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

Vol. II.—No. 24. **MARCH, 1920.** **Price Ninepence.**

A MATTER OF CONVENTION

FOR SIX STATE PREMIERS.

A Sub-Commission of the Peace Conference was appointed last year to serve on the International Commission dealing with the regulation of International Air Navigation. The result was an International Convention agreed to by all representatives of Allied and Associated Powers serving on that Committee.

The document deals comprehensively with such subjects as: Air Navigation above Foreign Territory; Rules to be observed on Departure, on Landing and when Under Way; Prohibited Transport; State Aircraft; Marking of Aircraft; Certificates of Airworthiness; Log Books; Rules as to Lights and Signals; Rules of the Air; Rules for Air Traffic on and in the vicinity of Aerodromes; Certificates for Pilots and Navigators; International Aeronautical Maps; Universal System of Ground Marks; Collection and Dissemination of Meteorological Information, with special Symbols and Codes for various forms of Reports; Customs Regulations applicable to Aircraft and Goods carried by Air; Form of Manifest or General Declaration of Aerial Cargo.

Attention may, for the moment, be confined to the following extracts:—

The British Dominions are deemed to be States . . .

There shall be instituted, under the name of the International Commission of Air Navigation and as part of the organisation of the League of Nations, a permanent Commission composed of: Two representatives of each of the following States—The United States of America, France, Italy and Japan; one representative of Great Britain and one representative of *each* of the British Dominions and India . . .

Each shall have one vote . . .

Any State which took part in the present war, but which did not take part in the negotiation of this Convention, may be admitted to adhere to it if such State is a member of the League of Nations.

Australia, as a British Dominion which took part in the war, and as a member of the League of Nations, is fully entitled to admission to the International Air Convention and, once admitted, is further entitled to a seat on the permanent Commission and to an *equal* vote with Great Britain, America, France, Italy and Japan.

A natural question at once suggests itself: Why does Australia withhold her application for admission? The answer is one which politicians and State Premiers may well ponder. It is that, for the pur-

pose of this Convention, Australia is regarded as a *single State,* and no action may be taken until our six State Premiers definitely agree that if the Commonwealth, as a single State, affix its signature to the International Convention, they will waive their State rights and thus make uniform administration possible.

America has not yet adopted the Convention, and Sir Arthur Whitten Brown, K.B.E., who has just arrived in Australia from the United States, tells us this month something of the unsettled condition of civil aeronautics in the United States arising from this neglect. Could Australia, a nation which has produced its Ross Smiths and its Hawkers, require a more conclusive illustration of the duty confronting the Premier of each of its Federated States?

It is well for the Premier of one State to contemplate the initiation of experimental aerial services, it is well too for him to talk of clearing away public indifference by this method and to engage in electioneering campaigns by aeroplane. But while one applauds Mr. Holman's energy and initiative, there is danger that he will defeat his own purpose. The greater the demand for civil aircraft, the greater the need for control.

The general employment of aeroplanes for passenger services without uniform regulations, is bound to result in chaos which will scare away the investor, cause loss of life, and so create prejudice against aviation; thereby considerably retarding its civil development.

INDIVIDUALITIES

Lieutenant John A. Tracey, who was with No. 3 Squadron, A.F.C., has joined the Australian Aircraft & Engineering Company as their representative in the Riverina.

* * * *

Captain H. J. Whittingham, R.A.F., arrived in Melbourne by the *Osterley* on March 5. He will take up duties as Assistant Chief Engineer to the Aerial Transport Limited.

* * * *

During his stay in Sydney, Sir Arthur Whitten Brown met an old friend of pre-war days in Captain A. B. Watkins, R.N.A.S., who was Sir Arthur's flying instructor.

* * * *

Mr. W. E. Hart, of Sydney, well-known throughout New South Wales as a pioneer of flying in that State, leaves for America this month on a brief visit, partly connected with aviation.

* * * *

Mr. B. Arthur Peat, Australasian representative of Rolls-Royce Limited, sailed from Sydney for England by the *Themistocles* on March 3, for the purpose of conferring with his principals in London and Derby. He expects to be absent about six months.

Major E. G. Knox, O.B.E., who enjoyed a unique popularity among service pilots as Recording Officer with No. 3 Australian Squadron, has returned to Sydney. After his service with No. 3 Squadron, Major Knox was loaned to the Royal Air Force and appointed a Staff Major.

* * * *

Lieutenant F. L. Roberts, who was with No. 2 Squadron, and later an Instructor with No. 5 Training Squadron, Australian Flying Corps, took a post-war course with Avro's in England, and has joined the staff of the Australian Aircraft & Engineering Company, for whom he is flying the new seaplane.

* * * *

Lieutenant Reg. Williams, No. 7 Squadron A.F.C., who was assistant pilot of the Blackburn *Kangaroo* on the attempted flight to Australia, returned to his home at Sydney on March 13. The attempt had to be abandoned at Crete as the crew were unable to replace one of their engines which had seized-up owing to a breakage in the return oil pipe. Lieutenant Val. Rendle, the first pilot, returned to England with Captain Wilkins, while Lieutenant St. Clair Potts remained at Crete with the machine.

THE "VIMY'S" WORLD-FLIGHT

WHAT IT TEACHES AUSTRALIA.

ORGANISATION AND DEVELOPMENT.

BY

EDWARD J. HART.

"The tumult and the shouting dies," and now, away from the noisy hyperboles of publicity opportunists, we can try to trace the significance of the world-flight by Sir Ross Smith and his colleagues. For immediate purposes, perhaps the chief result obtained was the focussing of strong lime-light in Australia on aviation. The journey from England to Australia demanded no non-stop flights of longer duration than had been frequently flown before. But it did demand expert pilotage, skilful mechanical care, good organisation and grit and determination. It was half an exploration and half a sporting venture, and its successful performance aroused tremendous enthusiasm throughout the world, but especially in Australia. The flyers were lionised everywhere. In part this was due to the charming personality of the men themselves, but principally because their feat appealed to the imagination of the people and illustrated, in a concrete form, the great progress made in aeronautics. For it must be remembered that Sir Ross Smith's *Vimy* was the first modern aeroplane to be seen in Australia. The tumultuous welcome, which at times was embarrassing both to the much-autographed *Vimy* and the much-fêted crew, was intended for the big machine as well as for the big men who flew it.

The *Vimy's* flight did not restore confidence in aviation in Australia—it *created* it. With the best will in the world a whole people cannot maintain enthusiasm for a mode of travel they have only read about. Prior to the *Vimy's* arrival a score or so of small-engined aeroplanes, many of which were obsolete three years ago, comprised the whole of Australia's aerial fleet. Some remarkable performances were achieved on these machines—such as the trans-continental trip by Captain Wrigley on a *B.E.2E.*—but they were due more to the ability and tenacity of the pilots than to the fitness of the machine. People were willing to believe what flying men had often told them—that an aeroplane could fly across the world—but they had never seen the machine which could do it, and they were not keen to accept a "pig in a poke." Many were inclined to "line up with the old fogies," as they called it, and to declare that we had better leave such an expensive luxury as aviation to nations that could better afford to lose the money.

AFTER FIVE YEARS!

Mrs. Andrew Smith and her son.

The renewal of this kind of prejudice and the creation of a wholesome faith in the possibilities of the flying machine, have been achieved by the *Vimy;* within the last few months public opinion in Australia has advanced five years, and at least reached the level of other parts of the world which necessity made more familiar with aviation.

Having crossed the world, Sir Ross Smith was determined to cross his own continent. He found it a harder task. The principal difficulties which delayed him on the journey south were unavoidable. An injured propeller had set up vibration which, on the top of 135 hours' running in all weathers, put too big a strain on the engine and resulted in a breakdown at Glengarry. The story of how the engine was repaired and how a new propeller was made, has been told in this journal and proves that Australians possess a skill and adaptability which will overcome all obstacles to the development of aviation in the country. But it was not only engine trouble which made the journey across Australia more hazardous than the journey across the world. To begin with, good maps were unobtainable, and the northern part of the continent is so isolated that when the *Vimy* had to land near Anthony's Lagoon with a broken propeller, it had, so far as the rest of Australia was concerned, simply disappeared. In the absence of wireless stations there was no means of quick communication with the more popu-

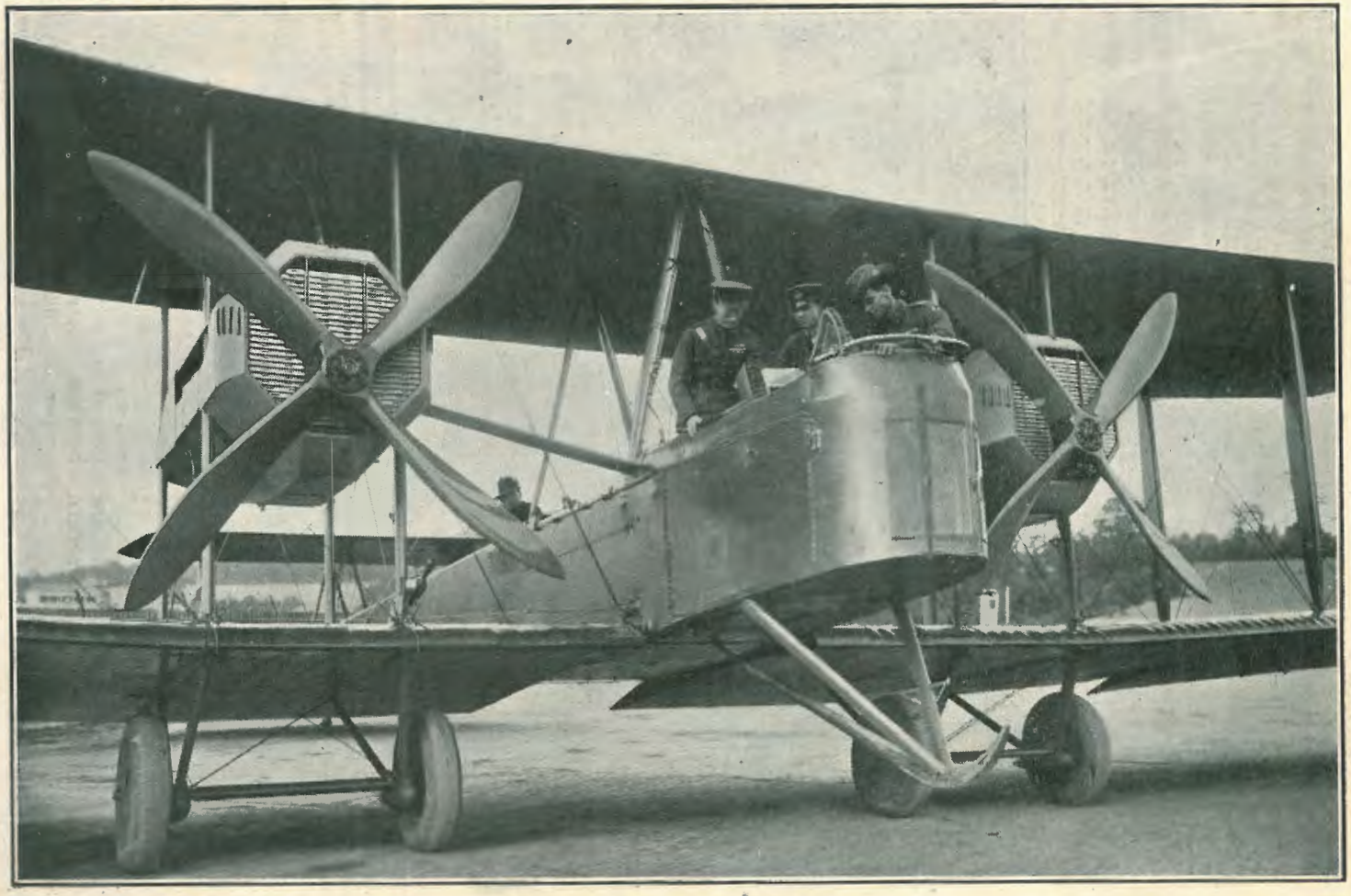
Sir Ross and Sir Keith Smith study the route.

Warrant-Officer Bennett.

Sergeant Shiers.

lous parts of the country, and the men we had been able to follow stage by stage for 12,000 miles, were lost to us within a day's journey of Darwin. Just as agitation was being made for search parties, we found the *Vimy* in the air again, the crew having patched up the split propeller in the most approved style of the Australian farmer, with fencing wire. But from the flying man's viewpoint even this isolation had its advantages, for it emphasised how badly out-back Australia needs the modern aeroplane.

It is impossible to over-estimate the educational value of the *Vimy's* feat. The world now knows that one machine can fly 12,000 miles in 135 hours over a period of twenty-eight days. It naturally begins to estimate how long it will take relays of machines and crews to cover the distance. It asks itself also—and perhaps this is most important of all—what organisation is necessary to enable passengers to be carried by air across the world in the quickest and the shortest time? During one of the many speeches Sir Ross Smith was asked to make, he gave a rough outline of an aerial time-table of the future between Australia and England. With proper organisation making night flying safe, the trans-Planet flight can be completed in considerably less than ten days. This is not a possibility of some vaguely distant future. It can be fulfilled as soon



After the Flight.

From left to right in the *nacelle*: Sir Ross Smith, Sir Keith Smith and Sergeant Shiers. In the *fuselage*: Warrant-Officer Bennett,

as the route is prepared, and need not wait till new types of aeroplanes are designed.

Australia is vitally concerned in this matter and has an important part to play herself. Unless the trade which will follow in the wake of these international air services is to be snapped up from overseas, Australia must develop aeronautics within her own continent. The essential preliminary to this is the establishment of uniform laws throughout the Commonwealth. State control, which in the opinion of many experts, is unable to provide us even with good roads, is obviously unable to grapple with the problem of controlling traffic in the air. Then comes the task of making good maps, establishing commercial aerodromes, wireless stations, lighthouses, customs and police depôts, meteorological bureaux, and generally doing all the organising which must precede the general adoption of any form of transport.

Mr. and Mrs. Andrew Smith watching the "Vimy" land.

Apart from its commercial aspect, the *Vimy's* performance has shown that if Australia wishes to be in a position to defend itself against attack, it must make full use of this new arm of war and commerce. With his experience the remarks of Sir Ross Smith on this subject command attention. He is emphatic—as are all men who can realise the significance of aerial development—that Australia must have an adequate air force. This means that Australia must take every advantage of the commercial possibilities of flying. Aircraft will be of great use domestically and, when the need arises, every machine which has served its turn as a domestic, can with equal effect, serve its turn as a fighter. A big commercial aerial fleet, reducing our big distances to almost insignificant proportions, and gaining for itself a stable industrial position thereby, will be a sound guarantee against invasion, and will reduce the cost of maintaining a nucleus of purely fighting aircraft to a figure very insignificant in comparison with the great defensive services it can render.

Sir Ross Smith's latest photograph, especially taken for "Sea, Land and Air."

Sir Ross Smith and his colleagues have done much more than win a £10,000 prize. They have blazed a trail from the use of which Australia will gain much, and they have awakened the nation to a keen interest in its own aerial development.

THE NEED FOR NATIONAL ROADS

HIGHWAYS THAT CRIPPLE BUSINESS.

DIVIDED CONTROL AND INEFFICIENCY.

