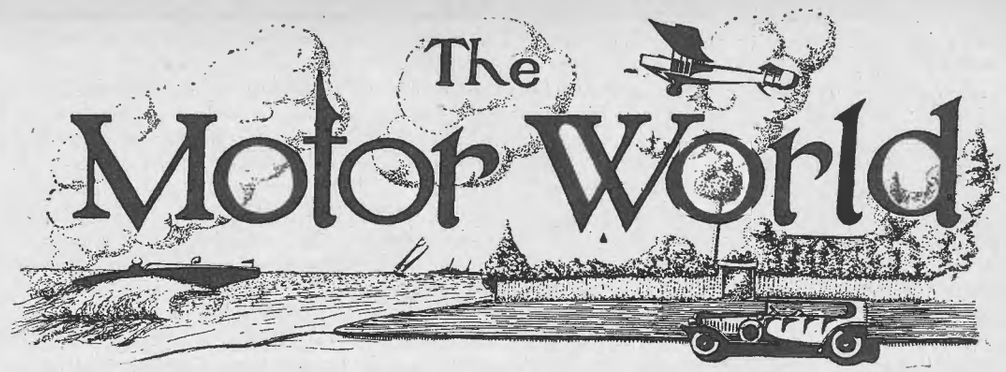
It may be of interest to readers of *Sea, Land and Air* to know that Mr. Foulkes at Narromine (N.S.W.), rendered great assistance in effecting some minor repairs to the *Avro* 'plane the writer flew during the Second Peace Loan flight last year.

* * *

Mr. J. Hayden, who has a hangar on his farm a few miles from Narromine, will be glad to assist any aviators who may visit the district.

* * *

The Brisbane Show is expected to attract a number of aeroplanes. Lieutenant Garth-Ellwyn, from Goondiwindi, is at present in Brisbane with his *Avro,* and Lieutenant Bird and Captain Snell will be flying from their aerodrome at Bulimba during show week.



BY

"WILGA"

SYDNEY TO NEWCASTLE.

168 Miles or 104 ?

"THE most important and representative deputation that has ever come here," said T. D. Mutch, Minister for Local Government, when he had, for two hours and a quarter, listened in his room to no less than twenty-three speakers out of a deputation of sixty-four, advocating the construction of about twenty miles of new road from Hawkesbury River railway station to Dangar Island, Woy Woy, and Gosford, so as to link up the Hornsby-Hawkesbury River railway station roads with the Gosford-Newcastle road. This will give a run of only one hundred and four miles between the biggest commercial city of the Commonwealth and our largest industrial city, as against the present one hundred and sixty-eight miles *viâ* Windsor, Wiseman's Ferry, Wollombi and Cessnock.

Before the deputation was seated betting at the Press table was "20 to 1 it's turned down"—with no takers. " 'Twas a near enough forecast."

The Minister left no doubt that he was a true-blue proletariat. He received the gathering minus his coat, announced that those who wished might smoke—they did! while he himself consumed many cigarettes. One pitied the sole stenographer, first for the extraordinary strain of two and a quarter hours' strenuous and continuous note-taking, as much as for the discomfort of the smoke-screen.

Mr. Mutch said he had been over the country per boot. "You want the road; put up the money," was his attitude right through. "You will? Then what's your scheme?"

A wonderfully organised deputation it was—Ms.L.A., a Knight, a K.C., Shire Presidents and Councillors, a civil engineer, fruit growers' councillors, the Chairman of the Newcastle Chamber of Commerce, the Chairman of the Roads and Tours Committee of the Royal Automobile Club of Australia, a representative of the Motor Traders' Association, Town Planners, and the Secretary of the National Roads Association.

Speakers said the districts concerned were prepared to put up the money, but had no concrete scheme prepared, for they did not think the Government would expect them to do work unaided when it would benefit the whole State; besides they had their own estimate of cost (£76,000), but did not know what that of the Government would be. Would surveyors be sent to ascertain? Mr. Mutch said his men were already working overtime, and none would therefore be available for some months. Then the President of Erina Shire (Cr. R. J. Baker, who is also President of the Northern Roads Association, expressed anxiety as to whether the money, when raised, would be applied faithfully to the object; would the Minister follow their policy if it could be financed? Mr. Mutch said "Yes," recommended a betterment scheme, and further, that the Association call a Conference and bring down a scheme to the Government.

On the motoring phase, Mr. Alick McNeil (General manager of Garratts Ltd., and representing the Motor Traders' Association) said the people concerned would finance a proposition if the Government put it up to them.

Mr. D. M. Cooper (Automobile Club) agreed with the Hon. Walter Bennett, M.L.A., that roads should be used for the benefit of the primary producer; and said that the proposed new route would save motorists in wear and tear anything from £5 to £10 on the trip to Newcastle, not to mention time.

Mr. Frank B. Smith (National Roads Association, N.S.W. Branch) was equally positive as to necessity, benefits and prospects and the criminal neglect of the Federal Government, which used State roads for defence, postal and other purposes, drew revenue therefrom and refused to pay out a penny.

Sixty thousand pounds for the road, £5,000 for a steam punt which would pass Dangar Island, £1,000 for approaches, and £10,000 for contingencies, brought the total to £76,000.

* * *

The Importance of Fuel.

However important your particular fancy in a car is to yourself and family or friends, "there as others." But in the all-important propellant there are but few distinct varieties. The component parts thereof are not always familiar to the average "motor-mobilist." Petrol is practically paramount.

When the internal combustion engine for motor vehicles was invented, it is pointed out, petrol was the first fuel employed. The crude petroleum from which it comes, is heated, and from it the first vapours are cooled; and, as only 21 per cent. of the original crude oil can be converted to motor spirit, other varieties of product are earnestly sought for.

In New South Wales money has been spent in experiments on power alcohol, such as Natalite, Powrol, etc. In Sydney, companies have been formed to manufacture the stuff. It has seemed so easy on paper to make "juice" that will shove what the Chinaman described as "No pushee, no shovee; he goee like ——," for it was quite believed that the process of making power alcohol from good commercial sago down to the decayed fruit at the tip and molasses, was simple. Large sums were spent in sending emissaries to distant lands to make experiments and to report; companies were formed in seemingly good faith, but a vague silence has drifted over the vaporised atmosphere.

To return: Benzol is the most important of the alternative fuels so far proved successful, reference to which is made in an article by Mr. W. H. Lober, which appears elsewhere in this section.

Akin to Benzol in composition is shale oil, distilled, as may be surmised, from shale.

"Mercury" benzine, a heavy spirit, has been tried in Sydney with success. The Vacuum Oil Co., Ltd., is importing large quantities.

Naphtha and coal gas (the latter carried in a special container on the top of the vehicle) are used as one. In Sydney some years ago a topped lorry belonging to the Australian Gas Light Co., Ltd., careered around in great style, with its gradually collapsing gas bag up above flapping in the breeze. To all intents it was a success, especially in a city where the fluid could be so readily obtained. That was before the war. Many similar vehicles adapted to passenger and goods carriage performed glorious service in England during the war, and for them special gas-supplying stations were provided throughout the country. Here, however, there would be limitations of supply outside the suburban area.

Paraffin or plain kerosene, obtained by distillation from crude petrol and also from shale, has been used. To cause complete vaporisation of this heavier fuel and to prevent deposits, the heating of the fuel by modifications in the carburettor is necessary. But in shale, perhaps, lies in New South Wales a great and wonderful possibility. Think of the enormous deposits of it in the Wolgan Valley, and just over the ranges at Capertee. Failure of success in making kerosene (and millions have been spent in the two localities named) has been largely a matter of unsuitable machinery having been imported and erected.

* * *

Touching Alternative Fuels.

Mr. W. H. Lober, of Messrs. McIntosh & Sons, Elizabeth Street, Sydney, who returned from a mission to England some months ago, where he investigated the possibilities of alternative fuels for motors, writes:

"The question of alternative fuels for internal combustion engines is one of recognised vital importance to Australia, dependent as the country is at present for its supplies from overseas; and no effort should be spared to enable Australia to be self-supporting in this direction should untoward circumstances interfere with the transport of fuel from abroad.

"Many worthy efforts are at present being made by men full of honest conviction that payable crude oil will eventually be found in Australia, to tap natural sources in various parts of the Commonwealth, but so far without success. However, we should not be discouraged, because in this country we have probably the most extensive deposits of oil in a solid form that the world knows of. It is *Lignite* (or brown coal) in Victoria, where up to the present, roughly three thousand million tons have so far been proved. Each ton contains from eighteen to fifty gallons of raw or crude oil from which motor spirit (benzol series), lubricating oils, burning oils, etc., can be distilled in the same manner as from the liquid crude oil from wells.

"Then, in New South Wales, there are countless millions of tons of shale very rich in crude oil in the solid state, and it is only a matter of sufficient capital and proper plant for the whole deposits to be made available to the internal combustion engine user at a price considerably below that now paid for imported spirit. It is gratifying to know that shortly an attempt will be made (after exhaustive experiments, now concluded, have demonstrated the practibility of the proposition) to work one section of the deposits, whilst at a later date a further proposition will be put before the public for support in the manufacture of motor spirit from New South Wales.

"There is now no shadow of doubt that such spirit is quite satisfactory; indeed it has been positively proved to be superior in propulsive power, freer from carbon, and more economical as regards mileage than imported spirit. The great obstacle to be overcome in the initial stages was the right type of retort. A local company claims to have evolved a satisfactory method, while an English firm is prepared to put up solid guarantees that its retort will be successful, so that the public can expect in the near future to hear that there is a good prospect of petrol being obtained locally and most probably at a cheaper price than now obtainable.

"There is also a further source of supply of motor spirit which will make itself felt as time goes on; that is the refining of tar oils from the gas works and coke ovens in the State. One large works is installing a distillation plant and some hundreds of thousands of gallons of benzol will be recovered annually. At present in England between thirty and forty million gallons are produced this way each year, thus helping to relieve the acute shortage in the oil supply. There is no doubt that there will be an Act of Parliament passed prohibiting the use of raw coal in the fire grate. When it is realised that such valuable chemicals as the tar oils provide, can be extracted from the coal by means of the low temperature carbonisation and distillation methods without detracting from the calorific value of the coal, and at the same time providing a smokeless fuel, then will it be understood how criminal is the waste that is going on to-day.

"Low temperature carbonisation is a system whereby the coal is heated up to about three or four hundred degrees centigrade, which causes the volatile hydrocarbons to pass off into containers, where they are cleaned and distilled into many commodities daily in use, such as petrol, lubricating oil, burning oil, phenols, anthracenes, paraffin wax—in fact there are nearly four thousand different chemicals obtainable this way, that at present are going up the chimney in smoke, real smoke! Then, of course, at the same time a large volume of household gas is obtained during this operation.

"When the desired amount of volatiles has been driven off," concludes Mr. Lober, "the remainder, called semi-coke is, if required, blended with other classes of semi-coke and briquetted. These briquettes are clean to handle, free burning, can be made so that they form no clinker, are smokeless and, if properly blended, will have the same calorific value as best Welsh steam coal. Thus, a great national benefit can be bestowed. The time is not far distant when the pressure of existence will bring into being such systems of coal treatment, and therein lies one of the great chances that the petrol-driven engine has of becoming a more economical factor in this country's development."

Where to Go To-Morrow.

Now for an entrancing day's run! We told in last issue of a good one hundred and twenty miles trip to historic Wiseman's Ferry and back; but this is a better trip. And, mark you, the writer has been over the trips many times which *Sea, Land and Air* has described and will describe, often as official observer for the reliability contests promoted by the Royal Automobile Club of Australia. Forward then to Kurrajong Heights and return.

First to Parramatta (15 miles). This asphalted surface, despite that it is already "ripply," is the best stretch over ten miles in length of any in the State, excepting the fourteen and a half miles red road of blessed memory between Armidale and Uralla. Follow the tram line to Baulkham Hills (four miles), turn northwesterly to Rouse Hill (eight and a half miles), descending to McGrath's Hill (six and a half miles). Leaving the silos on your right, proceed in a direct line to ancient Windsor (one mile), turn southwest at the Royal Hotel and follow the main street, swinging to the right (north) at the Park for another ancient town—Richmond (five miles). The road is a trifle bumpy and dusty in dry weather, but you will not notice that much, your attention will be attracted by the lovely stretches and swells of farm land, and by modernity in the shape of the famous aerodrome. The latter remarks apply even stronger to the next few miles past North Richmond to the river. Thence to Kurrajong town and Kurrajong Heights (eleven miles) the road is hilly and rising with one awkward turn to the right where a beetling cliff obscures the view, a nasty "V"-shaped gutter on the flat at the town, and a stiff climb to "the end of the road" at the Heights. Here the metal peters out on to a two-chain wide grass patch where hundreds of cars may "park." Praise of the hills on the right and left will leave you exhausted.

Of course it isn't the end of the road exactly, for a horse-drawn vehicle may proceed through a public gate (known as "anathema" in remote country districts) to parts unknown. Also, there is a road to the left at the picnicking ground and another further down to the right leading to Mount Tomah and Bell (twenty-nine miles). Back on to the main western line then and eleven miles from Hartley, after which Mt. Victoria's two excellent hotels will no doubt be appreciated.

But you are at the picnicking grounds. From this plateau grand and gorgeous views of mountain, vale, river and town are visible. In the season there are millions of golden oranges to feast the senses of smelling, seeing and tasting; at all times there are the "sighs of orange groves" with which Bulwer Lytton makes the masquerading prince, Claude Melnotte, tempt the hearing of Pauline.

But you have come fifty-one miles and must now return.

* * *

More Aluminium Parts.

The closer investigation made since 1914 of the nature and properties of light alloys and the scope of their application warrant the hope that car manufacturers will henceforth be less conservative in experimenting in such alloys than hitherto. To-day in Sydney, we see *Vauxhalls* with aluminium bonnets!

Except as regards the use of alloy pistons which has made some little progress, but has not materially affected the general use of the cast-iron piston, aluminium alloys have found (a few isolated instances apart) very little application. The use of aluminium for gear-boxes, crank-cases and some minor parts, need not be taken into account in considering this question, as this has been the universal practice for many years. The important point is that effecting a considerable reduction in the weight of the average touring car as it is to-day. The advantages that would be obtained by lightening a car without loss of strength are too well known to need reiteration.

It is possible to conceive a time not very far distant when, instead of steel and cast-iron being the preponderating materials in a motor car, they will only be used in small quantities on such parts as gear wheels, fly wheels, springs, etc.

* * *

Motor Yachting.

New Zealand comes into the Sydney limelight. The Secretary of the Auckland Anniversary Regatta, advises that in addition to the open speed event a £100 special speed motor launch race will be included in the programme. Boats to be twenty feet to twenty-one feet overall, beam not more than three feet nine inches, piston displacement not to exceed two hundred and fifty-two cubic inches, speed not less than twenty m.p.h., limit of cost £500, only commercial benzine or motor spirit to be used and only atmosphere air employed. It is hoped there will be a number of interstate entries.

The first ball of the Motor Yacht Club of New South Wales was held at Sargent's on August 4, and is considered to have been such a success that it has been proposed to make of it an annual fixture. The season's racing programme will be announced shortly.

* * *

Motor Cycle Club of New South Wales.

Weekly Wednesday night lectures have been inaugurated. The petrol consumption test in Centennial Park was set down for August 27. A "crock" hill-climb (every rider to take the same machine—a freak in engine manipulation—up the hill) is to be held on the 10th or 17th inst., and if it proves as side-splitting to the spectators as the last one up Avoca Street, Randwick, they will not care to see Chaplin on the screen the same night. The President, Mr. A. E. Morton, has donated £10 10s. for the six-days' trial within the State at Christmas time, and Messrs. C. C. Wakefield Ltd., £5 5s. for the twenty-four-hours trial to Nelligen and back, in November. A scheme is to be devised to encourage members to make (or break) records under the strictest supervision and a day is to be set aside with that object.

The date for this latter important event will only be made known to the competitors, in order that the men will have a freer run than would otherwise be the case. Mr. J. A. Fair, Honorary Secretary, announces classes for both side-cars and solos and the distance 440 yards.

* * *

Motorgrams.

The Brisbane-Sydney motor reliability trial started from the northern capital on August 23 and finished on Saturday, 27th, but the final results were not available in time for inclusion in this issue.

Mr. Frank Bignold, publicity manager for Messrs. Marcus Clark Ltd., agents for the two "Six-esses," the *Chandler* and the *Cleveland,* has quite recovered from a severe illness.

Mr. Frank R. Kern has just returned from a six months' trip to America where he secured the agencies for *Mitchell, Gardiner* and *Packard* motor cars, and about half-a-dozen good accessory agencies in addition to control of Henderson & Readings Standard motor cycles. Mr. Kern was formerly representative of General Motors Ltd.

Mr. J. W. Amos has assumed the publicity management of Garratts Ltd., in succession to Mr. R. H. Tribe. The latter has been appointed suburban representative of that firm's agencies, the *Overland, Fiat* and *Willys-Knight* cars and Fisk tyres, and will no doubt make his "heftiness" felt in this as in other departments of the trade wherein he has been engaged for years. Mr. Amos's ability is even now exerting itself in new forms of publicity work in pushing the wares mentioned.

A spot on the Parramatta Road at the "dip" within Burwood municipality has worn, but the Government immediately put on men to remedy the trouble.

The Government is spending £119,000 on the Parramatta-Penrith Road. Motorists are advised during the progress of work to go to Baulkham Hills, take the Windsor Road to the old Richmond Road (crossing the railway line at Seven Hills) and thus again joining the Parramatta-Penrith Road. The torn up parts are near Parramatta, Minchinbury and Mount Druitt. There is no other suitable motor route to the mountains than the Great Western Road.

The hill into Menangle is in very bad condition just now. A party of aldermen recently had to get out and push—in the rain, too!

The Royal Automobile Club of Australia has donated to the National Roads Association the sum of £50 towards the cost of a "Blue Colour Trail" to mark prominent posts, etc., on the main route from the Queensland border through Sydney to Albury.

Congratulations upon complete recovery from a severe indisposition to Mr. Fred Gagliardi, sole Australasian agent for the *Cole Aero-Eight, Moon* and other cars.

For many years Colo tyres have enjoyed an enviable reputation, but to-day the manufacturers (The Colonial Rubber Co., Ltd.) claim that this Australian product is of even higher grade than in the days when they became famous.

THE STORY OF RADIUM IN AMERICA

BY

THOMAS C. JEFFERIES

Truth about the mysterious metal, worth 180,000 times as much as gold—Though Mme. Curie discovered it in Europe, it is now produced almost solely in the United States—Limitations of its use for the cure of cancer—Romance of radium mining

A LITTLE over half a century ago, or, to be more definite, in the year 1867, there was born in the City of Warsaw, Poland, a woman who was destined to become world-renowned through scientific research, and especially as one of the co-discoverers of the most wonderful mineral in the world. This woman was Mme. Curie, who is now visiting the United States, and the mineral, which for the first time was isolated by her and her French husband, Professor Curie, was radium. Hence the appropriateness of the movement to raise one hundred and twenty thousand dollars and present her with a gram of radium for experimental purposes.

Dr. Robert Abbe, of New York, has given us much interesting information regarding this remarkable woman in his book called "Madame Curie." He tells us that her father was a Polish Jew named Ladislaus Sklodowski, who was a professor of physics at the University of Warsaw. Her mother was a Swede. As a young woman she went to Paris to pursue advanced work in science. While there she led an austerely simple life combined with intensive studies, which greatly increased her store of scientific knowledge and experience. She was welcomed into the Latin Quarter, and eventually became associated with the famous physicist and X-ray investigator, Professor Henri Becquerel. While engaged with this scientist in important experiments, she met Professor Curie, then a professor of chemistry, who later became her husband. With him she became the co-discoverer of the mineral with which their names will always be associated.