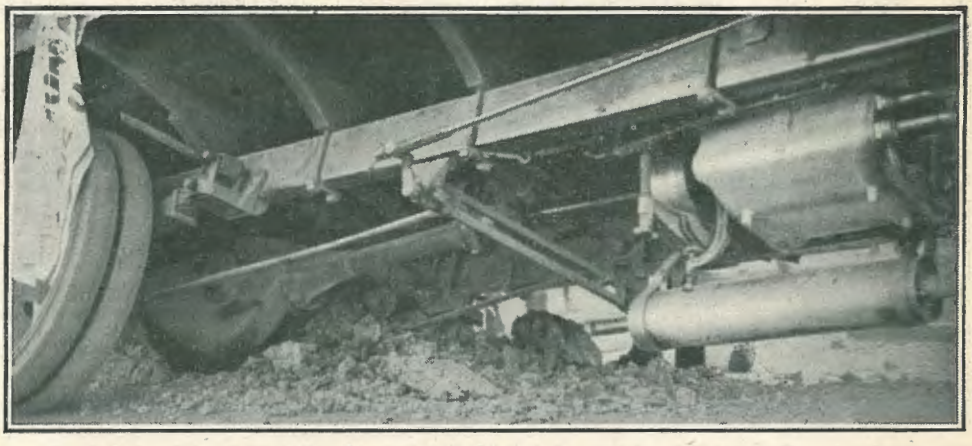
Transport is the life-blood of a nation. To neglect any of the courses along which it flows—roads, rail and waterways (and, in the near future, air-paths)—is to invite partial paralysis. A nation with bad roads is as greatly handicapped as a man with faulty blood-vessels. And to-day, when the wars of armies have intensified the renewed wars of commerce, no nation can afford to deliberately cripple itself. Unhappily Australia has done that and is limping along handicapped by self-inflicted wounds.

Australian roads are mostly bad, and in consequence transport is in as unhealthy a state as the man whose arteries are diseased. It results in sloth and muddle and means paying a high cost for inefficiency. The price is paid by all sections of the community. Because the roads are bad the life of horses, motor cars, and lorries is shorter than it should be. Loads are smaller and transit is slower. The lorry that leaves the factory with goods for even a near suburb, in the morning, returns with them in the evening, having been unable to get through. With Sydney business men this is a frequent experience. The result is that the buyer waits a long time for his goods and pays more than he would if there were good roads.

The motor industry in Australia is being held back by these bad roads. There is a big demand for increased motor transport, which is quicker and more efficient than the horse, but bad roads largely counterbalance the advantages and business men are forced to wait till there are decent roads. The motorist has a special grievance. In 1918, for instance, motorists in New South Wales contributed £118,584 9s. 11d. to the revenue. All this money goes to the consolidated revenue fund. In return the motorist gets roads that are frequently impassable.

Unfortunately we have developed the habit of thinking parochially when we think of roads. We regard them as the business of Shire Councils and Municipalities. Nothing is more definitely the business of a nation.

Every soldier who returned from France learned to appreciate the tremendous asset the great national roads are to that country. Both for work and war, good national roads are essential. We have had illustration of that in war, and we know that the roads of France did much to carry the Allies through. We have had also an impressive example of how good roads help during times of civil trouble and how bad roads intensify chaos. During the recent



The Price of Bad Roads.

A business lorry in the main street of Liverpool (N.S.W.).

railway strike England was able to carry on because of good roads and organised lorry services. But when trade was blocked by the strike of marine engineers here, it took from three to four weeks for goods to travel 500 miles from one capital to another by an over-loaded railway service. Had there been good national roads connecting the capitals there would have been lorry services to relieve the congestion and to save great inconvenience and loss to trader and consumer. But, with our main roads as they are, it is a pioneering feat to take a loaded lorry from one capital to another.

INTERSTATE HIGHWAYS.

A SERIES OF ROUGH STOCK ROUTES.

BY

FRED J. BERRY.

The Sydney-Melbourne road is one of our main interstate highways, yet such is its condition as a whole that motor traffic, which must travel frequently between the capitals, suffers tremendous depreciation, and takes twenty-five per cent. longer to complete the journey than if the road all through were in moderately good condition.

The first fifty miles from Sydney are probably the worst of the whole journey. The Ashfield-Liverpool portion has become so bad that the fastest car cannot exceed twelve miles per hour over this stretch. I have ridden over it often, but rarely without seeing a car or lorry held up for repairs to breakages caused by the condition of the road. From Liverpool to Goulburn a great improvement has been effected since the railway was altered, but one does not travel on really first-class road until the stretch from Goulburn and Yass to Gundagai is reached. But this good work is more than counterbalanced by the

Aquatic Motoring.
Frequent experience on main roads.

condition of the greater part of the road for the next 84 miles. The main highway between the two States often degenerates into a series of rough stock routes, unmade stretches between boundary fences with any sort of a surface, more resembling an approach to a farmyard than a broad highway. Nevertheless, its condition is not so bad as a few years back, some effort at reconstruction having been made, but unless the work is considerably accelerated it will be many years before this stretch can be regarded even as third-rate road.

A sharp distinction from the Sydney end is the last sixty miles from Seymour to Melbourne, which is a fine broad metal road capable of carrying any weight of traffic at reasonable speeds without damage to either road or car—one of the few instances on the route, of a road as it should be.

The route from Sydney to Brisbane is in a similar condition. Unless undertaken in fine weather a journey over the first portion to Wiseman's Ferry and on through St. Albans, Wollombi, Broke and Singleton, is a hazardous enterprise. After leaving Windsor and Pittown, very little

Bogged on the North Coast Road.
Four gallons of petrol were used on four miles of this road compared with one gallon for 30 miles, and eventually the car was hauled from the bog by bullock-team.

metal has been used in the construction of the highway and the bad clay surface after rain is very dangerous and sometimes impassable. From St. Albans towards Wollombi, logging has been used, and is probably the only existing example of the antiquated system on main highways. For 250 miles from Singleton the road is good, with the exception of a dozen miles between Goonco Goonoo and Tamworth, which passes through Common lands, and is still in its virgin state.

From Warwick are several alternative routes to Brisbane, either directly north to Toowoomba and thence to the capital (160 miles), or North-east to Maryvale, Fassifern and Ipswich, a saving of 50 miles. In this latter route, however, there are 20 miles of unmade mountain roads, very difficult for any car to negotiate.

BAD ROADS MEAN BAD BUSINESS.

HOW THE PUBLIC SUFFERS.

It is a fallacy to regard the roads problem as the special cross which the motorist must bear. It weighs more heavily on the shoulders of the general public. Bad roads, in New South Wales, at any rate, have added considerably to the cost of living. Carriers have had to reduce their loads and they pick their jobs. There are some districts around Sydney to which carriers refuse to deliver goods owing to the strain on their horses. A few years ago 25 cwt. was a usual load for a single-horse dray;

Part of "The Glue Pot" on the road to Melbourne.

to-day carriers look askance at more than 15 cwt. This means higher cartage costs and naturally the buyer must pay more for the goods. A typical illustration comes from the experience of one big Sydney firm. A ton of goods was loaded in a single-horse dray for Strathfield—a few miles out. The carrier refused to take it. A motor lorry was requisitioned, delivered the goods and two similar loads during the day. That is three times as much as the horse had ever been able to do. The obvious moral is to employ motor lorries. But here's the rub. The state of the roads at present is holding back the motor lorry. Merchants want them: makers are ready to supply them: the customer who wants his goods in a hurry needs them—and yet their use cannot be developed. A Sydney firm told its carrier-contractor that it wanted more motor lorries used. The contractor declined to undertake it. "In the present condition of the roads," he said, "it would not pay me to extend in this direction. The lorries get knocked about out of all proportion to their earning capacity. With good roads you would not need to ask me for motor lorries. I would be using them."

The road from Sydney to Parramatta is a sample of the conditions that are making transport a nightmare to the business man. Many motor carriers absolutely refuse to take goods to Parramatta. From Flemington onwards most of the ordinary cars get along by using the pathway, but the lorry must jolt over ruts and trenches, straining the engine and chassis—which is not a payable proposition. The result is that Parramatta is partially isolated instead of being linked up to Sydney by a broad highway carrying a constant stream of motor traffic. A heavy fall of rain means a partial cessation of work among Sydney carriers. After a few days' rain recently, some lorries set out from Sydney for Ryde with goods. They became bogged *en route* and had to return with their loads. Ryde is a comparatively close suburb of Sydney, and when such experi-

ences are encountered so near the centre of the city there is little wonder that carriers have not developed decent services to the more outlying districts.

Bad roads mean bad business. They mean inefficiency and big costs. They practically compel acute centralisation and the biggest sufferer of all is the average man who is sometimes short-sighted enough to think that good or bad roads are the sole concern of the man with a motor car, and who generally fails to connect increasing costs with the fact that his goods have to be carried under the most expensive and worst possible conditions. It is the voice of the ordinary citizen which should be most insistent in the demand for good roads.

"GET GOOD ROADS"

A REVIEW OF THE TASK AHEAD.

BY

FRANK B. SMITH (Secretary National Roads Association).

The bad condition of the roads throughout New South Wales is a painful fact so well established that it is unnecessary for me to supply details. I need point to one sample only—the Parramatta Road—which serves the dual purpose of illustrating how bad the existing system of road control is, and what thoroughly bad roads that system has produced. I understand that responsibility for the upkeep of these few miles of road is divided among fourteen Shires, with the consequence that instead of unified control there is chaos and inefficiency. No one can be pinned down as finally responsible. It is one of the tasks of my Association to fix liability and see that it is efficiently fulfilled.

Everybody is agreed that our roads are bad and that they must be made good. The Premier states he will provide £2,000,000 to improve them. Mr. John Storey, Opposition Leader, says he is prepared to make a still larger grant. But this pleasing unanimity has not produced good roads. The task has been shelved for so long that the work ahead is of astounding magnitude. A prominent engineer (until recently connected with the Roads and Bridges Department) has estimated that it would take over £5,000,000 to put the roads of New South Wales into even moderately good condition. Yet good roads are a vital and economic necessity. The benefits that attend them apply to the whole community, but to treat only one phase, for the moment, the increase in farm values alone, would more than equal the cost involved—a cost which is greater because the problem has been side-stepped for years.

The public interest which the formation of the National Roads Association created, can be gauged by the fact that the public bodies which immediately promised their support, came from every section of the people, as varied as the Master

Roads as they Should Be.
A welcome stretch between Sydney and Melbourne.

Retailers Association and the Institution of Engineers; the Chamber of Manufactures and the Taxi-cab Drivers' Association, as well as almost every country

Shire and Municipality with whom the question has been raised.

The objects of the Association are:—

(a) To unite together in one body all road users of Australia, for the purpose of obtaining reasonable and just legislation.

(b) To conduct an educational campaign to stimulate a demand for improved road conditions throughout the Commonwealth.

How do we propose to achieve these aims? Firstly we embark on an educational campaign to secure concerted action, so that whatever Government is in power will be compelled to heed the demands of a large body thoroughly representative of the people.

At the right juncture my Association will probably seek the establishment of a body competent to control the building of better roads. The most competent engineers obtainable must be employed to control the work.

After Half-an-hour's Rain.
Between Casino and Grafton.

(c) To assist country Shires, Municipalities and State Governments to ensure the establishment of better roads.

(d) To secure from the Federal and State Government recognition and financial support for the construction of interstate highways.

(e) To urge the Federal Government to construct Military and Postal roads.

(f) To advise authorities from time to time what roads shall be considered "National" and "Main" as distinct from "Local roads."

(g) To establish a National Roads Association of Australia, composed of this organisation and similar organisations in other States.

If a body were appointed to take charge of this important feature, it would be of incalculable assistance to the shires and municipalities. It could be divided into departments, such as are operative in the United States to-day, where the work of the office of Public Roads, is divided into four divisions:—

1. Road management investigations.
2. Road building and maintenance investigations.

3. Road material tests and research.
4. Field experiments.

If a Council were desirous of building a road and sent samples of their material to the Research Department, they could have the benefit of expert opinion, thus reducing the cost of maintenance to a minimum and securing an all-round high standard of efficiency. The primary object of the New South Wales Association is to deal with its own State, but it is a national body. Similar associations exist in Victoria and South Australia. When the time is ripe—probably within a few months—we shall establish a Federal Council of the National Roads Associations, each State Association working for the improvement of its own roads and combining to treat a nationl matter in a national way, so that there shall be good broad highways from end to end of the Commonwealth.

FROM SYDNEY TO MELBOURNE BY LORRY.

HOW STRIKES AND RAILWAY CHARGES WERE DEFEATED.

BY

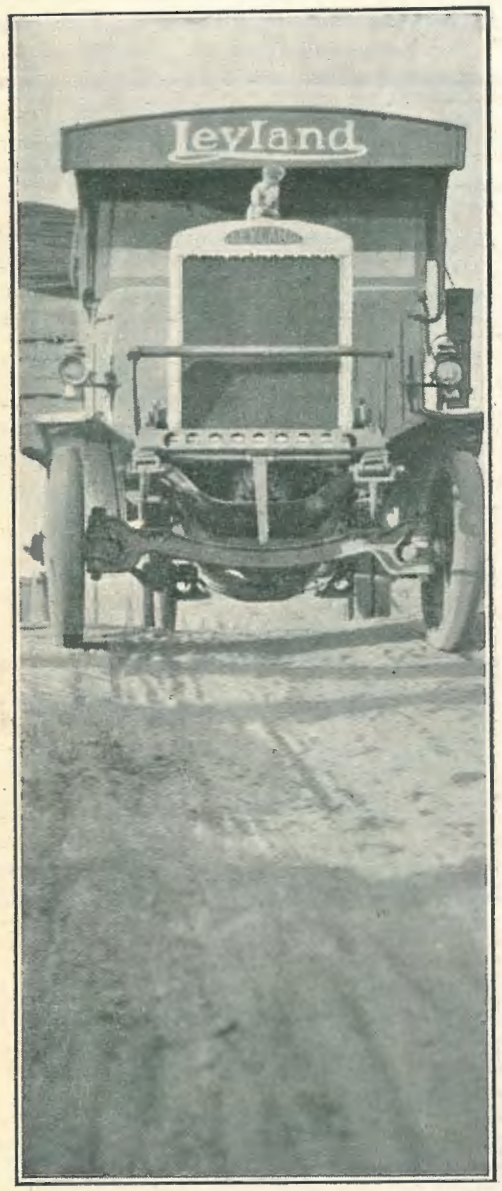
L. T. LEWIN.

[A useful demonstration of what a motor-lorry can do and an example which suggests the big possibilities of interstate motor transport, were provided last month by Leyland Motors, Limited. Owing to the agitation for improved roads throughout Australia the experiences of Mr. Lewin (Leyland's Australasian representative) are of special interest.—*Ed.*]

An export model "I" chassis Leyland, with a 36 h.p. engine, was ordered from Victoria during the marine engineers' strike. It was impossible to ship it from Sydney, and the freight asked and conditions imposed practically prohibited its

The Old and The New.
Pioneers of different ages.

transportation by rail. New South Wales wanted £27 11s. to take the vehicle as far as Albury. Victoria declined to quote, and we were told that the transference at Albury would be at our own risk and expense. In these circumstances we resolved to make the lorry work its own



A Sharp Descent.

passage. To reduce cost we offered freight-space at railway rates, but found we could quote £5 10s. per ton—more than £2 less than charged by the railways. The goods carried weighed 5 tons 15 cwt. the gross weight of the loaded vehicle being 10 tons 4 cwt.

The only difficulties experienced were due to the bad condition of the roads and bridges. The main street at Liverpool provided one of the worst examples. A water-pipe had been repaired, and the hole filled in with clay soil. On the surface it looked a solid road, but was actually a thin crust of dried soil covering a bog. When it touched it the lorry sank till the body-bearers were level with the road. From Liverpool to Campbelltown the road was shocking. Some of the bridges were not in a fit condition to be crossed, and detours had to be made. After we left Goulburn 2½ inches of rain

The End of a Long Climb.

fell within 25 minutes, and the violence of the downpour caused a washaway for about 250 yards. The lorry had to clamber over boulders, loose metal and deadwood, but these were negotiated without any stoppages to clear the track. From Gundagai to Tarcutta, the road was badly out of repair, nothing having been done to remedy the ravages of a big flood a few months back. But in spite of these difficulties we had a pleasant surprise on working out our mileage at Albury. We discovered we had averaged 16 m.p.h. over stretches of road which had a minimum of 10 inches of loose sand on the top.

At Albury the police informed us that the bridges over the flood area of the Murray were unsafe, although they looked much healthier than many we had already crossed. In consequence we had to make a detour of over 20 miles to Howlong before we crossed the Murray.

Bad as we found the roads on the New South Wales side, we were dismayed to discover that those in Victoria were even worse. If there were no railway to guide him, the motorist might easily follow the dried up bed of a creek instead of a road, as a creek often appears to be better than the road. Near Longwood a main bridge had to be side-tracked into the bed of the had to be sidetracked into the bed of the creek, and although she sank well up to both axles, no difficulty was experienced in getting her through when bottom gear was engaged. Our next difficulty was caused by the bridges on the Melbourne side of Seymour, which are a striking example of how the policy of drift has ruined our highways. After experience in France, their condition make one wonder how heavy artillery or military transport could be moved along this route. In spite of considerable sag and much swaying, these bridges held up under our weight, thereby proving the high value of the Australian timber used in their construction, but reflecting sadly on the inefficiency of a road-system, the sins of which are all those of omission. As an illustration of the ease of travel once we were on good roads, it is worth mentioning that the last 50 miles to Melbourne were accomplished in three hours.

The running time for the whole journey was 64 hours, spread over nine days, the greater part of which was taken up by demonstrations in all the principal towns through which we passed. The lorry consumed 96 gallons of petrol, and at the end of the journey there was little difference noticeable in the oil level in the engine base-chamber.

The journey undoubtedly proved that once the roads are put in moderately good condition, long-distance motor transport in Australia will be a paying proposition. Knowing the tremendous asset that motor transport has been to all European countries during and since the war, one hopes that the only obstacle to the development roads—will be moved by a commonsense of the industry in this country—bad system of road control.

LAWRENCE HARGRAVE MEMORIAL FUND

The following donations are acknowledged with many thanks by the Trustees:—

SECOND LIST.

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Mr. W. A. Lang	2	2	0
Mr. Bruce Campbell		10	0
Miss Rose Scott		10	6
Mr. H. S. Notley	1	1	0
Mr. James Kidd	1	1	0
Anonymous	2	2	0
Mr. R. O. Blackwood	5	5	0
Mr. George Wright	1	1	0
Mr. G. Ross Campbell	1	1	0
Mr. A. D. Pedley	2	2	0
Mr. W. H. Kelly	2	2	0
Mr. Colin Y. Caird	2	2	0
Total	£285	6	6

Donations should be addressed to the Trustees, Lawrence Hargrave Memorial Fund, 99 Clarence Street, Sydney, and will be acknowledged in the issue of *Sea, Land and Air* immediately following receipt of same.

DEVELOPMENT OF COMMERCIAL AVIATION

AUSTRALIA'S MANY ADVANTAGES.

BY

SIR ARTHUR WHITTEN BROWN, K.B.E.

[Sir Arthur Whitten Brown is an aircraft expert with a sound and practical knowledge of all branches of aviation. A world-tour enables him to compare aerial developments in many countries and, combined with his expert knowledge, makes his remarks on aviation in Australia of special value. We feel privileged to have secured an exclusive article covering a wide range of aeronautical interests by so distinguished an authority.—*Ed.*]

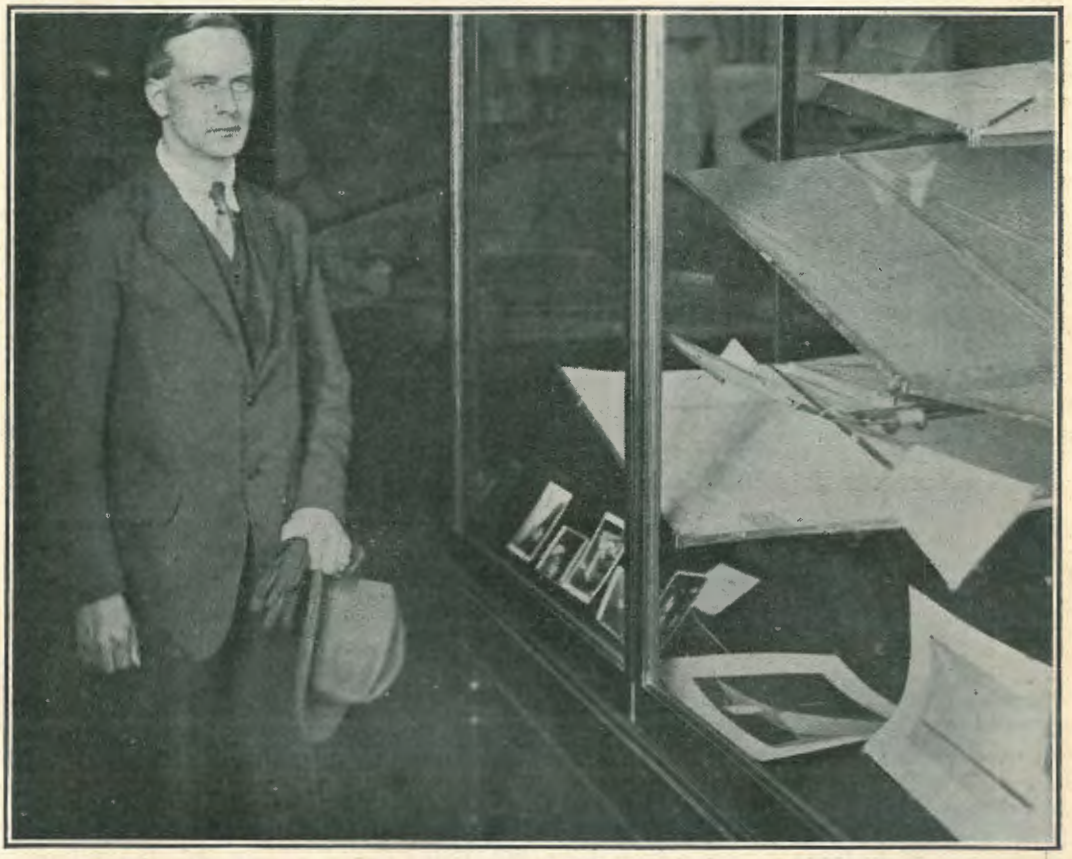
Aircraft can be of tremendous service to Australia. The climatic conditions give the Commonwealth an enormous advantage over many other countries, and its big distances make the eployment of commercial aircraft practical and politic. In war every commercial aeroplane can help defend the country—provided that a nucleus in the shape of an efficient Air Force exist. That Australia must have such an Air Force is self-evident to all who give a thought to the country's position. There is no longer the safety of isolation. The majority of the population lives in the most vulnerable part—along the coast. Attacks can only come from sea and air, and a retreat into the interior would be disastrous. Obviously the only way to avoid such a retreat is to repel the attack and *this cannot be done without effective air defence.*

For the development of commercial flying Australia has big topographical advantages also, which make the establishment of the large aerodromes required for this work comparatively simple. Owing to the fact that Australia's small population of the interior is scattered over an enormous area the high speed of aerial transport should be of the greatest assistance in opening up the interior and reducing cengestion in the big cities. But such services cost money

Sir Arthur Whitten Brown examines models of Lawrence Hargrave's monoplanes at the Technological Museum, Sydney. He is accompanied by Colonel W. O. Watt and Mr. E. J. Hart (trustees of the Hargrave Memorial Fund), and Mr. Hector Sleeman, Honorary General Secretary of The Australian Aero Club.

and may, perhaps, have to be carried on at a loss during the pioneer stages. This is where the Government can help, and any Government assistance might best be inaugurated by the adoption of uniform air laws for the Commonwealth; mapping of routes; provision of aerodromes, lighthouses for night flying and so forth. Monetary assistance, which may be necessary, may take either of two forms; fiirst, the subsidy for mail-carrying which will pay the bare cost of mail transport, or, secondly, a sufficient monetary reward spread over a number of years for a reasonable service carried out consistently, at the end of which time the service would be sufficiently established to carry on independently.

It is to be assumed that the Government will establish aerodromes for defence, and that many of these will be available to private owners upon payment of suitable rents and fees, as is being done in Great Britain. I regard the outlook as quite rosy, but this very rosiness may prove damaging if too many attempts are made to provide aerial services, because there may then not be sufficient business for any one concern to earn a decent living. The field for the sale of small machines suitable for private owners is excellent, as there are many wealthy prospective purchasers who would no doubt take up aviation as an added interest to yachting and motoring. Cheaper machines than the wealthy man's toy would be in demand among station owners for the inspection of their properties and stock, once the time-saving and actual economy of such machines become known. There in an erroneous impression that the petrol consumption of an aeroplane is inordinately high—but when the *speed* of the 'plane is taken into account, it will be found that the petrol consumption is no greater (*and in many cases less*) than that of a high-class car. There is now on sale in England a single-seater biplane—the "Bristol" *Babe*—which, when travelling at the rate



Sir Arthur Whitten Brown and the Hargrave Models.

of 80 m.p.h., consumes only one gallon of petrol for every 27 miles, *i.e.*, three gallons per hour.

A common error is to attempt to prove the practicability of air services by the use of comparatively obsolete machines which have neither the necessary weight-carrying power nor reliable engines—essentials in aeroplanes for passenger services. In many cases these obsolete machines are deficient in airworthy qualities, such as stability and efficient aerofoils. They may be satisfactory for pleasure flights, but to ask them "to serve your turn long after they are done" is to court disaster and to prejudice the public against air services. Too much experimental flying, to pave the way for regular services, cannot be done, but the wise nation will so control its flying that this work is done on machines which are fit for the task.

Such control is essential and, in my opinion, the Australian Aero Club should be of great assistance to the Government in the framing of aerial regulations. The expert knowledge contained in the Club should be used for examination of pilots, granting of licenses to passenger-carrying machines, inspection of aerodromes, etc., until the natural expansion of commercial aviation warrants the establishment of a civil air-staff.

Canada's Disadvantages.

Up to the time I left Canada—December, 1919—civil flying had received little Government encouragement. Uniform flying laws had not been adopted, and there was talk of even abandoning the idea of Canadian Air Service. A certain amount of civil flying was being done, chiefly joy-riding at a dollar a minute, principally on *J.N.4D* Curtiss machines, by Canada's two Air Force V.C.'s, Major Bishop and Major Barker. Canada, of course ,suffers severe climatic disadvantages. During from four to six months of the year the aerodromes are snow-covered, making impossible the use of large machines, which cannot be fitted with skids.

In the United States civil aviation, with the exception of joy-riding, has not developed much beyond the talking stage. When I left there were no regular passenger services between definite points. Several companies were operating in different States carrying passengers from one point to another as required—actually more a taxi service than a regular aerial transport service. The U.S.A. have not adopted uniform laws for the whole country, and it is probable that the establishment of regular services is thereby retarded. I spoke with several financial men in the country on the possibilities of aeronautical services, but found them loth to move until the position was made clearer legally as the questions of trespass and responsibility in the case of accidents vary from State to State. If a forced landing is made it depends upon which State the unfortunate airman happens to land in as to whether he is mulcted in heavy damages, discharged with a caution, or treated as a conquering hero! America is moving slowly, but, from the * Report of the U.S. Air Mission to Europe, it seems likely that the laws framed by the International Convention will be adopted, in which case civil transport should develop rapidly.

Single v. Multiple Engines.

A little controversy has arisen as to the comparative merits and demerits of the single and multiple-engined machines. I think the multiple-engined machine is undoubtedly the most suitable for passenger-carrying, while the single-engined 'bus will serve its turn carrying light loads at high speeds for short distances. The great advantage of the multiple-engined aeroplane is that it can, if necessary, fly on a single engine, which is an insurance against a forced landing in inhospitable country. Sir Ross Smith's flight for about 200 miles on one engine during the trip from Sydney to Melbourne, is a good instance; one remembers also the instance of the Blackburn-*Kangaroo,* which flew back to Crete with one of its two engines disabled.

In a comparatively short time, certain Australian ports will become terminals for aircraft arriving from overseas, and to guide such aicraft, wireless telegraph and telephone stations of high power will be required. In addition to their use as beacons they would be available for ordinary communication, and would therefore be self-supporting. All newly established commercial stations should give such directional service. For communication between aircraft and from aircraft to the ground and *vice versâ,* for the use of bush fire patrols and the hunting down of criminals, wireless is invaluable. The objection to wireless as a Government monopoly is that it has not yet been shown that the service rendered by State departments excels or even equals that of private companies.

* Extracts of this Report were printed in the February issue of *Sea, Land and Air.—Ed.*

AUSTRALIA AND THE LEAGUE OF NATIONS

AN EXAMINATION OF THE POSITION.

BY

H. S. NICHOLAS.

[Readers of *Sea, Land and Air* will welcome a contribution from Mr. H. S. Nicholas, whose pellucid English is a feature of the Sydney *Daily Telegraph*. His knowledge of international politics has gained him a unique place in Australian journalism, and makes him eminently qualified to examine Australia's position in relation to the League of Nations.—*Ed.*]

It is impossible as yet to form an accurate idea of the legal or the practical effect of the establishment of the League of Nations on the position and prospects of Australia. The status of the Dominions as members of the League has not been defined either by international lawyers or by practical statesmen. The prospects of the League depend on two factors, both of which are uncertain. The League will lose half its authority and almost all its possibilities for usefulness if America does not join. Many of the proposed reservations are of slight importance, and bear rather on internal questions such as the relation of Congress to the Executive than on the policy of America towards the rest of the world. But if America stays outside, the League can have very little hope of carrying out the main purpose for which it was formed, namely, to reduce armaments and to diminish the prospects of war. The League does not propose to limit armaments by compulsion, but to invite each of its members to fix a standard which, once fixed, will be permanent. It cannot, with any confidence, address such an invitation to Japan while America is free to make additions to its Navy and to build new naval bases. If the League wishes to eliminate the risk of war it must regulate the future of Shantung in some way more satisfactory to China and America than the present settlement. It can hardly do so if Japan is within the League and America without.

The status of the Dominions is clearer than the prospects of the League, but it still depends to some extent, on events such, for instance, as the holding of a Conference to provide for the maintenance of a common policy, in peace and in war, between the different units of the Empire and, possibly, on the reservation which America may make as to the use of Dominions' votes. If, however, the covenant of the League is taken apart from contemporary events the status of the Dominions is fairly clear. The members of the League are not identical with the parties to the Treaty. The parties to the Treaty are enumerated in two classes, which do not include the Dominions, although each Dominion is represented among the signatories by its Minister who signs as a delegate of the King. The original members of the League are the signatories, not the parties, to the Treaty and such of certain powers named in an annex to the Covenant who may have signified their wish to join the League within two months of the Covenant coming into force. In the future any fully self-governing State, Dominion or Colony may become a member if its admission is accepted by a two-thirds majority of the Assembly, and if it gives effective guarantees of its intention to observe international obligations. The members thus constituted are divided into two classe, the Five Principal allied or associated Powers—the British Empire, France, Italy, Japan, the United States and the lesser powers, including the Dominions. Their position is almost the same as that of independent countries except in one particular. They are grouped with the British Empire instead of being placed in their alphabetical position, and, by a printer's device, which seems to have some mystical significance, their names are printed about one-fourth of an inch further from the margin than those of the other powers.