Radium has proved itself so valuable in the treatment of human disease that every effort should be made to conserve it after it has been isolated. The life of radium is estimated at 1,760 to 2,000 years. Experienced surgeons say that if radium were useful for nothing else, the relief from pain it gives in certain forms of cancer makes it worth its whole cost. Radium cures some tumours which, before this substance was discovered, were successfully treated only by severe operations. That it does not cure all cancers or all tumours is beside the mark. Its value is sufficiently proved without claiming for it universal application.

The price of radium within the recent past ranged from $90 to $120 per milligram for the element contained in a salt. Since the war most of us have learned to regard the necessities of life as representing rather high standards of value when measured in terms of gold dollars; but imagine a substance that in volume and quantity is one hundred and eighty thousand times the value of gold, or, in other words, a substance of which a quantity the size of a five-dollar gold piece is worth $900,000! Considering, however, the hardship and the privation that both man and beast are obliged to undergo in order to obtain this precious mineral, and the long, complicated and expensive process by which the ore must be treated before its valuable residues can be secured for the use of humanity, the present writer, who spent some years in the radium fields, and who later, in the laboratory and the clinic, has seen many cases of malignant growth retarded or cured completely, has become convinced that the vast monetary value of this mineral has not been overrated.

Someone has told us that heaven knows how to place a proper price upon its wares. With this in mind, we may regard the almost inaccessible deposits of radium ore, their distance from such necessities as fuel, food and water, and the difficulty and enormous expense of reducing the ore to its precious content, as Nature's compensatory method of price fixing.

Radium is found in quantities so exceedingly small that it is never visible even when the material is examined with the aid of a microscope. Radium ore ordinarily carries only a small fraction of a grain of radium to the ton, and radium will never be found in large masses because it is formed by the decay of uranium, a process that is amazingly slow, while in its natural state radium itself decays and changes to other elements so rapidly that it does not accumulate in visible masses.

Radio activity, or in other words, the characteristic manner in which radium manifests its presence, was accidentally discovered by Professor Becquerel while carrying some radium in a tube in his waistcoat pocket. The burning of his body about the chest led to his discovery of the therapeutic value of the substance. Even after Mme. Curie's discovery of radium it was still regarded as a scientific curiosity until Professor Becquerel's accident. With this evidence that radium would destroy tissue its later employment in fighting malignant disease was but a question of time and experimentation.

Radium crystals give off minute explosions at the rate of three hundred and sixty thousand per second. These explosions form a gas, and it is this gaseous emanation which is the therapeutic agent. There is no remedial action in the powder itself. The presence of radium is manifested by the repelling of discs and sheets of tinfoil that form a part of a testing apparatus.

Radium minerals are generally found in granite formation. Most of the original radium minerals, such as uranitite, samarskite and brannerite are black, and are seldom found in quantities of much commercial value. Pitchblende is of practically the same composition as uranitite and of the same general appearance, excepting that it shows no crystal form and occurs in veins. It has been found in but few places, among them Bohemia, Southern Saxony, Cornwall and in Gilpin County, Colorado.

When these original radium minerals break down through the effect of the elements upon them, other radium elements are formed from them, such as antunite, tyuyamunite and carnotite. The latter two are the most abundant and furnish the bulk of the world's radium. To the naked eye they appear exactly alike, both being of a bright canary yellow. They are powdery, of very fine crystals, although in rare instances they are of a claylike nature. Carnotite is technically known as potassium uranium vanadate. Tyuyamunite, which is similar in composition, contains lime instead of potash. Large deposits of this last substance have been found in Russian Turkestan. The greatest known deposits of the two minerals, however, are found in south-western Colorado and south-eastern Utah, where both are associated with fossil wood and other vegetation in friable, porous, finely grained sandstone. It is reported that small quantities of carnotite also have been produced at Radium Hill, near Olary, South Australia.

In America radium has been obtained chiefly from carnotite ore, the principal deposit of which is in the south-western section of Montrose County, Colorado, in a valley called "Paradox," because, unlike most valleys, it runs at right angles to the mountain ranges which enclose it. This ore deposit extends over into Utah, but the Paradox Valley may be regarded as America's radium fields proper. This section is rich with legend and tradition of the American red man, for our radium fields are located on the site of a famous old Indian playground—a reservation once occupied in peace and contentment by the Ute tribe of Indians.

Radium ore seems always to be found in places that possess potential hardships. Most camps, when new, are tented villages. So it was in the camp in Paradox Valley in which I once sojourned. Offices, bunks and mess were under canvas. They have since been more permanently established in frame buildings, as shown in the photograph of headquarters camp in the radium fields. The "front yard" of radium headquarters is an expanse of alkali desert land, cactus and sagebrush; the back yard is a mountainside of jagged rocks and scrubby piñon trees. One of the few remaining open cattle ranges in this country is in this region, and during much of the year large numbers of range cattle graze and roam at will. Cattle raising, however, has become merely an incidental occupation; most thoughts and dreams there run to the precious radium. That is the chief subject of conversation for prospector, miner and operator. When someone tells of a new radium claim located, or a new body of good ore uncovered, eyes widen and listening ears eagerly catch each word.

As a rule, radium miners come from gold and silver mining districts. Many come into Paradox from Telluride, the nearest large quartz mining camp, about seventy-five miles to the south-east. At that place

are situated such large mines as the Tom Boy, Smuggler Union, and, a short distance further, the famous Bird Mine at Ouray. Hard rock miners as a rule are ignorant concerning both the nature and the location of carnotite ore. The miner in quartz must learn the mining game over again when he goes to the radium fields. Deep shafts and long drifts are seldom required, radium mining frequently being conducted by quarrying operations. Most miners of carnotite develop a hacking cough, caused by the fine dust raised by the handling of this ore.

There must be a well-equipped camp, located conveniently near wood and water, both of which are scarce in the radium fields. Within the camp there must be plenty of good, substantial food and clothing. The operator must also have many thousands of heavy canvas sacks available, and needles and twine with which to sew the sacks when they are filled. Production requires picks, shovels and drill steel and a forge, for mining tools must be kept sharpened. There must be powder, caps and fuse and a burro train for packing the ore from the mountainside to the foot of the hill. Not only is the original cost of production of radium-bearing ore high, but long hauls and handling and rehandling en route increase it. The use of tractors in freighting the ore in recent years is proving successful.

Mankind owes a debt of gratitude to the courageous and unselfish pioneers who supplied the means with which this work was carried on during the days when no commercial return came back to them. Long before a ray of light broke through or a dollar returned for the bread they cast upon the water, these men had demonstrated their faith to the extent of $500,000, and were content to keep going in the thought that the final result of their efforts would be of great benefit to humanity. Unfortunately, Joseph and James Flannery, the pioneers in this work, have both died within the last two years, and can in no event share in humanity's verdict.

Many times I have heard Joseph M. Flannery relate the circumstances that influenced him to enter the course that made him the world's largest radium producer. Several years ago, when the spectre of death crossed the threshold of the Flannery home at Pittsburgh, and cancer bore away one of its members, Joseph Flannery, with all the solemn determination of a head thus bowed and a heart thus weighted, imposed upon himself an obligation to find a cure for the disease whose ravages he had witnessed, a scourge that has disregarded time, geography, race and circumstance. He despatched experts to Europe, who reported back to him that radium would do the work, and forthwith he set out to obtain the precious substance in quantity. He established at Pittsburgh the largest and most complete radium laboratory in the world, and his mines in Colorado attained an output of over one hundred tons of ore a month, from which one gram of radium was obtained. Flannery, shortly before his death, stated that the production of the world's annual ounce of radium involved the use of not less than 1,400 carloads of raw material, of which 1,500 tons is carnotite ore, the basic ore that is found in Colorado.

Radium's War on Cancer.

Radium is not yet "ex-mystery." Although it has been used in the treatment of cancerous growths for several years, its curative properties are not wholly understood. It is generally admitted that, in the main, radium is still in the infancy period of investigation. Questions in the form of experiments are still being addressed to Nature on the subject. Its value, however, has been sufficiently demonstrated to induce many European cities to equip municipal hospitals with a working supply of the costly mineral. One great obstacle to investigation and experiment, both in Europe and the United States, has been the almost prohibitive cost of the substance. Mme. Curie herself has had to forego further study owing to the fact that she possessed no radium, and had not the means to purchase it. And yet, before the war, the world's supply of radium came from Europe. Since 1914 the leadership has been transferred to America. When hostilities ceased, the United States was producing almost the entire world output, which amounts to but an ounce, or approximately a teaspoonfull, annually, and it sells readily at $3,500,000. It is estimated that the total amount of radium in the United States at the present time does not exceed twenty-five grams, and that not over one hundred grams can be located in the whole world.

Despite the cost and scarcity of the substance, however, the use of radium goes on

apace. A gram of it, worth about $120,000, has been purchased for clinical and experimental purposes by the Post-Graduate Medical School and Hospital of New York. This is the largest amount of radium ever assembled for instruction purposes. The State of New York, furthermore, has purchased for the State Institution for the Study of Malignant Diseases at Buffalo two and one-fourth grams of radium, for which the sum of $225,000 was paid. Though the whole purchase could readily be contained in an ordinary fountain-pen barrel, it is enough to be a great permanent asset to the State and to do untold good to suffering humanity.

Though the action of New York State marks a forward step in the treatment of cancer, victims of that disease have been treated free in New York since 1889, at the Memorial Hospital for the Treatment of Cancer and Allied Diseases. Since 1914 that hospital has treated these diseases exclusively. Its medical staff, in affiliation with the Cornell Medical School, has been studying the application of radium to the treatment and cure of cancer since 1912. Through the generosity of the late Dr. James Douglas, eminent mining engineer and metallurgist, the Memorial Hospital in 1917 received over three grams of radium, valued at about $300,000, and later the hospital received by deposit from the United States Government, through the Bureau of Mines, over one-half a gram of radium to be used for the treatment of soldiers and sailors of the United States. This is said to be the largest deposit of the substance held by any public medical institution in the world. It is used exclusively for the treatment of cancer, and the condition under which the radium was obtained was that the poor should be treated liberally, and, when possible, gratuitously. In addition to the radium on deposit with the hospital, that institution recently erected a laboratory, at a cost of $75,000, which is fully equipped for the study of cancer in its relation to treatment by radium and radium emanation, and also maintains a staff of eminent physicians and physicists.

Radium gives off three different kinds of rays: alpha rays, which reach about one-half inch from their source; beta rays, which are projected three times as far, and gamma rays, which continue for a much greater distance from their source. A film of tin foil will serve as an effective filter to bar the alpha rays and permit the continuance of the other rays, or even a sheet of paper will do this. A barrier of lead a millimetre thick is sufficient to arrest the beta rays, but the gamma rays penetrate through seven and one-half inches of iron, and lose thereby only about one per cent. of their intensity. The gamma rays are the ones the surgeon employs, on account of their effect in retarding abnormal growths. In fact, they sometimes induce actual retrogression. The rays must always be confined to the diseased part when they are applied; otherwise, new growth is likewise retarded, and inflammation or ulceration in healthy tissues may be superinduced.

Actual practice has shown that in superficial conditions, where radium is easily applied, it has been 95 per cent. successful. This applies to cancerous diseases of the skin, lips, eyelids, etc. As for malignant growths, the head of the Department of Pathology of one of our large universities, who has long occupied a prominent position in the world of medical and scientific research, has stated that in many cases radium has replaced the knife in the treatment of such cases, and that in many others it has supplanted the knife with effective results. A leading radium therapist has declared that the best effect of radium does not consist in merely killing cancer cells, but in the symptoms of change and stimulation that mark the healing process. Some of the disadvantages are over-treatment, the ill-advised attempt to control too large an area of tissue, and the attempt to use radium on hopeless cases. A little radium improperly used can do much harm. It is highly important that its limitations should be recognised, so that its failures outside of its proper field should not prejudice its legitimate claims.

The somewhat complex physical laws governing the action of radium, the variations in quantity, duration and distance in the dosages of different operators, the wide range of filters employed, the varying effect of alpha, beta, gamma and secondary rays, the conflict of opinion and advice between enthusiasts and uninformed critics, have all contributed a share to the confused history of radium therapy to date. What radium therapy most needs is the active co-operation of the workers and clinics, the standardization of methods and the concentration of the work, so far as

possible, in large clinics thoroughly equipped with radium, technicians and trained medical specialists.

We have heard of many disastrous burns received by workers from radium and X-rays. In the leading radium clinics, however, the workers are protected from the dangerous effects of the rays, and, as a further precaution, they work with these rays only on alternate days.

It is a regrettable fact that tumours often follow X-ray treatment. Radium, however, is considered a more efficient agent, although some cases have been satisfactorily treated with radium in combination with the X-ray. In such cases, of course, great care and attention must be given to the matter of sequence and the intensity of the different applications.

There has been some difference of opinion between surgeons and advocates of X-ray or radium treatment, but, since each of these agencies contributes its share to the general advancement of scientific treatment of disease, there is little reason to expect anything but co-operation in the future. The necessity for this is emphasised by certain cases that are encountered and that demand a combination of different treatments. Sometimes, in treating cancer of the breast, for instance, the diseased part is exposed to radium rays, after which X-ray treatment is applied. In the treatment of cancer of the stomach, tubes containing radium have been swallowed. Certain cancerous conditions must be exposed with the knife before the diseased area can be treated with radium rays.

As stated recently by a prominent scientist, continues the writer in *The New York Times Current History*, "the practical limitations to the use of radium in cancer are numerous and formidable, and in any but experienced hands it is a dangerous agent. Until these difficulties are more widely recognised or overcome, a general recommendation of the use of radium, especially in place of competent surgery, is inadvisable. Although the available supplies of the metal are limited, and the indispensable skill in application so restricted, it would be specially unwise to spread among the general public the impression that radium is ready to supplant surgical treatment of operable cancer. On the other hand, these precautions should not be permitted to stand in the way of the normal and legitimate extension of the radium treatment of cancer."

TESTING LANDING GROUNDS FOR AEROPLANES

FLYING from aviation fields near Los Angeles, a fleet of fifteen airplanes recently tried out the new landing field at Burbank, where one of the greatest sky carnivals ever held on the Pacific Coast took place on July 2, 3 and 4 as part of the big celebration of the Burbank Memorial Association.

Pilots from Venice, Rogers Airport, Mercury Field and Pasadena made the inspection at the request of officers of the Aero Club, which assisted in making the event a success. Hubert Kittel, of Rogers Airport, made this report to the committee:

"The new field is safe and affords ample room for the three hundred and fifty 'planes that will take part in the sky carnival. It should be made a permanent field for commercial flying. We shall have no difficulty in landing the hundred Secretaries of Chambers of Commerce, who are to be carried from distant points in Southern California to the grounds by airplanes."

Completion of the rodeo track was also announced and during the carnival many of the cowboys who were entered in the Western championships tried out bucking horses, chariot racing and roping. Three car-loads of wild horses, cattle and calves were on the ground.

The Actors' Equity Association informed the Memorial Association that July 3 had been selected as "Hollywood Day," because of the fact that the organisation will at that time produce "The Building of an Empire," the pageant in which five thousand actors appear.

Governor Stephens sent a letter to the Memorial Association accepting the invitation to open the celebration on Saturday, July 2. He expressed approval of the plan to use the funds raised to build a Memorial Hall for all patriotic organisations and an armoury for the National Guard.

[GOVERNMENT NOTICES]

Department of Defence

AEROPLANE SERVICE BETWEEN SYDNEY, N.S.W., AND ADELAIDE, SOUTH AUSTRALIA

Tenders will be received by the Secretary, Department of Defence, at Melbourne, until October 1, 1921, for the establishment and maintenance of an aeroplane service, in safe and suitable aeroplanes, between Sydney, N.S.W., and Adelaide, S.A., over the route described hereunder, for the term of one (1) year from February 4, 1922, or from some such subsequent date as the Minister for Defence may approve, which date should not be later than five (5) months from October 1, 1921.

Each tender must be submitted on the printed form provided for the purpose, copies of which may be obtained from the Controller of Civil Aviation, Department of Defence, Melbourne, or from the Secretaries, District Contract and Supply Board, Victoria Barracks, Petrie Street, Brisbane; Ordnance Buildings, Pitt Street North, Circular Quay, Sydney; Keswick Barracks, Adelaide; Military Barracks, Perth; and Anglesea Barracks, Hobart.

Each tender must be signed by the tenderer and sureties, and witnessed by a Magistrate.

Each tender must be enclosed in a sealed envelope addressed to the Secretary, Department of Defence, Melbourne. The envelope must bear the words "Tender for Aeroplane Service."

A Tender may be delivered by hand to the Secretary, Department of Defence, Melbourne. If forwarded by post it must be sent as a registered letter and postage prepaid thereon.

The route of the service is from Sydney to Adelaide, via Goulburn, Cootamundra, Hay, Ouyen, and *vice versa*.

The approximate air mileage of the various stages of the route is as follows:—

Sydney to Goulburn	**110 miles.**
Goulburn to Cootamundra	**100 miles.**
Cootamundra to Hay	**190 miles.**
Hay to Ouyen	**155 miles.**
Ouyen to Adelaide	**240 miles.**
Total	**795 miles.**

Contractors will be required to make each week one trip from Sydney to Adelaide and back to Sydney touching at the localities mentioned above, and will be required to reserve, for the purposes of the Government, in each aeroplane employed in the service, space sufficient to accommodate mails weighing 100 lbs.

In no circumstances will consideration be given to any tender in excess of £17,500, but tenderers may forward proposals to maintain a se vice giving a greater or lesser number of trips than as set out above.

Attention is particularly directed to the Conditions of Tender and Conditions of Contract annexed to the Tender Form.

G. F. PEARCE.
Minister of State for Defence.

LUXURIOUS AIR TRAVELLING

WHAT AMERICAN ENTERPRISE HAS ACCOMPLISHED

SIX giant flying cruisers have just completed the record of a new page in the history of transportation. Their remarkable performance supplies the answer to the oft-repeated question: "Is commercial aviation possible?"

These airships, which have been turned into aerial vehicles of commerce through the co-operation of the United States Navy with the Aeromarine Engineering & Sales Corporation, have for six months maintained a daily passenger and freight service between Florida and Havana with clockwork regularity.

Day by day, despite the elements, these chariots of the skies plied the airway above the 110 miles of choppy water that separates the capital of Cuba from the Floridian Keys, making a total of 162 flights to and from Havana. Fighting terrific headwinds that at times approached a gale, and at other times speeding forward with the wind upon their tails, they completed their season's schedule in the average time of one hour and thirty-six minutes per flight—or in other words ninety-six minutes under all conditions for each flight of 110 nautical miles! Such is the remarkable performance of the first extended commercial air service in the Western Hemisphere. Can any other form of transportation equal it? It is doubtful; and this is but the beginning of commercial aviation.

That this was a very serious commercial enterprise, its record will show. Throughout the period that the Key West-Havana service was in operation 1,044 passengers and their baggage were carried in absolute safety and unusual comfort, free from the trying experiences of sea-sickness. In addition to this, however, 24,042 pounds of United States and Cuba Government mail was carried between the two cities.

In addition to the Key West-Havana service, the six flying cruisers also maintained other services, as well as making flights under special charter. These brought the total number of flights to 463, which kept the flying cruisers 644 hours in the air, and during that time they covered 38,264 nautical miles.

Each of these flying craft has an enclosed pullman cabin, which seats eleven passengers in comfortable wicker armchairs, each fixed alongside an individual observation window. Between these chairs there is an aisle along which the passengers can exercise themselves.

In analysing what this Aeromarine service means to the traveller bound to the Cuban capital, we will realise at a glance the value of the world's newest and most expeditious form of transportation—a form destined to annihilate the importance of time in travel.

Formerly the passenger arriving in Key West by the Havana Special shortly before noon, was compelled to wait until evening for the passenger steamer to take him across the Gulf of Mexico to Havana. Then followed a sea voyage of eight to ten hours across the choppy waters of the Gulf, that are churned to a state of perpetual agitation by the conflicting forces of the Gulf Stream and the trade winds. It is a disagreeable voyage at best, even for the experienced seafarer and is the American counterpart of the English Channel.