The League of Nations works through an Assembly and a Council with a permanent secretariat. The members of the Council are to be the five principal powers together with four lesser powers elected annually by the Assembly. The Assembly consists of all the members of the League. Each Dominion is a member of the Assembly and has a voice in the election of members of the Council, and is eligible for election itself. That right, however, is not likely to be worth much, since the lesser powers are not likely to vote for a Dominion when the British Empire, which includes them all, is a permanent member.

Membership of the League, however, does not confer another privilege which in the light of our history may be regarded as the most valuable of all. When the interests of any member of the League are in question that member has the right to send a representative to the Council who will sit and act on an equal footing with the representatives of the permanent and elected powers. It follows that no question affecting one of the Dominions and within the jurisdiction of the League can be decided unless that Dominion has had the opportunity of stating its case.

The League of Nations it must be remembered is a deliberative and not an executive organisation. The powers of these two bodies must be studied in the light of that principle. The decisions of either body must as a rule be unanimous so that no important conclusion is likely to be made unless pubilc opinion has first declared itself. The Council is the working body. It appoints the Court of Arbitration and decides disputes as they arise. The Assembly discusses and sanctions the revision of treaties, including the Covenant itself, any amendment to which must be ratified by the whole Council and by a majority of the Assembly. It is the clause relating to disputes which has been most frequently emphasised by the enemies of the League in the United States. Article 18 says that any dispute between members of the League may be submitted to the Council. The Council shall first try conciliation. If that fails they may adjudicate, and no member of the League may go to war with a power which adopts their judgment. In that judgment all must concur except parties to the dispute, who have no vote.

It may happen, say the critics, that circumstances may arise in which a Dominion may have an unfair advantage, since in a dispute between it and another power, though the Dominion and its opponent will have no vote, the British Empire will. The objection is certainly worth consideration. The members of the British Empire have not abandoned their right of consultation among themselves, and do not intend to do so. The Imperial delegation may therefore be pledged to its decision before the disputants are heard. There is, therefore, something to be said for the reservation by which America refuses to be bound by any decision of a League in which the Dominions and the British Empire are a separate unit. But it is an objection which should easily be overcome, and it comes with a poor grace from a nation which boasts of having the Central American Republics in its pocket.

Besides participating in the deliberations of the League, Australia also has the position of a mandatory. Mandates are of several kinds, but all mandatories are trustees, and must report to a commission appointed by the League to receive and examine reports and to advise the Council. The Australian mandate has not yet been issued, or at all events has not yet been disclosed. But the principles on which it will be framed are clearly stated in the Covenant. It may administer the former German possessions in the Pacific as if they were integral parts of its territory, and according to its own laws, subject to the following safeguards which apply equally to all territories inhabited by peoples in a low stage of development. There must be freedom of conscience and religion. The slave trade, the arms traffic and the liquor traffic must be prohibited. The natives must not be armed, except for police purposes or for defence. No fortifications or naval or military bases may be set up. The African mandates provide that equal opportunities for trade and commerce must be open to all members of the League. But that provision is held not to apply to the Pacific and the Australian Government has already extended the application of the Navigation Act to Rabaul as well as to Port Moresby.

We have seen that the practical working of the League depends on factors which are still uncertain. The members of the League cannot, therefore, assume that they are free from any of the dangers of international rivalry. They must, therefore, be prepared to defend themselves by their own strength without relying on the power of the League to punish aggression. The League has no forces of its own, having rejected the plan of the French delegates to build up an international army. It may call upon its members to furnish troops in case of need, but has no power of coercing a defaulter, except possibly by expulsion. Lord Jellicoe, therefore, has made his plans on the supposition that the several parts of the Empire, and especially Australia and India, are still exposed to aggression, and that the whole Empire will work together as it did in 1914. How far this last supposition is correct may not be ascertained until the emergency arises, or until the subject has been considered by an Imperial Conference. How far Lord Jellicoe is right in supposing that the battleship is to be the weapon of the future, whether the defence of coasts or even of trade routes is not properly a matter for submarines and aircraft, and whether the danger to Australia has been increased or diminished by the defeat of Germany would be proper questions for an article on Defence. But it must be remembered that armaments depend on policy, and that in the League of Nations a pacific policy has opportunities which it never had in the past. The League does not confine iteslf to the discussion of disputes. It is to be a continuous body, and it aims at supervising the processes which in the external realtions of Great Powers make wars probable or inevitable. It prohibits secret treaties and secret diplomacy, and thereby puts a check on the action of any scheming and aggressive power. There are certain questions, of course, on which no nation could be bound by the decision of others. Australia, for instance, could not renounce her White Australia policy even if the League were unanimously against it. Australians will remember that there has already been a majority, though a very small one, against her on this point, and that her best friends, including the French, have professed themselves utterly unable to understand the justice of her claims. But the League is never likely to be unanimously against her, and the possibility of winning over a majority depends on the way in which her case is presented. It has already been presented with firmness. We have to thank Mr. Hughes for refusing to accept any compromise or any ambiguous covenant. It must now be maintained with courtesy and with consideration for the feelings of others. Every statesman of authority who has written on the Great War, from Tirpitz to Haldane, teaches us that wars are not brought about by preparations for defence, or by an irreconcilable conflict of ideals, but rather by careless words, which enable a bellicose statesman to stimulate the suspicions of his countrymen, and which may persuade a whole nation that its neighbour is an inevitable enemy, sooner or later to be fought to the death.

ROMANCES OF INDUSTRY

AUSTRALIAN WOOL MANUFACTURE

THE WITCHCRAFT OF WEAVING

BY

KAE McDOWELL.

[We are indebted to Vicars Ltd., for the photographs illustrating this article.—*Ed.*]

Weaving is not a new industry in Australia. It was established in our grandfathers' time, and one day will be an industry of immense importance in the country. A brief glance at the conditions governing the period of its growth explains why expansion has not been more rapid. During its early years the struggle was heart-breaking. This was especially so in New South Wales, where, in addition to hide-bound prejudices against the local product, manufacturers had to contend with a Free-Trade policy which had the effect of giving preference to established industries abroad. Many mills gave up after the first few years of the unequal fight, and by the time the first tariff readjustment took place there was little left to protect. But the tariff quickly acted as a stimulant. Weaving, with many other wilting industries, began to revive—but prejudice died hard. It was difficult to convince the Australian consumer that his country was capable of producing goods of a high standard. With his fingers upon the fabrics themselves, and his eyes upon the price, he remained deeply suspicious of the quality.

The Witchery of Wheels.
Spinning Worsteds in Australia.

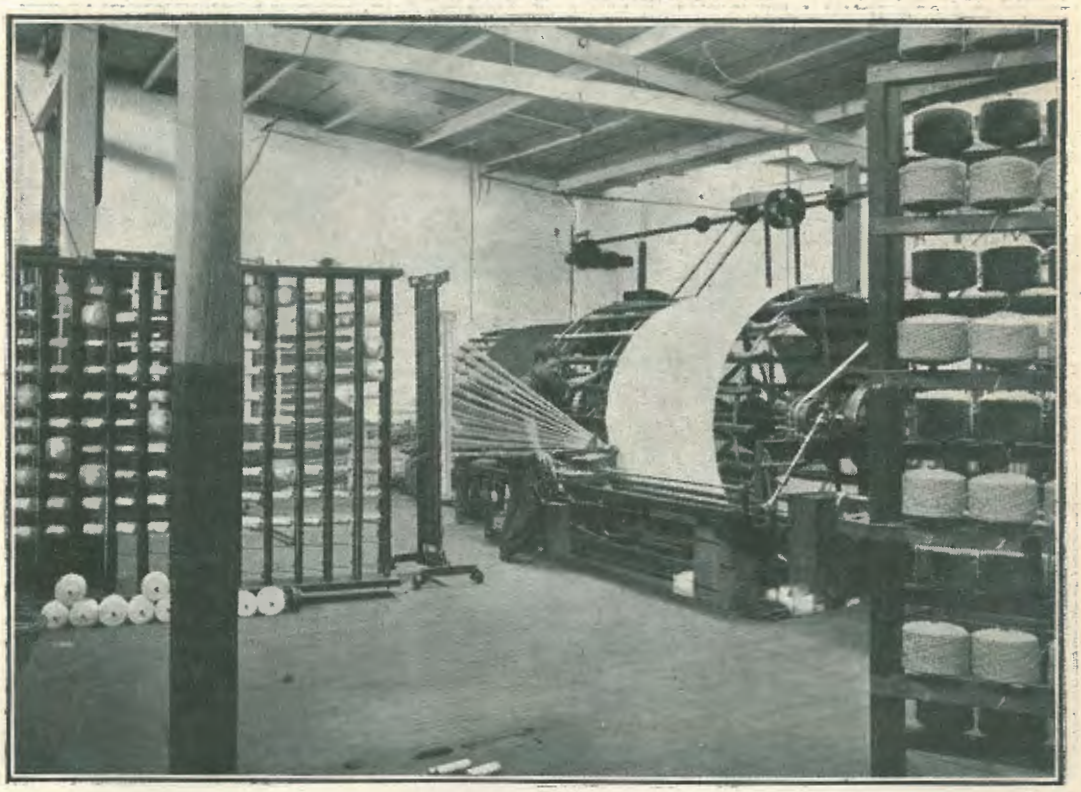
The Impetus of Necessity.

It was not until war thrust the majority of European tweeds, serges and cloths out of reach that prospects definitely brightened for the Australian weaving industry. Then, at last, the humming of the looms began in earnest, and consumers discovered that fabrics of excellent quality and reasonable price were being made locally. That their patronage was more from necessity than patriotism is a pity, but for the manufacturer it was sufficient that it was won. Now the demand for materials is greater than the output. Marrickville tweed, Ballarat serge, Tasmanian flannel, have become household words in Australia. By and by these names will find their way into the trade-vernacular of the world.

We have read romantic tales of the weaving mills of France and England—of warp and woof and of the riots that ushered in weaving machinery. And to watch the looms at work, to follow the deft hands of the weavers, and the magic interlacing of the threads, is to discover the fascination that has given the industry such a prominent place in European literature. Witchcraft still works within the walls of the weaving mill.

After the wool has passed through the intricate process of top-making, described in the previous number of this magazine, it is not by any means completely prepared for the looms. It is then a thick soft rope wound into a huge coil. Before it is fit to be spun into yarn it has to be considerably refined and drawn out to a greater length. How finely the thread is drawn out is explained by the fact that one pound of good quality fleece will make 22,400 yards of single yarn.

To prepare wool-tops for spinning they are first put through a series of nine gilling machines, each of which draws out the moving rope a little finer and winds it on to bobbins. Having passed the ninth machine, the wool is like an almost endless strand, and as fine as knitting yarn. It is then ready for the spinning frame, where the shining spindles turn at the rate of from six to seven thousand revolutions



Tangled O rderliness.
The Delicate W ork of Warping.

a minute. These give the yarn the definite twist that turns it into weaving thread. The next device twists two threads lightly together, forming the two-ply worsted which is the quality generally used in the manufacture of tweeds and serge. For knitting, wool of a looser thread and weave is necesary.

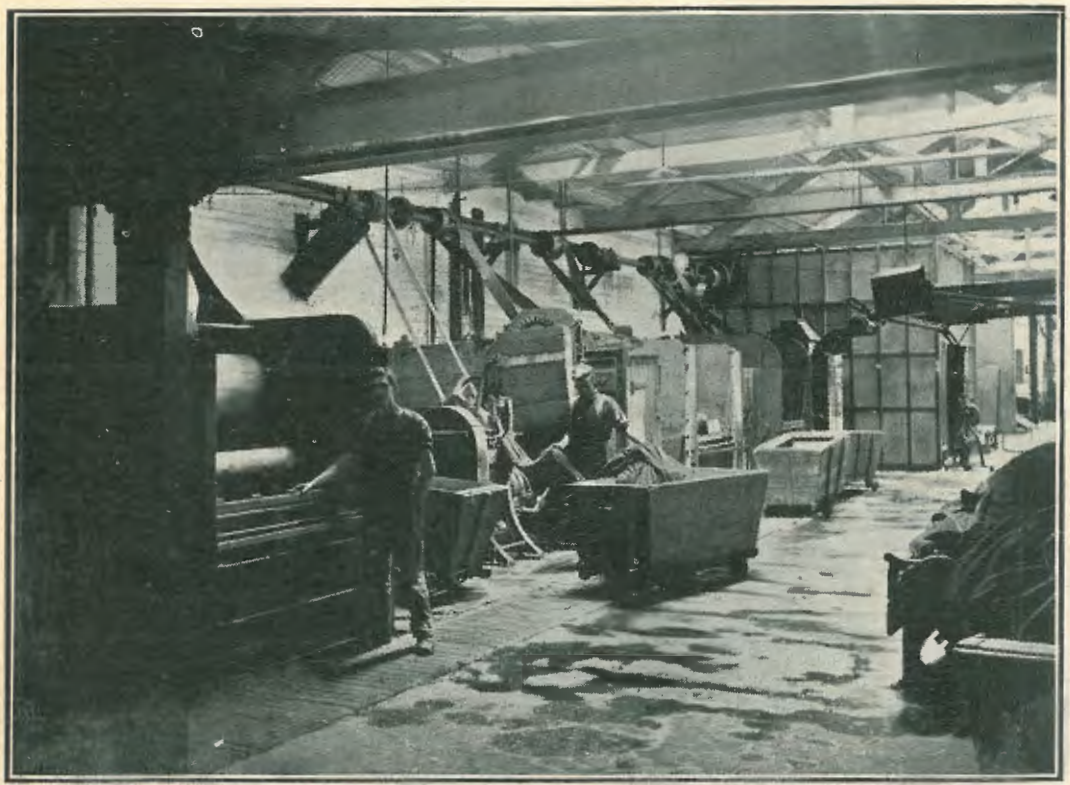
Good Wool and Fine Thread.

The better the quality of the wool the finer can the thread be drawn. The best wool used in Australia is for tweeds and serges. The weaving of these two materials, by the way, is similar, the chief point of difference being in the dyeing. Tweed is dyed in the yarn (before it is woven), and plain-coloured serge in the piece.

After the worsted for tweed has been twisted into double-ply it is wound into huge hanks, carefully tied to prevent tangling. Dyeing takes three hours of hard boiling. In the vats the yarn is stretched evenly upon the spokes of revolving wheels so that every particle will get its share of the colour. When dry it enters on its final course for the loom.

First comes the laying of the warp—these are the lengthwise threads of a material. Side by side, like closely-ruled lines, the lengths of yarn are placed upon a large cylindrical frame, which winds them on to a wheel so that the threads will not become mixed. The warp has then to be threaded through the heald (a Yorkshire word pronounced hedle), a tedious job which has to be done by hand, in order to set the design of the surface of the cloth. Three hundred yards is the usual length of a warp. As the material is woven it is cut into fifty-yard lengths. It is then ready for the looms.

When first entering a weaving-room one's whole attention is distracted by the noise. There is a humming as of innumerable bees, and the sound is punctuated with the harsher clicking of the flying shuttles. But the noise quickly becomes familiar. One stands entranced by a loom, watching the substance of a fabric



The Prosaic Part.
Finishing, Seouring and Milling.

grow as if by magic; watching the timely introduction of colored threads, the flashing shuttles and the rhythmic action of the heald shafts as they interlace the warp and woof.

Women Weavers.

Women do the weaving, though usually men lay the warp. Wool-weaving is neither heavy nor unhealthy work, and the handling of the threads seems especially women's work; also the workers are well paid, no weaver making less than £2/2/- per week.

Fabric that has just been taken from the loom is said to be in the raw state; it is rough in appearance and hard to the touch. It has to be scoured and dried, then put through a milling machine to mat the threads, and give the material something of a surface.