Such was the condition of transport across the Gulf of Mexico until the arrival of the American flying cruisers. With their advent the traveller for Havana was in the lobby of his hotel at the Cuban capital two and a quarter hours after he had stepped from the Pullman coach of the Havana Special at Key West.

It sounds miraculous, but nevertheless it is the accomplished fact, and this is how it was done. The passenger arrived in Key West about eleven o'clock in the morning. He then had one hour spare time in which he could lunch ashore, or see the sights of Key West. At noon he boarded the flying cruiser and was off to Havana on one of the greatest flights in the world. As he sat in his wicker chair watching the shipping upon the waters below him, he could eat a luncheon if he desired. Alongside him was an electric bell that immediately summoned a steward from the forward cockpit who attended to his every want. The Aeromarine Navy cruisers are as much at home on the water as in the air, and are as staunch and seaworthy as a steamer.

These cruisers are of the same type that

[GOVERNMENT NOTICES]

Department of Defence

AEROPLANE SERVICE BETWEEN SYDNEY, N.S.W., AND BRISBANE, QUEENSLAND

Tenders will be received by the Secretary, Department of Defence, at Melbourne, until October 1, 1921, for the establishment and maintenance o an aeroplane service in safe and suitable aeroplanes, between Sydney, N.S.W., and Brisbane, Queensland, over the route described hereunder, for the term of one (1) year from February 4, 1922, or from some such subsequent date as the Minister for Defence may approve, which date should not be later than five (5) months from October 1, 1921.

Each tender must be submitted on the printed form provided for the purpose, copies of which may be obtained from the Controller of Civil Aviation, Department of Defence, Melbourne, or from the Secretaries, District Contract and Supply Boards, Victoria Barracks, Petrie Street, Brisbane; Ordnance Buildings, Pitt Street North, Circular Quay, Sydney; Keswick Barracks, Adelaide; Military Barracks, Perth; and Anglesea Barracks, Hobart.

Each tender must be signed by the tenderer and sureties, and witnessed by a Magistrate.

Each tender must be enclosed in a sealed envelope, addressed to the Secretary, Department of Defence, Melbourne. The envelope must bear the words "Tender for Aeroplane Service."

A Tender may be delivered by hand to the Secretary, Department of Defence, Melbourne. If forwarded by post it must be sent as a registered letter and postage prepaid thereon.

The route of the service is from Sydney to Brisbane, via Newcastle, West Kempsey, Grafton, Ballina, and *vice versa*.

The approximate air mileage of the various stages of the route is as follows:

Sydney to Newcastle (Hunter River)	90 miles
Newcastle to West Kempsey (Macleay River)	155 miles
West Kempsey to Grafton (Clarence River)	115 miles
Grafton to Ballina (Richmond River)	75 miles
Ballina to Brisbane	105 miles
Total	540 miles

Contractors will be required to make each week one trip from Sydney to Brisbane and back to Sydney, touching at the localities mentioned above and will be required to reserve for the purpose of the Government, in each aeroplane employed in the service, space sufficient to accommodate mails weighing 100 lbs.

In no circumstances will consideration be given to any tender in excess of £11,500, but tenderers may forward proposals to maintain a service giving a greater or lesser number of trips than as set out above.

Attention is particularly directed to the Conditions of Tender and Conditions of Contract annexed to the Tender Form.

G. F. PEARCE,
Minister of State for Defence.

the Navy used with signal success during the war. One of them remained in the air over twenty-one hours in one continuous flight. This type of flying cruiser has already carried over 275,000 passengers and flown more than a million miles over the open seas of the world—a truly prodigious record!

The pilots who navigate the airships have been carefully chosen from the ranks of those heroic aviators who wrote the most brilliant chapters in the history-making period of the world war. Not one of them has flown less than thirty thousand miles. The flying cruisers themselves are veritable giants of the air, most sturdily constructed, and each has been rigidly inspected and tested by the United States Government and certified as to air-worthiness and sea-worthiness. In fact the Government has such profound faith in their staunchness that it readily awarded the contract for carrying the mails. They are driven through the air at an average speed of 100 miles an hour by two Liberty motors, each of four hundred horse power. In addition to the luxurious accommodation for eleven passengers the flying cruisers have a crew of four men; two pilots, a mechanic and a steward.

In the record of their achievement off the Florida Coast only on three occasions were their flights discontinued for any cause whatsoever, and even then it was only due to a minor incident. Not a single accident occurred during the 644 hours these remarkable flying craft were in the air.

In addition to this their engines functioned throughout with perfect regularity, and in travelling 38,264 miles it was necessary to change only four of their engines. What railroad or steamship line could compare with this for efficiency?

Now that the Florida-Cuban season has finished, these flying cruisers have come to northern climes to continue their epoch-making performances. One of them has just flown from New York to Detroit with complete success. Its flight was in the nature of a trail-blazing adventure, and no attempt to establish a record was made. Instead the *Santa Maria*—for it was she who made this first overland flight—went out of her way in order to show our Canadian cousins the latest mode of travel in the air. She stopped at Montreal and Toronto on her way and was received royally by the citiens of both communities.

This ship will shortly inaugurate a daily aerial passenger and mail service between Detroit and Cleveland during the summer months. She will be joined later by some of her sister ships.

In and about New York a number of passenger lines will be established very shortly with these remarkable cruisers, through the enterprise of the Aeromarine Airways.

BIRDS AND THE AIRPLANE

New light is to be thrown on a fascinating but little known subject—the height birds attain in flight, and more especially the altitudes at which they fly while migrating. Pilots of commercial airplanes are to be asked to observe bird-flight on a precise and organised scale, writes "H.H." in the London *Daily Mail*. Air-express pilots say they rarely see a bird above a height of about 3,000 feet, but the other day, when at 12,000 feet, one pilot saw a couple of birds several thousand feet higher than he was. He believes they were eagles.

Another airman, when on a coastal flight recently, was attacked by a seagull. The bird did not seem to recognise him as the human controlling power of the airplane, but made a general onslaught upon the machine, evidently taking it for some huge feathered creature.

Eagles, possessing keener eyesight or more intelligence, appear to distinguish the man from the airplane. In one case, at any rate, when a pilot was passing over the Pyrenees, the eagle which flew at him seemed, he says, to make a definite swoop at him rather than upon the machine.

As to the height attained by birds when on migration, a theory has been held that the birds reach sometimes an elevation of 20,000 feet, but more recent opinion suggests an average of about 5,000 feet. Pilots will also report on the speed of birds. Swifts, the fastest bird, have already been known to overtake an airplane in flight. Their speed has been calculated to exceed 100 miles an hour sometimes. There is one curious instance, already recorded, of a lammergeier, a bird of prey, which was pursued deliberately by an airplane pilot, and which, in "nose-diving" to escape, attained a pace of 110 miles an hour.

A REAL INNOVATION.
Simple Anti-Dazzle Device.

In the motor world, when one thinks of coil springs of any kind, the world-famous name that one associates with these is that of Herbert Terry & Sons, Ltd., of Redditch. There are, however, many other products, and especially pressings, which Messrs. Terry manufacture, and a real innovation which has attracted some attention is, says *The Motor Weekly's* London correspondent, a very simple type of anti-dazzle device for headlamps.

The idea is to provide a grid of some depth in front of the lamp so that the rays which pass straight forward meet only the edges of the grid, and are therefore practically unobstructed, but to an observer who is a little to one side of this central point, the divisions of the grid prevent the direct rays from reaching the eye, and thus the dangerous dazzle is avoided.

The construction consists of a grid composed of aluminium strips, which are blacked and cross each other at right angles, leaving a mesh of about three-eighths of an inch. The depth of the grid is up to two and one-half inches, according to the degree of control required for the lamp. The device is now being turned out as a fitting that can be clipped on to the front of existing lamps, while it is also intended that lamps of all sizes should be made with the screen built into them. The length of the lamp is naturally increased by the fitting of the device, but the result is not unsightly.

An Ambulance Aeroplane.

The latest innovation in aircraft is the ambulance aeroplane. A British firm has completed the first machine of this type. It is an adaptation of the firm's regular commercial model for passenger service. The forward part of the *fuselage* is arranged to accommodate four stretcher cases as well as a doctor, nurse, pilot, and mechanic. If the patients are able to sit up, eight of them can be carried. The machine can climb to 6,500 feet in ten minutes, and at that height it can be driven at a speed of over one hundred miles an hour. Enough oil and petrol are carried for a five-hours' journey at full speed. The machine, which is fitted with wireless telegraph apparatus, will be used in operations remote from a hospital base.

What Has Been Done With Previous Peace Loan Moneys?

Interesting Statement By Sir Joseph Cook

"The Millions Spent on the Diggers are Not Lost!"

As the balance of War Loan Funds will be exhausted within the next two or three months, it is now necessary to raise a further War Loan.

The money will be used almost wholly for settling soldiers on the land, and for the building of War Service Homes.

The Commonwealth Government realises that it is necessary to reduce borrowing as far as possible, but certain definite obligations to Returned Soldiers can be met out of Loans only.

The money required to carry out the promise recently made to cash a further amount of War Gratuity Bonds must also be raised by loan.

Out of previous Peace Loans the following sums have been expended on the repatriation of soldiers:—

Land Settlement	£26,600,000
War Service Homes	12,200,000
War Gratuities	2,800,000
	£41,600,000

In addition, there has been paid out of Revenue for—

Repatriation of Soldiers (General Benefits, Vocational Training, Furniture, Unemployment, Sustenance, Sustenance to Men under Medical Treatment)	11,300,000
	£52,900,000

It has been decided to raise a further loan (called the "Diggers' Loan") of £10,000,000, bearing a nominal rate of 6 per cent. interest. The price of issue is 96, and the date of maturity is December 15, 1930. Closing date for subscription, September 5, 1921. Subscriptions are payable as under:—

10 per cent. deposit with application.
20 per cent. on October 3.
20 per cent. on November 7.
20 per cent. on December 5.
26 per cent. on January 9.

INTEREST PAYMENTS:—

(a) on Subscriptions paid in full on application—£1/12/6 per £100 on December 15, 1921;
(b) on Subscriptions under the instalment system—£3/7/6 per £100 on June 15, 1922.

Thereafter interest will be paid half-yearly on June 15 and December 15 in each year.

THE AVERAGE YIELD for the whole period of the loan is £6/12/- per cent. per annum. This is 11/- higher than the Second Peace Loan.

CONVERSION RIGHTS: A subscriber to the new loan may convert bonds or stock of previous loans equal in amount to his new subscription.

Interest will be subject to Commonwealth taxation, but will be free of State Income Tax.

As on previous occasions, the Government is arranging with the Australian Banks to make advances at 5 per cent. per annum to customers who have a good prospect of paying the money within 18 months. Under these arrangements the Banks will advance up to 86 per cent. of the Bonds to be subscribed, and no security other than the Bonds themselves will be required.

The terms offered are attractive as an investment, but the patriotism and duty of the people must be relied upon to help. Whole-hearted support is required. The Loan is a necessity. We are bound in honour to repatriate our soldiers in the best possible way, and give them profitable occupations.

I appeal to all to assist in making this Loan a success by contributing to it to the best of their means.

A NEW SYSTEM OF SHORT WAVE AMPLIFICATION

BY
EDWIN H. ARMSTRONG
(Columbia University, New York)

SUMMARY.—The various possible known methods of amplifying incoming signals of very short wave length (below 600 metres) are described, and their limitations considered.

The new method then described consists (for continuous wave reception) of the following steps:

(1) Heterodyning, with the production of a beat frequency which is itself a radio frequency (for example, 100,000 cycles per second).

(2) Rectification of the beat current.

(3) Amplification at the beat radio frequency, preferably by a tuned amplifier.

(4) Audio frequency modulation of the amplified current.

(5) Rectification of the modulated current.

For reception of damped wave or radiophone signals, step 4 is omitted.

It is shown that in this case the quality (characteristic tone) of the incoming signals is preserved.

THE problem of receiving weak signals of short wave length in a practical manner has become of great importance in recent years. This is especially true in connection with direction finding work where the receiver must respond to a very small fraction of the energy which can be picked up by a loop antenna.

The problem may be summed up in the following words: To construct a receiver for undamped, modulated continuous, and damped oscillations, which is substantially equally sensitive over a range of wave lengths from fifty to six hundred metres, which is capable of rapid adjustment from one wave to another, and which does not distort or lose any characteristic note or tone inherent in the transmitter.

It is, of course, obvious that some form of amplification must be used, but a study of the various known methods soon convinces one that a satisfactory solution cannot be obtained by any direct method. In the interests of completeness, we will consider the three well-known direct means which might possibly be employed, and examine the limitations which apply to each. These three methods are:

(1) Amplification of the audio frequency current after rectification.

(2) Amplification of the radio frequency current before rectification; and

(3) Application of the heterodyne principle to increase the efficiency of rectification.

Consider first the method of rectifying the radio frequency current and amplifying the resulting audio frequency current. Two limitations at once present themselves, one inherent in audio frequency amplifiers, and the other inherent in all known rectifiers. The limitation in the amplifier is the residual noise which makes it impracticable to use effectively more than two stages of amplification. The second limitation lies in the characteristic of the detector or rectifier. All rectifiers have a characteristic such that the rectified or audio frequency current is roughly proportional to the square of the impressed radio frequency emf. Hence the efficiency of rectification becomes increasingly poorer the weaker the signal, until a point is reached below which the detector practically ceases to respond.

The second method of attack on the problem is the amplification of the received radio frequency currents before rectification to a point where they can be efficiently dealt with by the detector. This method is ideal on long waves, and various methods of inductance, resistance, and capacity couplings have been successfully used, but when the attempt is made to use the same methods of coupling on wave lengths below six hundred metres, it results in complete failure. This is because the low capacity reactance existing between the various elements of the tubes causes them, in effect, to act as a short cir-

cuit around the couplings means and thereby prevents the establishment of a difference of potential in the external plate circuit. It is, of course, possible to eliminate the short-circuiting by tuning with a parallel inductance, but this introduces a complication of adjustment which is highly objectionable, and the tuning of all circuits also leads to difficulty with undesirable internal oscillations.

The third method which might be used is the heterodyne method to increase the efficiency of rectification. Great increase in signal strength is possible by means of this method, particularly where the signal is very weak, but there are certain reasons why it cannot be effectively used in practice at the present time. The chief reason in receiving continuous waves of short wave length is the instability of the beat tone which makes operations below six hundred metres unsatisfactory. This disadvantage does not apply to the reception of spark signals, but here the loss of the clear tone and its individuality offsets much of the gain due to increased signal strength. In the case of telephony the distortion which always results, likewise offsets the gain in strength. It is, of course, undeniable that there are many special cases where the use of the heterodyne on short wave lengths is of the greatest advantage, but the foregoing remarks apply to the broad field of commercial working where the practical aspects of the case greatly reduce the value of the amplification obtained by this method.

In spite of the great difficulties involved in a direct solution, great success was obtained by Round in England and Latour in France, in the production of radio frequency amplifiers to cover effectively a range from three hundred to eight hundred metres. This result was accomplished only by the most painstaking and careful experiment, and it represents some of the very finest radio work carried out during the war. Round secured his solution by constructing tubes having an extremely small capacity without increase in internal resistance above normal values and coupling the tubes by means of transformers wound with very fine wire to keep down the capacity, and very high resistance to prevent oscillation at the resonant frequency of the system. The effect of the high ratio of inductance to capacity and the high resistance of the winding is to flatten the resonance curve of the system and widen the range of response. Latour solved the problem by the use of iron core transformers wound with very fine wire, the iron serving the double purpose of increasing the ratio of inductance to capacity and introducing resistance into the system. Both these factors widen the range of response.

It is the purpose of this paper to describe a method of reception evolved at the Division of Research and Inspection of the Signal Corps, American Expeditionary Force, which solves the problem by means of an expedient. This expedient consists in reducing the frequency of the incoming signal to some predetermined super-audible frequency which can be readily amplified, passing this current through an amplifier, and then detecting or rectifying the amplified current. The transformation of the original radio frequency to the pre-determined value is best accomplished by means of the heterodyne and rectification, and the fundamental phenomena involved will be understood by reference to the diagram

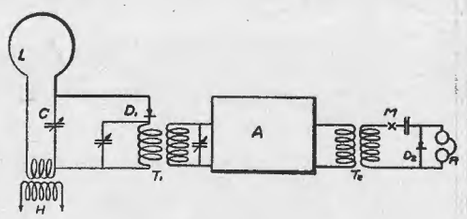


Figure 1.

of Figure 1. Here LC represents the usual tuned receiving circuit, loop or otherwise, H a separate heterodyne, and D_1, a rectifier. A is a radio frequency amplifier designed to operate on some pre-determined frequency. This frequency may be any convenient frequency which is substantially above audibility. The amplifier is connected on its input side to the rectifier D_1, and on its output side to a second rectifier D_2 and a telephone or other receiver.

Suppose now that the frequency to be received is 3,000,000 cycles per second, corresponding to a wave length of one hundred metres, and, for the sake of simplicity, that the incoming waves are undamped. Also, assume that the amplifier A has been designed for maximum efficiency at 100,000 cycles per second. The circuit LC is tuned to 3,000,000 cycles, and the heterodyne H is adjusted to either 3,100,000 or 2,900,000 cycles, either of

which will produce a beat frequency of 100,000 cycles per second. The combined currents of 3,000,000 and 3,100,000 (or 2,900,000) cycles are then rectified by the rectifier D_1 to produce in the primary of the transformer T_1 a direct current with a superimposed 100,000-cycle component. This 100,000-cycle current is then amplified to any desired degree by the amplifier A, and detected or rectified by D_2. In order to get an audible tone where telephone reception is used some form of modulation or interruption must, of course, be employed in connection with this second rectification, as the current in the output circuit of the amplifier is of a frequency above audibility. While this frequency is only 100,000 cycles and while it is, therefore, well within the range of practical heterodyning, its steadiness depends on the beats between 3,000,000 and 3,100,000 cycles per second and hence in any attempt to heterodyne it to audibility the same difficulties, due to fluctuation, would be encountered as in heterodyning the original

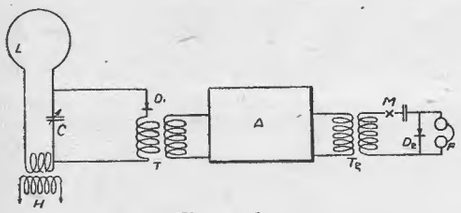


Figure 2.

radio frequency to audibility. However, the inability to use the heterodyne on the second rectification is not of great importance because the amplitude of the signal to be rectified is large, and hence the difference (as far as signal strength in the telephone is concerned) between heterodyne and modulated reception is not great.

It is important to note here that the value of the heterodyne current in the first rectifier should always be kept at the optimum value in order to ensure the carrying out of the first rectification at the point of maximum efficiency. This adjustment, however, is not a critical one, and, once made, it is seldom necessary to change it. The amplifier A may be made selective and highly regenerative if so desired, and some very great increases in the selectivity of the system as a whole can be secured. Figure 2 illustrates the principle involved. This arrangement is substantially the same as Figure I, except that the primary and the secondary coils of the transformer T_1 are tuned by means of condensers as shown, and the coupling between them is reduced to the proper value to ensure sharp tuning. This system of connection has all the advantages of tuning to the differential frequency in the manner well known in the art, and an additional one due to the fact that since it is above audibility the musical character of atmospheric disturbances so troublesome in audio frequency tuning, does not appear.

So far, the reception of undamped waves only has been considered, but this method of amplification is applicable also to the reception of damped wave telegraphy and to telephony with practically equal efficiency and without distortion of any characteristics of tone. It is somewhat difficult to understand this, particularly in the case of the reception of spark signals as in all previous experience the heterodyning of a spark signal has resulted in the loss of the note, whereas in the present case the individuality between stations is more marked even than on a crystal rectifier.