The next machine reminds one of a lawn-mower. Its function is to trim the surface to the requisite length. The fabric now resembles the finished article. It is soft to the touch and is becoming glossy and attractive, but has still to be examined for faults, and when these are rectified a steam-blower is brought into use. This sets the material and gives an added gloss. A great hydraulic machine with a pressure of about a ton completes the process. After this ordeal the material is folded, ready for the warehouse at last.

The manufacture of travelling rugs is an important branch in some of the big mills. Few of us, however, would recognise the finished article in the harsh, multi-colored material that leaves the looms. The rugs have to go through various processes of tweed manufacture, and after scouring and drying are taken to a curious machine, the business of which is to scratch up the fleecy surface that distinguishes a real rug from an army blanket. This scratching, by the way, is done by large hard burrs, called teasels, which grow only in Europe.

A good weaver can turn out twenty-five coarse rugs in a day, but it will take him the same time to treat three rugs of high quality; hence the big variation in the price.

Australia's golden fleece has now been traced from the shearer's clippers to the tailor's shears. The rest of the process is familiar to everyone of us—the less interesting business of paying the tailor's bills.

The Finishing Touches.

AUSTRALIAN AERO CLUB.

CONFERENCE OF HONORARY SECRETARIES.

The conference was held on March 9 in the Board Room of the Club's official journal, *Sea, Land and Air*, 99 Clarence Street, Sydney. The following delegates attended: Mr. Hector Sleeman, Honorary General Secretary (Victoria); Captain P. Roach-Pierson (Victoria); Captain H. E. Rydon (Queensland); Colonel W. Oswald Watt, O.B.E. (representing the Honorary Secretary South Australian Section, in the absence of Mr. R. O. C. Matthews), and Mr. E. J. Hart (New South Wales). The rules as drafted by the New South Wales Section Committee were discussed *seriatim* and, on the motion of Mr. Hart, seconded by Mr. Sleeman, it was unanimously agreed that they be adopted, with certain formal modifications, as the rules governing all Sections of the Australian Aero Club.

The following resoltions were carried:—

Proposed by Mr. Sleeman, seconded by Captain Rydon:

That the card of membership as adopted by the New South Wales Section be adopted by all other State Sections.

Proposed by Captain Roach-Pierson, seconded by Captain Rydon:

That State Secretaries be appointed ex-officio members of the Council.

Proposed by Captain Roach-Pierson, seconded by Mr. Hart:

That copies of minutes of all general meetings and committee meetings be forwarded as soon as possible to the Honorary General Secretary.

Proposed by Mr. Sleeman, seconded by Captain Roach-Pierson:

That, subject to the approval of the Committees of the Sections concerned, the official journal of the Club (*Sea, Land and Air*) be supplied free to all financial members, at a cost to be borne by the respective Sections.

Proposed by Mr. Sleeman, seconded by Captain Roach-Pierson:

That the issue of Club stationery and the printing of rules and other circular matter be undertaken by the New South Wales Section, accounts for same to be paid by the Sections concerned.

NEW SOUTH WALES SECTION.

A committee meting was held on February 10. Ten new members were elected. At a general meeting on February 12, a lecture was delivered by Major Barton Adams on "Repairing Sir Ross Smith's Engine at Ipswich." Discussing the need for an educational campaign, Major Adams told an anecdote of an Ipswich resident who asked him whether Sir Ross Smith intended to fly the engine from the railway workshops back to its machine at Charleville! The following resolutions were carried unanimously:—

"That the rules drafted by a sub-committee appointed for that purpose be adopted as the rules of the New South Wales Section of the Club."

"That the committee be empowered to agree to the adoption of any minor alterations to these rules which may be jointly approved by the Committees of other Sections."

On February 19 a banquet to Sir Ross Smith and his crew was tendered by the Section at the Voluntary Workers' Café, Sydney. A commmittee meeting was held on February 24. Forty new members were elected, bringing the total new membership for February to fifty-nine. It was resolved that a wireless mesage be sent to Sir Arthur Whitten Brown, K.B.E., aboard the *St. Albans*, inviting him to lunch with members on his arrival

The first letter by aerial mail received by the Aero Club.

in Sydney. This invitation was accepted by wireless, and on March 2 the distinguished airman was entertained at the Voluntary Workers' Café.

The Club entertained Sir Ross and Sir Keith Smith and Sergeant Bennett to dinner at the Voluntary Workers' Cafe, Elizabeth Street, Sydney, on February 19. Sergeant Shiers was absent on his honeymoon. Lieutenant-Colonel W. Oswald Watt, O.B.E., presided over an attendance of about 250 club members, and under his guidance the dinner lost all air of formality and became a convivial re-union of old comrades. After an excellent dinner and a few very brief speeches, the floor was cleared for dancing, and when Sir Ross Smith described it as "my happiest evening in Sydney," members regarded it as a well-deserved appreciation of the excellent arrangements made by Colonel Watt.

On March 2, Sir Arthur Whitten Brown, K.B.E., was tendered a luncheon at the same cafe, Colonel Watt again presiding over a large attendance. During a very interesting speech, Sir Arthur paid tribute to the great work of Sir Ross Smith and his colleagues; traced the importance of Lawrence Hargrave's experiments; emphasised the advantages of aviation to Australia; the need for uniformity of control before commercial aviation would attract the investor, and urged the use of the Aero Club's expert knowledge by the Government in the framing of aerial regulations.

VICTORIAN SECTION.

A committee meeting was held at the new club premises on February 18. One new member was elected. Mr. H. Sleeman and Capt. Roach-Pierson were instructed to attend the inquest on Mr. Coghlan, who was accidently killed by an aeroplane at the Geelong Carnival on February 14. The flying exhibition having been held under the auspices of the Club, it was considered necessary that the Club should be represented.

The following letter was read from General Sir William Birdwood, G.C.M.G., K.C.B., etc.:—"I write to thank you for the kind invitation which you have extended to me on behalf of the committee and members of the Victorian Section of the Australian Aero Club, to become vice-president of the Club, and to say that I am glad to accept the position, more particularly as it is a renewal of old associations with many gallant comrades who did such magnificent work in our Australian squadrons during the war. With kind regards and good wishes."

Mr. Ross, father of Lieutenant "Les" Ross who was killed in the *Alliance* disaster, has presented a photograph of his son to the Club. This has been framed and hung in the Club rooms with a picture of the late Captain Cedric E. Howell, which has been presented to the Club by his widow.

A smoke night in honour of Captain Sir Ross Smith, Sir Keith Smith, Sergeant Bennett and Sergeant Shiers, was given at the Savoy, Melbourne, on March 1. About 120 were present, amongst whom were Major-General J. G. Legge, C.B., C.M.G., General Blamey, C.B., C.M.G., D.S.O., Commander Bayley Jones, R.N., Major Slaney, D.S.O., Captain Roy King, D.S.O., D.F.C., Captain H. J. Larkin, D.F.C., Major W. Sheldon, Colonel G. B. Appleton, V.D., Mr. W. T. Appleton.

"The Guests" was proposed by Lieutenant-Colonel Cass, C.M.G., and Sir Ross, in answer to the cries of "Tell us all about it!" gave an interesting description of the flight.

QUEENSLAND SECTION.

At a committee meeting on January 9, it was decided to enrol civilian members and to accept Captain E. R. B. Pike's offer to act as honorary publicity agent to the Section in conjunction with the local representation of *Sea, Land and Air*.

A meeting of the Committee was held on January 21. Approval was given to the suggestion of the Honorary General Secretary, that he take steps to obtain the prefix "Royal" to the Club's title. A letter was read from Mr. S. D. Sandes with reference to the disposal of the *Courier* aeroplane at Doombyn. The committee replied to the effect that they understood Mr. J. H. Hart had purchased the aeroplane to present to the Brisbane Museum and that the committee would be pleased to see this intention carried out.

WIRELESS ADVENTURES

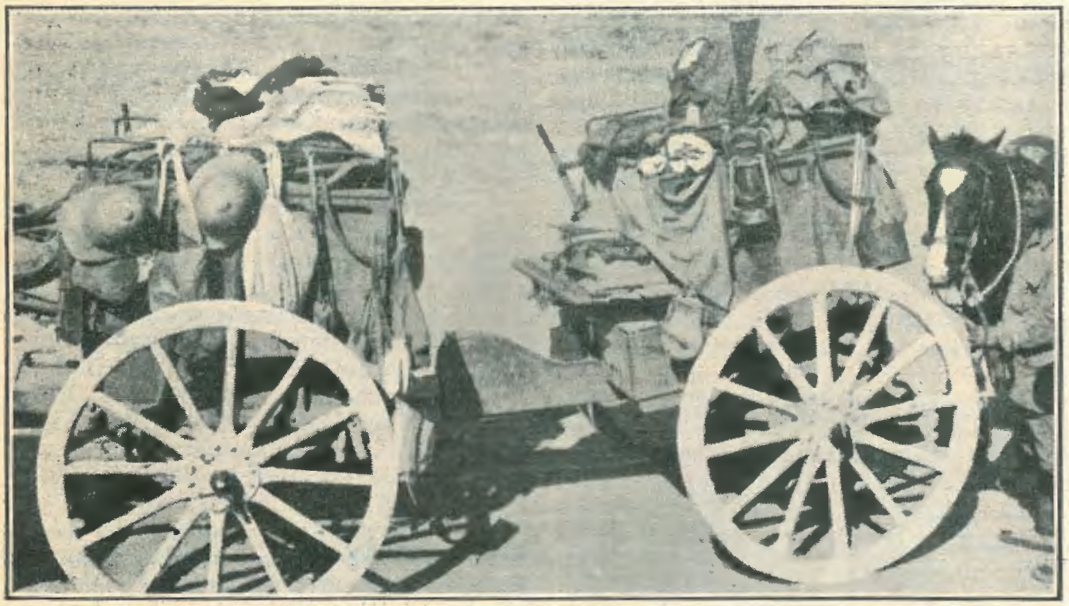
A LONG "TREK" IN PERSIA.

BY

ERIC KEAST BURKE.

Wireless did some of its best work on the out-posts of the war. Wherever there were scattered units hundreds of miles from their base, protecting mountain passes, raising levies for out-post work, peacefully penetrating or actually fighting their way into enemy territory, it was wireless which made effective co-operation possible. And in the farthest Never-Never of the war where the wireless pack set penetrated there was generally an Australian operator. For seven months the Radio at Enzeli in North-West Persia was manned by Australians, and Australians were also in charge of the Baku Radio at the time of the historic original occupation.

During the latter half of 1918 an expedition operated in Russia and Persia, organising Armenian, Persian and Georgian levies to secure the important areas held by Russians before their defection. These were the roads through Persia to India, and the valuable oil-producing regions of Baku. From 15 to 20 wireless stations were maintained. Some were allotted posts along the Persian lines of communication to Baghdad (Kermanshah, Hamadan, Kosvin), others to outlying posts and mobile protecting forces such as Senna, Bijar and Resht, and some to ships on the Caspian Sea.



A Wireless Emporium.
Mobile Wireless Station on "Trek."

A Circus on "Trek."

My unit was Australian, and to us was entrusted the greater number of the more active mobile stations among the outposts of the Force. In May, 1918, one of these stations—a horse-drawn waggon—had reached Kermanshah, and about the same time it was decided to send up a relief staff (to which I was attached) from Baghdad.

We travelled by rail to Kermanshah (240 miles distant), where we picked up our outfit and started on "trek." The sight of the column as it moved out of the town would have been comic in less bizarre surroundings. First came the two limbered waggons carrying the station apparatus, each drawn by six postillion-ridden horses and so loaded by clothing, rifle-buckets, drumming-up tins, headlines, nose-bags and such necessary impedimenta that it was impossible to see the limbers. A general-service limber and two army transport carts followed, driven by Indians and bearing enormous loads of stores, spares and kits. Next came an Indian sweeper on foot driving two sheep and a goat—meat rations for the first few days. Strung out last of all were pack-horses and donkeys, managed by a Persian brigand of so alarming an appearance that we detailed a special escort to keep an eye on him.

Twenty-five miles from Kermanshah we passed the great rock Bisitun, an imposing inland Gibraltar, rising sheer from the plain. High up on the cliff face is the famous cuneiform inscription of Darius the Great—witness of the might of Persian Kings, who ruled in undisputed sway for over two thousand five hundred years. The country had been skirmished over by Russian and Turk for the preceding two or three years. Both forces had lived on the country, and starvation and its accompanying horrors were visible every where. Much relief work was done by the troops, but in many cases pressure

A Difficult "Trek."

had to be brought on local profiteers to make them disgorge stores of grain, even though women and children died by the roadside for need of the food they hoarded.

A Stay at Hamadan.

At Hamadan we erected the station, took over from Russians who were moving on, and camped for about three months. Hamadan was then headquarters, and, despite heavy atmospherics and severe surging, some good records (crystal) were put up. Messages were exchanged with the radio at Basrah, and a pack station about eighty miles away was in almost continuous communication, although the high ranges were a hindrance to good work.

Hamadan is the usual type of the cities of the Near East—flat-roofed houses, mostly built of mud bricks, and squalid crowded bazaars. The gardens and it's site at the foot of a high range are the chief beauties. It is the ancient Ecbatana, erstwhile capital of Media, and the road from Babylon to Ecbatana is one of the famous Biblical highways.

Early in September there appeared a possibility of a dangerous Turkish advance, *viâ* Tabriz, threatening the whole Persian Line of Communication, so a marching column, to which we were attached, was hurriedly despatched beyond Zingan. Our route lay through the villages to the north—a mere track almost impassable to wheeled traffic. Drag-ropes had often to be used in the descent of boulder-strewn mountain-slopes, while a pioneer party was continually filling in irrigation channels and nullahs. Narrow bridges over deep ravines, approachable only from sharp take-offs, were always dangerous, and it speaks much for the construction of the Marconi gear that no breakages occurred beyond the splitting of a wooden spring support on a limber under-carriage.

Typical Persian Mountain Pass.

The station had to be erected daily—a laborious procedure involving the handling of seventy foot masts by teams weary from the day's journey, and often the camping ground was not reached until after dark, which meant erecting the station by moonlight or by the fitful gleams of a hurricane lamp.

Back to Army Rations.

After a short stay in Zingan, we started on the long, dreary "trek" down to Baghdad. Autumn was tinting the gardens of Hamadan when we got back, and the first

snow had fallen on the heights of Mount Elwend, under whose shelter the city lies. A short rest here and we continued towards rail-head—a monotonous journey in bitter weather, made bearable only by the knowledge that we were homeward bound. The return to Mesopotamia meant mail and — strange that this should attract!—a reappearance of army rations. Our food had consisted of local products—coarse, unleavened flaps of leather-like *chupatty*, everlasting mutton and acid grapes. "Bully," milk, jam, cheese and other army staples were never seen. In fact, the only stores that came up the line seemed to be petrol, to enable the motor convoy to return to the base!

Baghdad was reached by the end of November, which concluded what is probably the longest journey ever made by a mobile wireless station.

A Roadside Spring.

WIRELESS NEWS.

Australians in Japan.

Mr. P. Moore Farmer has recently returned from Japan, where he spent two years supervising the installation of wireless in the ships being built for the British Government. The installations, about 30 in number, were all manufactured in Sydney, and Australian operators were appointed to the ships for the voyage to England.

The Tonga Station.

Having completed the erection of the wireless station at Nukualofa, Tonga, Mr. D. Campbell and Mr. G. Robertson recently returned to Sydney. After a month's trial the station was handed over to the Privy Council of the Tongan Government on January 30th. When the station was proposed, the idea was to communicate with Australasia and the outside world generally through Suva, but the trials proved so successful that direct communication with Awanui (New Zealand) is easily effected. The story of Mr. Campbell's experiences will be related in a future number of this journal.

Wireless Telephone Service.

Sir James Allen (New Zealand Minister for Defence) replying to the Magaia Island Council said it was likely that wireless telephones would eventually connect the islands with Raratonga (Cook Islands).

In the Schools.

A Radio Telegraphic Club—probably the first of its kind in Australia—has been formed at the Sydney Grammar School with an initial membership of 23. A suitable library has been provided, and it is intended to instal an experimental receiving station, all apparatus for which will be made by members.

NIEUPORT and General Aircraft Co. Ltd.

CONTRACTORS TO H.M. GOVERNMENT

Office :
Langton Road
Cricklewood
London, N.W. 2

Cable Address :
"*Nieuscout Crickle*, London"

Prior to the War and throughout the entire War period the Management, Designers and Staff of this Company have been engaged on the Design and Production of aircraft which have been in continual use day and night, on active service, from August, 1914, to the cessation of hostilities.

"Daily Mail" (London) Copyright

Evidence of our high state of efficiency is again demonstrated in the fact that the LATEST TYPE OF FIGHTING MACHINE chosen by the Royal Air Force prior to the Armistice was the BRITISH NIEUPORT NIGHT-HAWK, which we are still producing in large quantities for the Royal Air Force Peace Programme.

THE FIRST DELIVERY BY AIR OF NEWSPAPERS WAS UNDERTAKEN BY

BRITISH NIEUPORT

¶ Our Organisation which has in the past been responsible for our success in design and production of NAVAL and MILITARY aircraft, is now concentrating its energies in the development of Commercial machines—ranging from a small single-seater, of moderate power and price, to a large, twin-engine machine capable of carrying a disposable load of 1 ton.

¶ Inquiries are therefore solicited from Governments, companies or individuals interested.

NEW AERIAL COMPANIES.

PROSPECTUS OF AVIATION, LIMITED.

A new aerial company, to be known as Aviation, Limited, is being formed in Melbourne with a capital of £25,000 in £1 shares, 10,000 of which are offered for public subscription. According to the prospectus, provisional directors are: Mr. W. L. Thompson (Bay Steamship Co., Ltd.), Major E. T. J. Kerby, M.H.R., Lieutenant A. L. Long (ex No. 2 Squadron, Australian Flying Corps); Managing Director, Major Gerald Audry Cadogan Cowper (ex O.C. No. 6 (T) Squadron, A.F.C.). "The Company," continues the prospectus, "is being formed to develop commercial aviation in Australasia, particularly passenger and excursion services, and ultimately to manufacture (under royalties) aircraft and accessories in Australia, and to undertake the repair and maintenance of aeroplanes and engines. An immediate proposal is to establish a special aeroplane service of short flights or "joy-rides."

Aerodrome Sites.

"The promotors have acquired an option over a site for the Melbourne Aerodrome for £3,000. The site of 60 acres near Glenroy railway station—nine miles from Melbourne—is served by an electric railway. The land is high and level, and practically no work will be necessary to fit it for aeronautical purposes.

"The Company will acquire for a period of 15 years from Lieutenant A. L. Long the sole agency for Australasia of the aircraft productions of Boulton & Paul, Ltd., Norwich (England), who, during the war achieved a high reputation, their output at the termination of hostilities being the second largest in Great Britain. Boulton & Paul, Ltd., are prepared to construct any type of machine required, and one of their machines is at present in Melbourne, while two more are arriving shortly.

The machine at present in Melbourne was used by Lieutenant Long in his pioneer work in Tasmania, and in the first flight from Tasmania to the mainland.

The consideration for the agency and manufacturing rights will be the issue of 1,000 fully-paid shares to Lieutenant Long, and the three machines and spare parts will be purchased from him at an expert valuation of £3750.

Negotiations are practically completed for the Company to take over the agency for the sale of the "G.N." Cycle Car also.

Capital Required.

"It is estimated that in order to place the Company on a sound footing, the following capital will be required:—

Aerodrome site at Glenroy ..	£3,000
Three machines and spare parts	£3,750
Engines, spares and workshop equipment, the erection of hangars and for working capital	£3,250
Total	£10,000

The promoters, Major G. A. C. Cowper and Lieutenant A. L. Long, are to receive 2,300 fully paid-up shares for their services in promoting the Company, and the vendor, Lieutenant A. L. Long, 1,000 shares for the Boulton-Paul agency rights, so that the total paid-up capital of the Company will be £13,300.

Aircraft Proprietary Limited.

Australian Aircraft Proprietary Limited, registered at Melbourne, January, 1920. Capital £15,000, for the purpose of conducting joy-riding in the northern portion of Victoria. Directors: Captain C. W. Snook, R.A.F., Captain Leggitt, R.A.F., Lieutenant J. G. McGill, R.A.F., and Sergeant-Major Watson. Registered offices: 320 Collins Street, Melbourne. This Company has a 160 h.p. Beardmore-Armstrong-Whitworth and one 80 h.p. Le Rhone *Avro*.

IN THE FLYING WORLD

Imports by Air.

The London Customs Bill of Entry, now contains in its Imports columns details concerning goods brought into Great Britain by air. A recent issue announces that the Handley Page Transport Company Ltd. imported from France, quantities of silk, fancy goods, ladies' hats and embroidery—carried from Paris to Hounslow by the two-engined Handley Page machines engaged on the cross-channel service.

Sopwith "Gnu."

Rolls-Royce in America.

The Wire Wheel Corporation Works at Springfield, Massachusetts, have been purchased by Rolls-Royce of America, Incorporated, for the manufacture of Rolls-Royce cars and aero-engines. Most of the pioneering work will be done by the men who built up the name of Rolls-Royce in England.

"Castrol" Prices.

"Castrol" has lubricated some famous aeroplanes since the war. It was used by Sir John Alcock and Sir Arthur Whitten Brown during their trans-Atlantic flight, and by Sir Ross Smith on his England to Australia flight. It also "oiled the wheels" of the *Times'* Vickers-Vimy-Rolls, the "Silver Queen" Vickers-Rolls and the D.H. Napier Lion, in the London to Cape flight. By the way, owing to shortage of stocks, increased labour charges and freight, it has been necessary to increase the selling price of "Castrol" Motor oils and greases in Australia.

Captain Stanley Cockerell 151st Squadron, R.A.F., a competitor in the Cairo to Cape flight.

Avro Seaplane converted from a land 'bus for the Manly Carnival.

Lucerne paddock used as a 'drome during Mr. Holman's aerial tour.

ing to hear that one passenger was accompanied by his two youngsters. The machine continued to make flights from Manly during the remainder of the Carnival.

Aircraft Expenditure.

The following items of expenditure on aircraft are taken from the Statement of Receipts and Expenditure for the half-year ended December 31, 1919, as published in the *Commonwealth Gazette* (26/2/'20).

Service.	Half-year ended Dec. 31, 1918. £ s. d.	Half-year ended Dec. 31, 1919. £ s. d.
Aviation Instructional Staff (Central Flying School) Pay	3,628 3 5	9,895 5 11
Contingencies	1,543 8 2	2,684 0 4
Gratuity to W. H. Wright for special services	.. .. ..	20 0 0
Compensation to E. S. Jenkins for damage to property by a low-flying aeroplane	.. .. ..	6 12 6
Royal Australian Naval Air Service towards cost of establishment	820 3 4	679 6 4
Flying School—new equipment and material, including aeroplanes, motor vehicles, engines and tools	30,307 18 7	Cr. 35 16 10
Aerodrome, workshops and buildings	25 10 7	1,946 10 4
Anti-aircraft ammunition — towards cost of purchase	.. .. ..	1,754 18 4
Aviation Depôt Hospitals	12,675 19 5	—

An Aerial Catalogue.

To mark "the beginning of a new era," as they have aptly described it, David Jones Ltd., Sydney, have issued an aerial catalogue, with an air-picture by Percy Leason for a cover. Referring to their delivery of goods to Goulburn by air the publishers remark: "the day is not far distant when aerial transport will compete with existing methods, and then we will be one of the first to utilise the air for the regular delivery of merchandise."

Passenger Flights at Newcastle.

During the last week in February the Aerial Company, Limited (Sydney), conducted passenger flights at Newcastle. Lieutenant S. Keith Lavers, accompanied by Lieutenant Neal flew from Sydney, on February 24, in 55 minutes. A gale was blowing and clouds were very low, necessitating a compass-course. A landing was made on the old race-course at Newcastle, which the pilot describes as an ideal spot for Newcastle's future aerodrome. Passengers included the editor of the Newcastle *Sun* (Mr. Clarence Moody) and several ladies.

R.N.A.S. Re-union Dinner.

The first re-union dinner of the Royal Naval Air Service officers, was held in Melbourne on March 2, at the Oriental Hotel. Those present included Wing-Commander S. J. Goble, O.B.E., D.S.O., D.S.C., Squadron-Commander R. H. Berriman, Flight-Commander J. Minifie, Flight-Commander Watson, Flight-Commander Cussens, Flight-Lieutenant D. Minifie, Captain P. Roach Pierson, Messrs. L. Hooke and T. Trumble (Secretary, Department of Defence).

A Good Example.

Letter from Larkin-Sopwith Aviation Company to the Goodyear Tyre Agency: "We would like to thank you for generously offering the "Goodyear" Cup at our Exhibition of Flying at Mordialloc (Victoria). This race gave a distinct stimulus to commercial aviation in Australia and your firm is to be congratulated on its enterprise."

Aerial Police.

Among the twenty registrants at the Curtiss Flying School at Manila are 10 members of the future Philippine Aerial Police. The new constabulary will be organised as soon as pilots are trained.

Expenditure on Wireless.

The following appears in the Commonwealth Gazette of February 26:—Expenditure on wireless telegraphy: Half-year ended December 31, 1918, £8,284 4s. 9d.; half-year ended December 31, 1919, £3,595 15s. 7d.; Townsville Wireless site, 1918, £12 6s. 3d., 1919, £197 3s. 3d.

An Aerial Tour.

During February, the Australian Aircraft and Engineering Company made a tour of the Riverina. The object of the trip was to familiarise residents with aviation and to endeavour to remove some of the prejudice which has naturally arisen among people solely dependent on newspaper reports of flying. The tour was made in a 130 h.p. *Clerget* three-seater *Avro*. From Cootamundra (headquarters for the trip), flights were made to Junee, Tumut and Grahamstown, where passenger flights were made. On February 6, the machine left Cootamundra with two passengers for Cowra (75 miles distant). The journey occupied 45 minutes—105 m.p.h.—made possible by a favourable wind. Passenger flights were given in Cowra, and on Monday, March 1, the machine was flown to Coombing Park Station, landing in a field practically at the front door of the homestead, the residents of which stepped out of the house into the machine as familiarly as if they were taking a motor trip. On March 2, Mr. and Mrs. Reg. Fagan flew from Cowra to their station at Sunny Ridge, made several calls at Carcoar and Mandurama and at several neighbouring homesteads. As a result of the trip Mr. Fagan expresses the determination to purchase a machine in the near future.

On March 3 the machine left for Sydney, calling at Bathurst and Richmond. The mountains were crossed at 10,000 feet with two passengers.

Seaplane Joy-Rides.

In readiness for the Manly Carnival, which commenced on February 28, the Australian Aircraft and Engineering Company converted a two-seater land *Avro* into a three-seater seaplane to enable passengers to be taken up from the water. The Company's engineer, Mr. H. E. Broadsmith, F.R.Ae.S., A.M.I.A.E., must be congratulated on the expeditious piece of work. The conversion was made in four days, and on Saturday, the 28th, Lieutenant Roberts flew the machine to Manly, from where twelve passengers were carried in six flights. On Monday the machine returned to Cook's River and was utilised as a sort of aerial lorry, carrying a quantity of tools, including a couple of wheels and two axles, to enable it to be taken from the river and wheeled across the 'drome to the hangar.

THE CENTAUR 4 AEROPLANE

THE MOST WONDERFUL TRAINING AND PASSENGER MACHINE YET DESIGNED.

SPECIFICATION

Motor	100 H. P. Anzani
Tankage	3 Hours
Feed	Gravity
Control	Dual
Seats	Two or Three
Oil Consumption	1½ galls. per hour
Petrol	8 galls. per hour
Speed	32-70 miles per hr.
Load	500 lbs.
Weight	1,400 lbs.
Wt. per H.P.	18.65 lbs.

The Last 4 Royal Aero Club Certificates taken at the Central Aircraft Co.'s School of Aviation were obtained in the following Flying Times:—

J. E. Russell, New York, 1 hr. 40 mns.
E. P. C. Godsil, New York, 2 hrs. 5 mns.
W. Pool, London, 3 hrs. 15 mns.
M. E. Tanner, London, 3 hrs. 30 mns.

Price: £900 F.O.B. London

SPECIFICATION

Length, 24 ft. 8 in.
Span, 34 ft.
Speedometer
Oil Gauges
Rev. Counter
Compass
Altimeter
Spare Propeller
Best Workmanship and Finish.

Holding the

WORLD'S RECORD

Safe and Easy To Fly

High Factor of Safety

This Machine can be converted into a 3-seater in a few minutes.
IMMEDIATE DELIVERY FROM STOCK.
INSPECTED AND PASSED BY AERONAUTICAL INSPECTION DEPT.
CERTIFICATE OF AIRWORTHINESS WITH EACH MACHINE.

The CENTAUR 2A TWIN-ENGINE NINE-SEATER

Passenger or Commercial Aeroplane. Th most Economical Machine yet produced.
Carries 9 People for 320 H.P.

SPECIFICATION

Motors	2-160 Beardmore
Tankage	3½ hours
Span	63 feet
Length	39 feet
Total Weight	5,400 lbs.

ENCLOSED CABIN, HANDSOMELY DECORATED.
BEAUTIFUL LINES AND FINISH.
FOLDING WINGS.
HIGH FACTOR OF SAFETY.
BEST MATERIAL & WORKMANSHIP PROCURABLE.

Certified Air Worthy by Air Ministry

SPECIFICATION

Wt. per H.P.	16.9 lbs.
Load	2,000 lbs.
Speed Range	40-90 M.P.H.
Petrol consumption	.63 pints.
Oil	4 pts per hour.

F.O.B. London **Price: £5,600** Complete with Instruments and Spares

THE CENTRAL AIRCRAFT CO., KILBURN, LONDON, ENGLAND

CABLES: AVIDUCTION, LONDON. CODE: A.B.C., 5th ED.

A Speed Record.

Captain Roy King, D.S.O., D.F.C., established a cross-country speed record on March 8. Flying a Sopwith *Gnu*, fitted with a B.R.2 engine, Captain King left Glenhuntly (Melbourne) with two passengers and luggage at 9.40 a.m. and arrived at Sale at 10.37 a.m., covering 128 miles in 57 minutes—an average ground-speed of 134½ miles.

AVIATION IN NEW ZEALAND.

MAIL EXPERIMENT AND A CONTRACT.