This is the most interesting point in the operating of the system and the reason will be understood from the following analysis:

In heterodyning, the efficiency of rectification of the signalling current depends on its phase relation with the local current. If the two currents are either in phase or 180° out of phase, the efficiency of rectification is a maximum; if 90° out of phase a minimum. In ordinary heterodyning, the initial phase difference depends on the time of sparking at the transmitter and hence this initial phase difference will be different for each wave train. As the frequency of the two currents are substantially the same, and as the duration of a wave train is short compared to the time necessary to produce a complete beat at an audible frequency, this initial phase difference is maintained throughout the wave train. Hence, the different wave trains are rectified with varying efficiency, the telephone current becomes irregular, and a rough or hissing tone results.

In the present method of heterodyning, the beat frequency is high, so that several beats per wave train are produced. As a consequence, the phase angle between the signalling and local current varies through several cycles, and the initial phase difference becomes a matter of minor importance. The number of beats which actually

occur in practice depends on the beat frequency, the damping of the incoming wave, and the damping of the receiving circuit. As the damping of the receiving circuit is almost invariably much less than the damping of the incoming wave, it is a determining factor. In any practical case, however, where the beat frequency is kept above 20,000 cycles per second, there is a sufficient number of beats to minimise the initial phase differences and maintain the characteristic tone.

The phenomena which occur in the reception of modulated continuous wave telegraphy and telephony are substantially a combination of those explained in the cases of undamped and damped wave reception. The adjustments are made in the same manner as for damped waves and the only precaution necessary in the reception of telephony is to damp the amplifier circuits somewhat to prevent distortion of the speech by excessive resonance.

The general arrangement found most suitable for practical working is shown in

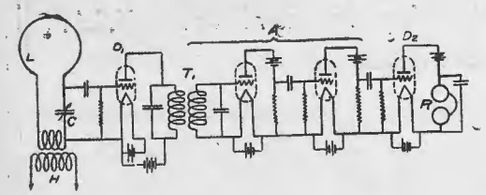


Figure 3.

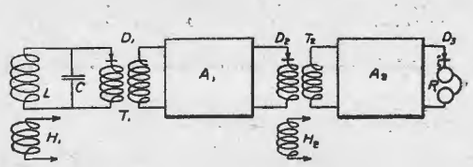


Figure 4.

Figure 3. Both rectifications are carried out by three-element vacuum tubes. The amplifier here shown is resistance coupled, although any form of coupling may be used. The tuned circuits LC and L_2C_2 are preferably adjusted to some frequency between 50,000 and 100,000 cycles. The circuit LC may be made regenerative, if so desired, by any form of reactive coupling, but the practicability of this depends largely on the amount of time which is available for making adjustments.

In the diagram of Figure 3, only two stages of radio frequency amplification are shown, but at least four and preferably six should be used to get the maximum advantage of this method. This is because the transformation of frequency is accomplished only by a certain loss so that something between one and two stages of amplification is required before this is overcome and it is possible to realise a gain. In this figure a separate heterodyne is shown, and it will generally be necessary to use it on account of the mistuning which is involved in the use of the self-heterodyne. This mistuning is considerable on six hundred metres, but on the shorter waves it is possible to use the self-heterodyne method with equal efficiency as far as signal strength is concerned, and a great gain in simplicity, as adjustments have been reduced to the minimum of a single one.

It may be observed here that this method is not limited to one transformation of frequency with one subsequent amplification. If the frequency to be received is 5,000,000 cycles this may be stepped down to 500,000 cycles, amplified, stepped down again to 50,000 cycles, re-amplified and detected. The great advantage of this method of amplification is that the tendency to oscillate, due to the reaction between the output of the amplifier and the input is eliminated as the frequencies are widely different. The only reaction which can take place is in each individual amplifier. Hence, the process of extreme amplification is best carried out in stages of several frequencies, the amplification on each frequency being carried as far as possible without loss of stability. As soon as the limit of stable operation is approached, no further amplification should be attempted until the frequency has been changed.

The foregoing descriptions and explanations do not pretend to any save a most superficial treatment of the phenomena present in this method of reception. Lack of time has prevented a careful study, and quantitative data only of the roughest sort has been obtained. Sufficient work has been done, however, to demonstrate the value of the method, particularly in the case of modulated continuous wave telegraphy and telephony. In this field neither the amplification nor the selectivity can be equalled by any direct method.

The practical results which have been obtained may perhaps be of interest. With

a ten-turn, three-foot (1 metre) loop antenna and an amplifier consisting of six stages, resistance coupled, making a total of eight tubes, the night signals of ships working with the Florida and Gulf stations are loudly received. The night signals of amateur stations in the Middle West are regularly received, as are also the signals of the stations in the Gulf States. The general arrangement of the apparatus used is shown in Figures 5 and 6, which illus-

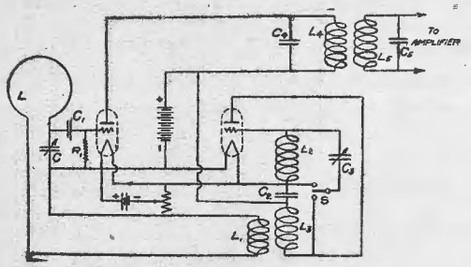


Figure 5.

trate the scheme of connections of the frequency transformer and amplifier respectively. Four stages of amplification only are shown, but six were actually used.

It is beyond question much more efficient to use some form of inductive coupling, since the amplifier is intended to operate on only one frequency, and the use of a resistance-coupled amplifier is not recommended where one of the former type is available.

The new practice of this method involves the use of many known inventions, but in connection with the production of a super-audible frequency by heterodyning, I wish to make due acknowledgment to the work of Meissner, Round and Levy, which is now on record. The application of the principle to the reception of short waves is, I believe, new, and it is for this reason that this paper is presented.

While the fundamental idea of this method of reception is relatively simple,

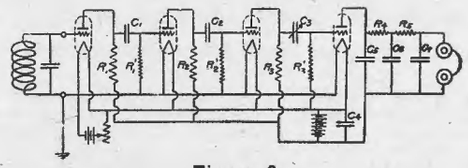


Figure 6.

the production of the present form of the apparatus was a task of the greatest difficulty for reasons known only too well to those familiar with multi-stage amplifiers; and to Lieutenant W. A. MacDonald, Master Signal Electricians J. Pressby and H. W. Lewis, and Sergeant H. Houck, all of the Division of Research and Inspection, Signal Corps, A.E.F., I wish to give full credit for its accomplishment.

Hartley Research Laboratory,
Columbia University, New York City.

AN EXTRAORDINARY BRIDGE

A bridge which will dwarf all others is that lately designed for crossing the Hudson River and connecting the cities of New York and New Jersey. The Hudson River Bridge, as it is called, is of the suspension type. There are three spans in all—two shore spans of 1,710 feet each and a central span of 3,660 feet.

All the dimensions are colossal. Thus the roadway has a width of 220 feet. This will be suspended from four steel cables, each consisting of eighty lines of eyebars, arranged in three banks, and enclosed in watertight bronze casing fifteen feet in diameter. The upper deck, 155 feet in width, will be reserved for motor vehicles, and will be flanked on either side by electric tram-tracks and two seventeen feet pavements for pedestrians. Between the upper and the lower deck are six tunnels, which will carry ten railway tracks.

It is difficult to say what are the most impressive features of the design. Certainly not the least impressive are the main towers, which are carried to a height of 840 feet. The famous Woolworth Building, though nearly as high (792 feet), would look insignificant if placed beside one of these cyclopian structures, for at the base they measure 400 feet in width, whereas the Woolworth Building is only 151 feet in width. The estimated cost of the bridge is £22,000,000.

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

Revised to August 8, 1921.

SHIP.	OPERATOR.
Aldinga	———
Apolda	J. W. McKay
Arafura	———
Arahura	G. M. Gormlie
Araluen	H. H. Black
Aramac	———
Arawatta	F. L. Scott
Aroona	J. Daggett
Atua	———
Australbrook	J. F. McGinley
Australcrag	S. J. McVeigh
Australford	H. G. Reilly
Australglen	H. A. MacDonald
Australmead	S. V. Blight
Australmount	G. Vincent
Australpeak	J. B. Ponsonby
Australplain	A. Stuart
Australpool	E. J. Glaisher
Australport	E. J. Giles
Australrange	E. F. Hayes
Bakara	G. Maxwell
Baldina	A. W. Hooper
Bambra	R. C. Williams
Barambah	M. L. Robertson
Barunga	H. E. Young
Bingera	W. C. Lucas
Bombala	J. H. Hawkins
Boonah	F. A. Cook
Booral	T. V. Tressler
Boorara	T. Alexander
Bulla	R. T. Stephen
Calulu	R. C. Dymond
Canberra	H. W. Barnfield
Carina	V. E. Stanley
Changsha	B. Boni
Charon	J. E. Cleary
Cooee	A. W. Benn
Cooma	V. M. Brooker
Delungra	———
Dilga	H. F. Giles
Dimboola	J. R. Hodder
Dinoga	H. W. Barnes
Dongarra	H. J. Byrne
Dromana	F. Stevens
Dumosa	R. J. Webb
Dundula	———
Eastern	J. F. Hutton
Emita	F. A. Woodall
Enoggera	F. G. Lewis
Eromanga	A. H. Jeremy
Erriba	———
Eudunda	———
Eurelia	F. Marsden
Flora	———
Gilgai	A. S. Dening
Gorgon	M. A. Prudence
Hwah Ping	H. F. Hartley
Iron Monarch	A. D. R. Davis
Kaiapoi	E. A. Miller
Kaikorai	J. Elmore
Kaimanawa	G. Illingworth
Kaitangata	N. W. G. Scott