The New Zealand Postal Department, not to be behind the times, decided in December last to arrange an experimental aerial post between Auckland and Dargaville, North Wairoa, a distance of 80 miles. The Department entered into a contract with Messrs. Walsh Bros. and Dexter of the New Zealand Flying School at Kohimarama, and on December 16, with Mr. George Bolt (pilot) and Mr. Leo Walsh (director of the flight) one of the School's seaplanes, a twin float of 125 h.p., with "Royal Mail" emblazoned

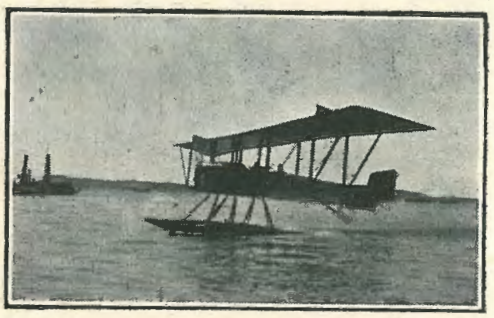
Taking the Mail Aboard.

along her *fusclage*, took aboard a mail of about 50 lbs. Aided by a light south-west breeze she left the harbour opposite to man-o'-war steps and passed North Head at an altitude of 1,000 feet on the trial trip.

About 2,000 people saw the start, and among those who were in the launch that took the mail to the seaplane were the Chief Postmaster (Mr. W. Gee), the Superintendent of Mails (Mr. G. W. Rudd), the Mayor and Mayoress of Dargaville (Mr. and Mrs. R. E. Hornblow) and Mr. G. A. J. Macdonald (head of the Dominion Wireless College), together with several of the instructional staff.

On the outward journey the 'plane followed the Rangitoto Channel and over Kawau attained an altitude of 2,300 feet, rising to 3,200 at Leigh. She then bore inland and passed Mangawai 3,900 feet up. The pilot and passenger looked down on Wairoa River from 4,200 feet, the highest altitude attained, thence she gradually glided to the river opposite Dargaville. The journey occupied 1 hour 35 minutes, for approximately 112 miles.

Mr. J. G. Coates, Postmaster-General, welcomed the airmen, and a luncheon was held. Responding to the toast of his health, Mr. Coates dwelt upon the possibilities of aerial mail carriage, not only among the Auckland districts, but all



Seaplane Taking Off.

over the Dominion, and spoke in praise of the work done by the New Zealand Flying School in connection with the war.

The return journey, carrying a mail of 51 lbs., was made by a more direct route and Helensville was passed at an altitude of 4,500 feet, and a message from the P.M.G. dropped. Following the course of the Waitemata, Auckland was soon visible, and a landing was made opposite the Harbour Board's Office. The 80 miles took 1 hour 23 minutes.

Mr. Walsh expressed himself as thoroughly satisfied with the experiment, and the machine used was considered admirable for the project. The Postal Authorities have entered into a contract for mail services to Dargaville, Whangarei and Thames with the Flying School with their present machines until experience determines what class of 'planes are most suitable for a permanent service.

WIRELESS OFFICERS ATTACHED TO VESSELS OF THE AUSTRALASIAN MERCANTILE MARINE.

Revised to March 15, 1920.

SHIP.	OPERATOR.
Apolda	J. W. McKay
Arawatta	V. Blight
Arahura	V. M. Simpson
Aramac	R. D. Thompson
Australbrook	R. E. Haddock
Australcrag	V. E. Stanley
Australford	———
Australglen	J. R. Gilligan
Australmead	G. Pow
Australmount	A. R. Catford
Australpeak	R. H. Alexander
Australplain	S. R. Dixon
Australpool	K. J. Dines
Australport	A. H. Jeremy
Australrange	C. Black
Atua	L. N. Callaghan
Bingera	H. L. Miller
Bombala	———
Bundarra	H. K. Burbury
Canberra	———
Changsha	S. J. McVeigh
Charon	J. E. Cleary
Coolgardie	R. S. Taylor
Cooma	J. H. Hawkins
Dimboola	A. F. Vipan
Eastern	P. C. Gillon
Indarra	H. Firth (s) A. G. Ross (j)
Kaiapoi	A. E. Sheppherd
Kaitangata	R. W. Barnes
Kaituna	G. Illingworth
Kaiwarra	C. Smith
Kanowna	H. Tuson
Karori	S. G. Jones
Karoola	R. R. Pilmore
Katoa	B. Boni
Katoomba	T. A. Jones
Kauri	N. W. G. Scott
Koromiko	F. N. Davidson
Kowarra	H. Fullerton
Kurow	D. C. Lane
Levuka	A. S. Smith
Loongana	H. G. Reilly
Macedon	N. W. Marshall
Mackarra	A. R. D. Davis
Maheno	C. F. Griffiths
Makambo	C. H. A. Kidman
Makura	D. N. Quinn (s) E. A. Hunter (j)
Manuka	J. A. Heavey
Maori	H. Jones
Mararoa	H. A. Bloxham
Marsina	W. H. Richardson
Mataram	S. A. Ludlow
Maunganui	———
Mawatta	H. W. Barnfield
Melusia	———
Minderoo	J. G. C. Higgins
Mindini	A. Stuart
Moana	J. F. Hutton
Moeraki	H. M. Lamb
Monowai	G. Donnelly
Mokoia	L. V. B. Sutton (s) A. E. Lrence (j)
Montoro	L. G. Devenport
Morialta	E. F. Hayes
Morinda	F. C. Davies
Navau	H. Speed (s) R. P. Ginders (j)
Ngakuta	H. Bargrove
Niagara	W. J. Martin (s) M. A. Prudence (j)
Ooma	E. A. Miller
Oonah	R. M. Firminger
Paloona	T. W. Bearup
Paringa	H. A. de Dassel
Pateena	J. H. Bennett
Rakanoa	W. C. Brown
Riverina	J. F. McGinley
Rotomahana	W. E. C. Sawyer
Rupara	G. Cook
South Africa	E. J. Giles
St. Albans	W. H. Harris
Suva	L. S. Lane
Taiyuan	———
Tahiti	E. M. Bain (s) G. M. Whiteside (j)
Talune	H. F. Harman (s) T. H. McWilliams (j)
Tarawera	G. H. Hugman
Tofua	W. A. Hawkins (s) J. G. Campion (j)
Ulimaroa	A. L. Dixon
Victoria	F. A. Hunter
Wahine	F. E. Duggan
Waihemo	F. A. Cook
Waihora	V. M. Brooker (s) F. L. Dawes (j)
Waikawa	F. L. Scott
Waimarino	K. L. Freeman (s) J. A. Guy (j)
Waipori	H. E. Young
Wairuna	A. Cuthill (s) L. R. Dickson (j)
Waitemata	H. F. Hartley (s) C. H. Hart (j)
Waitomo	A. S. Dening
Wanaka	R. R. Robinson
Wandilla	M. Sedgers
Westralia	M. A. H. Ryan
Whangape	A. O. Sutherland (s) F. P. Cunnold (j)
Wodonga	J. Welch
Wyandra	T. Bannister
Wyreema	W. J. Washbourne
Zealandia	L. J. Glyde
Zealandic	E A. Burbury

On Home Port Leave.

C. Williamson — C. F. Green
N. H. Brown — T. Chalmers

SALVAGE BY BALLOONS

BY
FREDERICK A. TALBOT.

The seas around Great Britain will be an El Dorado for the adventurous for years to come. The floor of the North Sea is strewn with the wrecks of vessels, many laden with valuable cargoes, sent to their last account by the enemy during the ruthless submarine war.

Some have settled down to depths which place them beyond the reach of divers, but an immense number have foundered in relatively shallow waters where but a little perseverance and ingenuity are required to retrieve them. These are the prizes which await those who are prepared to woo fortune from the sea.

There is no reason why the majority of these craft should not be brought to the surface, assisted into port, and be overhauled to swell the British mercantile marine which has suffered such startling diminution. Only a few have been so hopelessly shattered as to make their salvation extremely precarious or not worth while.

Old Methods Useless.

But to win fortune from the sea-bed it is necessary to adopt up-to-date methods. To attempt to achieve the desired end by the appliances now in vogue, and the applications of which are so extremely limited, is wildly impracticable. The expense of such an undertaking would be greater than the value of the richest prize raised.

Appreciating the peculiar difficulties of the situation, fertile brains have been thinking hard, and experimenters have been busy putting newly born precepts into practice. Among these ingenious workers must be numbered the marine engineer, Mr. Russell Gordon, A.M.I.N.A., who has perfected something distinctly attractive in salvage engineering. Briefly described, he has modernised a means of bringing ships to the surface by air-balloons.

A vessel sinks because its buoyancy is destroyed. Accordingly the basis of the latest ideas is the perfection of ways and means of restoring buoyancy to the craft. When this is given she must of necessity rise. She cannot refuse to do so any more than coal-gas will refuse to ignite when a match is applied.

There, is of course, nothing new in the application of air to restore the lost buoyancy of a ship. It has been practised for years, but along totally different lines. One method is to sink massive metal cylinders, called "camels," by letting water into them, and then when they have reached the wreck to attach them thereto by means of chains or hawsers. The water is then expelled from the camel by simply blowing air into it. When the camel is fully charged it naturally exerts the tendency to rise to the surface and to haul the wreck with it.

Air "Camels."

Provided a sufficient number of camels are hitched to the sunken craft, and the buoyancy thus imparted exceeds the weight of the water within the wreck, the latter must rise to the surface. It sounds a very simple system, but it is one beset with difficulties innumerable, since the camels must necessarily be of large size and impressive weight, rendering their manipulation into position arduous, protracted and tedious.

Another method is to sweep hawsers made fast to pontoons, set on either side of the wreck, under the sunken craft. The work is conducted at low tide, and the hawser is wound tightly. When the tide rises the pontoons, being charged with air, rise with it, and in so doing lift the wreck in the slings. At high tide the pontoons, with the wreck slung between, are warped inshore until the wreck touches bottom on the shelving sea-bed.

A halt is called until the tide again falls, when the cycle of operations is repeated. This process is continued until, as the result of successive lifts with each tide, the wreck is beached, when repairs are made, and the vessel refloated to be towed into dock. This process is also slow, since it is dependent upon the weather, while it is also relatively expensive, involving considerable skilled labour in working the hawsers beneath the wreck.

A Tedious Job.

The third method is one which has considerable vogue at the present moment. The interior of the vessel around the wound which sunk her is rendered air-tight. When this work has been completed air is driven into the hold, and as this is compressed it naturally drives out the water, thus giving the vessel the requisite buoyancy to float once more. In this instance the vessel is really supported upon a cushion of air.

A little reflection will reveal the high degree of skill required for success by this expedient. Caulking must be very thorough, since the slightest air-leak will dissipate all hopes, and it must be done from inside to prevent the air pressure blowing it out. But the air pressure bearing upon the internal caulking makes the latter still tighter. It is a method imposing a severe tax upon the diver, occupies much time, may be protracted by unfavourable weather, and withal is expensive.

Under-Water Balloons.

To eliminate the defects of the foregoing systems Mr. Gordon decided to introduce new ideas into an old system. The "camel" system appealed to him as offering the most promising results, but instead of utilising a rigid, weighty and unwieldy metallic cylinder, he hit upon the idea of pressing a flexible camel into use. This is the outstanding novelty of his system.

The flexible camel is contrived from canvas. It is built up in a special manner, with a series of layers of fabric, each of which is individually dressed to ensure air- and water-tightness, great strength and durability. When inflated this inflexible camel recalls its metallic prototype in form, but there the similarity ends. The fabric cylinder is protected by special fenders and chafing strips, or bands, so that frictional damage is reduced.

One outstanding advantage of these air-balloons is that should any damage be suffered the injury may be promptly and cheaply repaired, the application of a patch to fabric obviously being simpler, quicker, and less expensive than mending a metal cylinder.

While the method of utilising the camel in actual wreck-raising naturally varies according to the character of the work, it is always far simpler to handle than the unwieldy rigid appliance. The balloon is submerged in the deflated condition, and so can be easily handled by divers, even when conditions are far from being favourable. Weighing exactly the same as the water it displaces, but little effort is required to manœuvre it into the desired position.

Portability and mobility appreciably accentuate its value. In the deflated condition, and when rolled up, but little bulk is offered, so that it can be passed readily through such small openings as the port-hole, while movement through the hatches is extremely simple.

The diver descends, taking the deflated camel with him. He penetrates into the hold of the vessel, and then, unrolling the bag, sets it in position, making it fast by means of the facilities provided. The number of camels required varies with the weight of the water it is necessary to displace to restore the buoyance of the ship.

Correcting a Cant.

When the camels have been suitably disposed flexible armoured hoses are coupled up with the valves in the camels, and the bags inflated. Naturally, as the camels expand so much water is ejected from the holds, and is replaced by air. When sufficient air has been pumped into the camels to impart the desired buoyancy the vessel, responding to the natural law, lifts to the surface.

There is no need to repair the injujry to the sunken vessel. There may be a hole in her side of sufficient dimensions to admit a suburban villa with ease, but it does not prevent her rising, because the air cannot escape from the camels. When the wreck has been lifted to the surface she can be hitched to waiting tugs, and thus be towed into harbour or beached, the balloons of course being maintained in the inflated condition meanwhile.

Of course, it may happen when a submerged ship is canted over to a severe angle, or even lying on her beam ends, that the disposition of the bags within the ship may fail to achieve the desired end satisfactorily. In this event camels can readily be attached to the external surface of the hull, and thus restore the wreck to an even keel.

The camels are of varying sizes. This is necessary to meet the special requirements of the peculiar work for which they have been designed. The largest to date, and which has been despatched to assist in salvaging a valuable wreck in the Mediterranean, is 40 feet in length by 10½ feet in diameter.

The connection through which the air is admitted is in triplicate, the admission valves being placed in three different positions, allowing that which is most convenient for coupling-up to the hose from the air compresser to be used. There is no compression within the balloon itself, the pressure never exceeding 5 lbs. per square inch of the external or hydrostatic pressure no matter what the depth may be. Consequently, to continue after the bag has been fully inflated is merely so much useless effort. The air escapes as rapidly as it is driven in.

New Wine in Old Bottles.

The means whereby this requirement is met constitutes one of the salient characteristics of the whole device. It must not be imagined that the employment of flexible camels for such work as this represents a new development. The fundamental idea is as old as the hills. The Chinese are stated to be the originators of the principle and to have pioneered its use centuries ago. From time to time efforts have been made to revive the system, but they have met with dismal failure, partly owing to the inherent difficulties of construction, but more particularly because of the problem of controlling inflation and preventing excessive pressure within the bag.

Now the water, or hydrostatic, pressure increases roughly by ½ lb. with each succeeding foot of depth. That is to say at a depth of 14 feet the water pressure is 7 lb. per square inch—approximately the same as the atmospheric pressure at sea-level. At a depth of 160 feet it is about 80 lb. per square inch. Consequently—explains the writer in *The World's Work*—it will be recognised that control of the internal pressure of the camel, irrespective of depth, is complicated, because as the wreck is rising the outer pressure is steadily and persistently falling.

It was the difficulty of controlling this varying pressure which floored so many inventors. Mr. Russell Gordon, however, has solved the problem by an automatic "foolproof" valve, positive in action, and which cannot possibly get out of order. By this valve the air pressure within the bag, cannot possibly be forced above the set 5 lb. excess, so that the strain upon the camel remains constant under every and varying condition.

A Practical Trial.

Apart from the saving in first cost which the flexible camel represents, it is also easier and cheaper to transport. Packed for shipment, a 100-ton bag occupies about 90 cubic feet or 2 tons shipping measurement. A steel camel of the same capacity would have a shipping measurement of approximately 90 tons. Whereas a flexible camel of 100 tons lifting capacity weighs about one ton, the rigid steel camel of equal effort weighs from fifteen to twenty times as much. Consequently, the saving in freightage charges alone would more than defray the cost of the balloon, while, of course, there is an equally marked saving in storage and handling charges.

The system has been subjected to exhaustive trials, has established its possibilities, and it is now being submitted to practical trial upon a spectacular scale. An 18,000-ton vessel came to grief in the Eastern Mediterranean. She lies in a precarious position, canted to a dangerous angle, and has her stern deeply submerged. Seeing that she is worth £600,000 the underwriters are loth to write her off as a total loss without making a big effort to recover her.