SHIP.	OPERATOR.
Kaitoko	W. S. Ringrose
Kaituna	W. A. Hawkins
Kaiwarra	L. A. Ternes
Kanna	K. H. McSwan
Kanowna	W. J. Washbourne
Karoola	R. R. Pilmore
Karori	M. Webb-Watts
Katoa	F. E. Duggan
Katoomba	T. A. Jones
Kauri	H. S. Chown
Kawatiri	E. H. Heather
Kekerangu	R. P. Ginders
Koromiko	J. G. Henderson
Kowarra	H. Fullerton
Kurow	J. B. Gibson
Levuka	A. W. Watt
Loongana	———
Macedon	F. Ouvrier
Mackarra	S. L. Filer
Macumba	H. F. Harman
Maheno	G. H. Hugman
Makambo	J. A. Cooper
Makura	F. A. Hunter (s) / W. Reithmuller (j)
Malayan	R. T. Murray
Manuka	G. Cook
Maori	R. S. Taylor
Mapourika	A. E. Lawrence
Marama	C. F. Griffiths (s) / J. M. Camps (j)
Mararoa	W. C. Brown
Marella	W. H. Harris
Marsina	A. Cuthill
Mataram	C. H. A. Kidman
Maunganui	———
Melusia	S. F. Stafford
Merriwa	J. H. Pullen
Milluna	D. N. Quinn
Minderoo	J. G. C. Higgins
Mindini	R. Jordon
Moana	———
Moeraki	———
Mokoia	———
Monowai	———
Montoro	A. L. Dixon
Morinda	F. C. Davies
Nairana	P. C. Gillon
Navua	N. W. Leeder
Ngakuta	S. G. Bargrove
Niagara	W. J. Martin (j) / E. W. Coldwell (j)
Ooma	A. E. Sheppherd
Oonah	F. G. Forrest
Paloona	G. M. Whiteside
Parattah	K. L. Simpson
Rakanoa	G. Donnelley
Riverina	L. G. Devonport
Rotomahana	———
South Africa	S. R. Dixon
St. Albans	A. H. Beard
St. George	S. G. Jones
Suva	L. S. Lane
Tahiti	E. M. Bain

(Continued on next page.)

(Continued from last page.)

Taiyuan	J. H. Wilkin
Talawa	K. J. Dines
Talune	———
Tarawera	H. Kirk
Tofua	L. R. Dickson
Toromeo	M. Sedgers
Ulimaroa	H. Tuson
Victoria	R. H. Alexander
Waihemo	C. Williamson
Wahine	———
Waihora	E. A. Hunter
Waikawa	V. P. Nevins
Waikouiti	R. R. Robinson
Waimarino	F. L. Dawes
Waiotapu	T. H. McWilliams
Waipori	M. H. Ryan
Wairuna	F. N. Davidson
Waitemata	D. W. Higgins
Waitomo	J. R. Gilligan
Wanaka	A. J. Sawyer
Westralia	A. R. Catford
Whangape	A. O. Sutherland
Waingatui	J. H. Bennett
Wodonga	G. Pow
Wyandra	F. Exon
Wyreema	T. Chalmers
Yankalilla	———
Zealandia	A. G. Ross

Amalgamated Wireless (Australasia) Operator Temporarily Attached to New Guinea Expedition.

Wattle	L. N. Callaghan

WIRELESS OPERATING ON A MAIL STEAMER

A WIRELESS operator's life on a mail steamer carrying passengers has many humorous sidelights as well as the more serious business side of handling public correspondence. He is apparently expected by the travelling public above all to have the latest news of the day on hand at a moment's notice, notwithstanding the fact that news is not transmitted from all coast stations. For the guidance of new operators joining the profession, a few of the questions commonly asked, together with the subjoined answers to them, will no doubt be useful.

What happens if a message comes when you are off duty?

This is the question that has puzzled many operators. Just murmur something about it's being relayed and get off the subject.

Does a bell ring to call you at night when you are asleep?

No, but operators offer up many a thanksgiving when reminded of the horrors of same, should it ever be introduced into the service.

What is the weather like ahead?

Never tell the truth in answer to this question, as invariably the weather will be quite the reverse by the time the ship arrives there.

The sporting fraternity always want to know the following: Who won the fight on Saturday night at the Stadium?

Should no result be obtained it is generally safe to give the answer from the "tips" in one of the sporting papers you may have on hand. Should the tip turn out wrong it will not be found out until the vessel arrives in port and the operator, with luck, will not see the passenger again.

Who won the Cup?

This is a corker. When you offer the information that no racing intelligence is sent out, do not be discouraged when you are told that the operator on another vessel gave the result of the Melbourne Cup last year to the same passenger. Passengers usually take it that the operator on another vessel was a better man at his business than you.

Do you get tired of the sea?

Never give this secret away as it may affect shipping companies obtaining recruits for apprenticeships. Just answer that you do not have to go to sea for a living, only for pleasure, as your people are well off. Never mention that you cannot find them.

What time will the ship arrive?

Give the approximate time with the same confidence as a tipster with a certainty at a race meeting. This is good for business, as Marconigrams will then be sent to friends ashore asking them to meet the boat at this time.

When in the wireless office on board ship you are often asked "What's this?" and "What's that?" pointing to different parts of the apparatus. Just give it a name, and if further information is requested, would suggest you act like an old hand in the service and spring to it, keeping in mind the maxim "an old dog for a hard road," and inform the questioner that you have just received a call and will be busy for some time. Then a little adjusting of receiving apparatus will probably rid you of the passenger. Leave all technical details to the man who has just joined the service. As time passes he, too, will favour brief answers. Benjamin Franklin wrote: "Experience keeps a dear school, but fools will learn in no other, and scarce in that."

J.A.H.

BRITISH WAR MEDALS

The Minister for the Navy announces that British War Medals are now being issued by the Navy Office, Melbourne, to ranks and ratings eligible during the qualifying period August 4, 1914, to November 11, 1918. All ex-members of the Royal Australian Navy, and the Naval and Military Expedition to New Guinea who are entitled to this medal, and have not yet applied for the award, should make early application to the Secretary of the Navy Office (Medal Section), Melbourne, stating full particulars of their service during the war.

No application is necessary from members of the Royal Australian Naval Reserve (late R.A.N.B.) who were called up by proclamation during the war. Medals for these persons will be issued at a later date.

WIRELESS INSTITUTE OF AUSTRALIA

NEW SOUTH WALES DIVISION

The Fifty-third General Meeting of the New South Wales Division of the Wireless Institute of Australia was held at Wireless House, on Tuesday, August 9, at 8 p.m., Mr. J. F. Wilson occupying the Chair.

The Minutes of the previous Meeting were read and confirmed.

The business of the evening, being a debate by prearranged speakers on "Panel and Cabinet Sets" versus "Isolated Apparatus," was then entered upon.

For demonstration purposes Amalgamated Wireless (Australasia) Ltd., loaned a complete cabinet set as used to equip tug-boats for emergency runs and similar expeditions.

The speakers in favour of panel and cabinet sets were Messrs. Stowe, Zech, Mawson and Blanchard; those in favour of isolated apparatus being Messrs. Perry, Steele and Cooke.

The subject proved an excellent one for debate, a great many important points being emphasised on both sides.

The principal points in favour of panel and cabinet sets were:

(1) The advantage of design of suitable arrangements which permit interchange of parts, thus giving confidence in trying out new circuit arrangements.

(2) Compactness of apparatus and absence of open wiring with its attendant risk of short circuit.

(3) Portability under war and emergency conditions.

(4) Reliability and appearance.

The principal points in favour of isolated apparatus were:

(1) Panel sets are not experimental but the result of experience.

(2) Flexibility enables innumerable rearrangements without difficulty or damage, which is the requirement of the *bona fide* experimenter.

(3) Open wiring is specially advantageous as it permits of speedy alteration of circuits, and if insulated wire is used the danger of short circuit is neutralised.

(4) Last, but no means least, the expense is a minimum.

In summarising, at the conclusion of the debate, Mr. Wilson stated that the method of grouping apparatus largely depended on what an experimenter required and how much he was prepared to spend.

A vote being taken, resulted in a majority of only three in favour of isolated apparatus.

SOUTH AUSTRALIAN DIVISION

The Monthly General Meeting of this Division was held at Alfred Chambers on Wednesday, August 3, the Chair being occupied by Mr. Hambly-Clark.

The Minutes of the previous meeting were read and confirmed. Application has been made for a transmitting license, and it is anticipated that in the very near future a broadcast will be transmitted at regular intervals.

The following nominations have been received for officers for the coming year: President, Mr. Hambly-Clark; Vice-Presidents, Messrs. H. Hawke and J. M. Honner; Hon. Secretary, Mr. C. E. Ames; Hon. Assistant Secretary, Mr. F. L. Williamson; Hon. Treasurer, Mr. R. M. Dunstone; Council, Messrs. Austin and Bland; Examiners for Valve Licenses, Messrs. W. J. Bland and J. M. Honner; Librarian, Mr. R. M. Dunstone; Library Committee, Messrs. C. Hatchett, K. J. Martin, H. L. Austin and C. E. Ames; Auditors, Messrs. J. M. Honner, K. J. Martin, H. L. Austin and H. Hawke.

One of the features of the evening was the excellent lecture on the Electronic Valve, delivered by Mr. J. M. Honner. Mr. Honner gave a number of diagrams on the blackboard of regenerative circuits and explained the working of amplifiers using "transformer," "choke" and "resistance coupling." He explained the advantages and disadvantages of "high" and "low" frequency amplification.

Mr. Honner treated his subject thoroughly and his lecture was greatly appreciated by all present, and a hearty vote of thanks was tendered him by acclamation.

A single-stage amplifier built into a cigar box was brought along by Mr. Austin and exhibited to all present, who complimented Mr. Austin on his excellent workmanship. All parts, including inter-valve transformer and valve socket, were constructed by himself.

Members are notified that next month begins a new year for this Division and that the Secretary will be pleased to receive subscriptions immediately.

"SEA, LAND and AIR"

THE AUSTRALIAN NATIONAL MONTHLY

— OF —

TOPICAL INTEREST

OFFICIAL JOURNAL OF THE AUSTRALIAN AERO CLUB.
THE WIRELESS INSTITUTES OF AUSTRALIA AND NEW ZEALAND.
THE MERCANTILE MARINE WAR SERVICE ASSOCIATION OF AUSTRALASIA.

Edited by S. E. TATHAM.

CONTENTS

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.

All business communications should be addressed to

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