The plant which has been established at the scene of the wreck is of a most elaborate description, representing an investment of at least £80,000. But the most difficult phase of the whole undertaking is the restoration of the vessel to the even keel. The problem was thoroughly surveyed and the possibility of failure with the available plant being recognised, it was decided to employ the flexible camels for the peculiarly critical operation.

To this end the assistance of Mr. Russell Gordon was sought, and he has elaborated a battery of balloons for the work. They are the largest bags which so far have been constructed, measuring, when inflated, 40 feet in length by 10½ feet in diameter. The installation, involving an outlay of £3,000, has been despatched to the wreck.

The point to bear in mind, however, is that an expenditure of £3,000 has been incurred to conduct an operation which it was feared would be impracticable, with a plant valued at £80,000. Should the venture prove successful—and there is no reason to entertain any doubts upon this score—it will be seen that the whole science of wreck-raising is likely to undergo complete revolution.

Bringing Boats to Life.

The extremely economical solution of an expensive problem which this system offers constitutes an outstanding feature. The invention has already been recognised as offering the means of recovering vessels which hitherto have been regarded as beyond salvation. The system can be utilised up to any depth at which a diver can work, say, 150 feet, and it is immaterial whether the wreck be in a sheltered position such as a landlocked bay, or in open water.

The celerity with which the camels can be fixed in position enables the diver to take the utmost advantage of the tides, currents and weather. He is not called upon to essay any fatiguing work; he merely has to stow the bag within the vessel and to make the connection with the armoured hose communicating with the air compressor. Even if external attachment be essential it offers no supreme difficulty owing to the simplicity of the system of attachment.

Should the weather break after the bags have been set in position, the wreck may be left in safety. In the case of the externally attached camels no apprehensions need be entertained concerning their safety once they have been secured. When the weather moderates the essential connections can be made and inflation resumed.

The simplicity and inexpensiveness of the invention have resuscitated interest in the whole issue of raising vessels sunk through enemy torpedoes and mines. It is realised that here is a promising means of bringing to the surface many ships which otherwise would have to suffer complete abandonment, owing to the impracticabity of raising them with existing plant.

THE "DUMOSA" ON TRIAL.

During the past twelve months six vessels of the home-built merchant fleet commissioned by the Commonwealth Government have been launched.

The latest—the *Dumosa*—the second of the vessels built at the Williamstown Shipyard, was sent on her engine trials in Port Phillip on the 17th of last month. Unfortunately, a slight mishap to a feed pump interrupted the speed test of the *Dumosa*, and doubtless accounted for the fact that the highest speed obtained was 9.5 knots, which was slightly below that of her sister ship, the *Dromana*.

The engines, built by Messrs. Thompson & Co., Castlemaine, Victoria, are the triple expansion reciprocating type developing 3,500 I.H.P., and the trial proved them to be thoroughly satisfactory.

The vessel, which is to be commanded by Captain Thompson, is very comfortably fitted. Large and airy cabins amidship are steam-heated, and have the latest appointments, while the crew's quarters show a welcome improvement on vessels of an earlier pattern.

The *Dumosa* is 5,500 tons dead weight, and 3,500 tons gross. She has four hatches, and is fitted with ten steel cargo hoists controlled by steam winches of the latest design.

Amongst those on board for the trial were Senator Russell (representing the Federal Ministry), the secretary of the Prime Minister's Department (Mr. M. L. Shepherd), the manager of the Williamstown Yard (Mr. D. Pickering), the chief draughtsman (Mr. Hewison), the secretary of the ship construction branch (Mr. G. L. Campbell), Mr. McCowan (Lloyd's Surveyor), Mr. Rex Thompson (representing Thompson and Company, of Castlemaine, the makers of the engines), and Mr. W. A. Reynolds (of Messrs. Babcock, Wilcox and Company, the makers of the boilers). Captain J. Banks was pilot.

Seated at the President's table (right to left):—Sergeant J. M. Bennett, M.S.M., A.F.M. (bar); Capt. G. F. Hughes, M.C., A.F.C.; Lt.-Col. P. W. Woods, D.S.O.; Mr. E. J. Hart (Hon. Secretary); Sir Keith Smith, K.B.E.; Lt.-Col. W. Oswald Watt, O.B.E. (President); Capt. Sir Ross Smith, K.B.E., M.C. (bar), D.F.C. (2 bars), A.F.C.; Sir Thomas Hughes, M.L.C.; Capt. E. Telford Simpson; Capt. W. R. Munro; Capt. H. G. Watson, D.F.C. Standing:—Major Barton Adams; Capt. J. W. Wright, D.F.C.; Capt. G. F. Malley, M.C., A.F.C.

AERO CLUB BANQUET.

The Club Banquet to Sir Ross and Sir Keith Smith and Sergeant Bennett, held at the Voluntary Workers' Café, Elizabeth Street, Sydney, on February 19, was attended by some 250 members, and under the guidance of the President, Lieutenant-Colonel W. Oswald Watt, O.B.E., the function lost all air of formality, and became a convivial reunion of old comrades.

In proposing the toast of Sir Ross Smith and his gallant crew, Colonel Watt referred to his last meetings with Sir Ross Smith on the Sinai Peninsula in 1916, and Sir Keith Smith at Gosport. Tribute was paid to "the men who stay on the ground and keep the machine in the air." In this category Colonel Watt included not only the Equipment Officer and the Technical Officer, but also "those wonderful people—the mechanics."

The toast was supported by Sir Thomas Hughes, M.L.C., and Mr. E. J. Hart (Hon. Secretary), who briefly referred to the significance of the flight and its world-wide effect on civil aeronautics.

Sir Ross Smith, in reply, said: "I can say, with perfect honesty, that this is quite the best evening I have spent since my arrival in Australia. (*Cheers.*) We have all had a very happy gathering. The enjoyment of our very excellent dinner has been much heightened by having such charming ladies to minister to our creature comforts."

Sir Ross Smith concluded his general description of the flight with the following remark: "I think you will all agree with me that the future of aviation in Australia is particularly bright.

"It is up to all of us flying fellows who have returned, to impress upon the people of Australia the necessity of having an air force of our own for the defence of our own country."

Sir Keith Smith and Sergeant Bennett having also spoken, the remainder of the evening was devoted to an impromptu ball.

OUR QUESTION BOX

H. J. Cummings, Belalie North, S.A.—The information desired is given in a publication entitled "Model Gliders—How to Make and Fly them," by E. W. Twining—published in London by Percival Marshall & Co. The booklet is accompanied by coloured diagram of model aeroplane glider, showing top and bottom elevators and top and bottom main planes; also diagram showing side frames and struts for same. The whole is contained in an envelope and obtainable in Sydney from Swain & Company, Ltd. If desired, we will purchase a set on your behalf, price 1/6, plus postage.

Clement E. Ames (Torrensville).—The following announcement was made in the *Radio Amateur News* (September, 1919, p. 112):—"Dr. Pickard informs us that due to extended patent prosecution the article covering the use of the Crystal Detector as an oscillator cannot be released, but hopes to be in a position to do this shortly."

J. M. Bruce (Paddington).—Both are procurable from the Australectric Company, 97 Clarence Street, Sydney.

Jack Holt (S.S. Bulga).—Questions are answered through this column only. (1) Yes, certainly. (2) It is necessary for him to know this to enable him to navigate his ship in a seamanlike manager. (3) Must always be used in steam to compete with other companies.

H. O. Woodhouse (Orange).—We do not anticipate the school opening again. If it does we will keep your questions in mind.

Novice (Torrumbarry).—(1) Major-General J. G. Legge, C.B., C.M.G., states: "Australian timbers are particularly suitable for aircraft construction; Queensland maple, Tasmanian pine and Victorian mountain ash are largely employed for that purpose in British aeroplane factories as substitutes for American timbers. (*Sea, Land and Air*, November, 1918, p. 461.) Professor Warren, of Sydney University, is making exhaustive tests of all suitable Australian timbers, and we hope to publish the result of his researches in a later issue. (2) Armour plates would not be used; mild steel sheets are used to connect a horizontal to a vertical shaft. (3) If all the weights of the component parts are known and the position of their centres of gravity from some fixed datum line, then it is easy to calculate the position of the centre of gravity of the aeroplane as a whole, for it is only a matter of finding the position of the resultant of a number of parallel forces. The position may, however, be found experimentally as follows:—Let the height of the centre of gravity from the axle of the wheels be h, when the 'plane is horizontal, and d, its horizontal distance from the vertical through the axle. Let W be the total known weight of the 'plane and let θ be the angle made by the fuselage to the horizontal when the tail skid is resting on the ground. Let w_1 be the up load on the tail skid when the 'plane is horizontal, and w_2 the load on the skid when it is resting. Both these loads may be measured by means of a spring balance. Then if l be the distance from this wheel base to the point of support of the tail—

$$\text{(a)} \quad w_1 l = Wd$$
$$d = w_1 l / W$$

also (b)

$$W(d \cos\theta + h \sin\theta) = w_2(l \cos\theta + h \sin\theta)$$
$$h = \frac{w_2 - w_1}{W - w_2} l \cot\theta$$

Also the centre of gravity is clearly on the longitudinal plane of symmetry of the aeroplane, and its exact position is therefore known from equations (a) and (b). (4) This is done with a light fine string which is passed through the fabric from top to the bottom round each rib about every 4 in. and knotted at each turn, taking care to knot up fairly tightly.

R. E. Fishwick (Northam, W.A.).—Shipping companies are willing to take apprentices on payment of a premium, which is repaid as wages. The applicant must be under 16 years of age, and the term of apprenticeship is five years.

Oscillator (Redfern).—(1) Pennant Hills and Garden Island; they both operate continuously. (2) The Pennant Hills station has both a C.W. transmitter and a spark apparatus installed. The wave length is normally 600 metres. The Wireless Year Book for 1920 is a fund of information on wireless stations and other matters pertaining to the science. It it obtainable from the Wireless Press, 99 Clarence Street, Sydney. Price, 10/6, postage 6d.

E. R. Merton (Burwood).—For purposes of identification and, incidentally, for use as call letters for that particular aircraft when transmitting or receiving wireless signals, aircraft carry nationality and registration marks displayed to the best possible advantage and consisting of five letters of the alphabet in black on a white ground. The width of the letters must be two-thirds of their height and must not exceed 2.5 metres in height, the space between the letters must be half their width. The first letter represents the machine's nationality as, on Sir Ross Smith's *Vimy*, "G" stands for the British Empire, and the four letters following, prefaced by a hyphen, the registration marks.

MECHANICAL TELEGRAPHISTS

DEVICES WHICH HELP THE OPERATOR.

BY

ARTHUR RUSSELL.

Since Morse Telegraphy was invented many efforts have been made to get an automatic device which would avoid the manual labour of working the telegraph key.

The first useful instrument is credited to Charles Wheatstone, inventor of the early Wheatstone A.B.C. telegraph, and later of the Wheatstone Automatic system of telegraphy at present in use throughout Australia. It consisted of a board about one foot square into which long and short strips of brass, to correspond to the dots and dashes of the Morse alphabet, were let, the necessary connections being made beneath. To "send" with this instrument all that was required was to firmly brush the brass strips, corresponding to the letters wanted, with a metallic brush which was connected by flexible wire to the battery. The advantage was that anyone could "operate" without previous experience. The disadvantage was its lack of speed, and for this reason it was soon discarded. Several of these instruments are still to be found among the curios of the large telegraph offices of Australia.

Telegraphists' Cramp.

From then until comparatively recently nothing was evolved in this direction important enough to claim attention. As the telegraphic business increased "Telegraphists' Cramp," a paralytic disease similar to "Writers' Cramp," began to seriously affected the operators. Worn-out telegraphists became numerous, and it was imperative that mechanism should be employed.

The first machine worthy of mention was the Mecograph, which, with slight modifications, is still largely used. On this machine two levers are supplied and a horizontal instead of a vertical action is used. This has the effect of bringing a new set of nerves into play, which, in itself, is a great boon. But the machine goes further; it provides that a pressure on the left-hand lever will make a continuous stream of good, firm dots, while the dashes are made by a pressure on the right-hand lever.

Originally two methods of making dots were used. One was by releasing a weight which caused a thin spring to vibrate and make contact. The other was by electrical means similar to the vibrations of the ordinary electric bell. The latter method is not now used as it required an extra battery to work it, consequently being more cumbersome without being any improvement on the weight-worked machine.

The next dot-making instrument to come into prominence was the "Pendograph," the invention of Mr. Albert MacDonald, a South Australian telegraphist. The great difference in his machine is that the weight, instead of being horizontal, is arranged in a vertical position like a pendulum, which arrangement, the inventor claims, makes the dots firmer and more even, and improves their carrying capacity. Mr. Mac Donald's instruments are used in many of the main offices in Australasia, and have never failed to give satisfaction on land lines, cables or wireless.

Australian Inventions.

An improvement on the foregoing machines is the "Dunduplex," an American arrangement, which has two methods of manipulation on the one instrument. It can be worked either by levers or by small stops, similar to typewriter keys.

The latest sending instrument is the "Auto-Morse," invented by Mr. N. Thomas, also of South Australia. This instrument makes both dots and dashes, a slight pressure on the dash key resulting in an unlimited supply of dashes. A third lever makes it possible to use the instrument either as an ordinary key, a dot-making instrument, or a combined dot and dash producer. The experts of the Commonwealth Telegraph Department have tested the instrument and recommended its use both for telegraphists suffering from "Glass Arm," and those who,

though not yet troubled with the complaint, are anxious to ease the strain on their wrists.

There is also the "Yettman" combined typewriter and automatic sending machine. This combination can be used either as an ordinary typewriter or, by making a simple mechanical change such as the throwing over of a lever, as a machine which, on depressing the same keys as used for typing, produces telegraphic symbols corresponding to the dots and dashes of the Morse Code.

Owing to its complicated mechanism this machine did not come into prominence in Australia, and the two or three samples that were purchased are never used except, perhaps, on an odd occasion to demonstrate the wonders of telegraphy to visitors.

WIRELESS INSTITUTE OF AUSTRALIA

NEW SOUTH WALES DIVISION.

The sixth annual general meeting will be held next month. Members will receive due notice of the date.

The Institute wishes it understood that it has been formed with the object of protecting the interests of the experimenter and to assist him in his work. The provision of club and practice rooms is under consideration by the Council. A practice class is held at Wireless House, 97 Clarence Street, each Friday evening at 8 o'clock, when members should attend and qualify for the "12 word per minute" standard. Naval Regulations require experimenters to be able to receive at least at this rate, and to have certain knowledge of the use of the valve. Members may be tested on request by the Testing Committee in attendance.

Mr. Phil Renshaw has donated an Expanse "A" two-filament valve as a prize, to be competed for by members only, for the most correct reception of a ten minute buzzer test at 20 words per minute, mixed alphabet. The competition will take place on Friday evening, May 7, at Wireless House. It is hoped that all members will enter for this competition to brush up their bazaar work and make the contest keen. Other competitions will follow if members are sufficiently interested.

Intending members are invited to write to the Hon. Secretary, Mr. Malcolm Perry, Box 2, King Street Post Office, Sydney, for particulars of membership. The subscription is £1/1/- per annum for metropolitan members and 10/6 per annum for country members.

At a council meeting held at Wireless House, Sydney, on January 23, it was decided that the title of the Institute be altered from "Section" to "Division," and that a general adoption be urged.

NEW ZEALAND WIRELESS INSTITUTE

A meeting of the Institute was held on January 16, at Wellington. The rules of the Institute were adopted, and it was resolved that incorporation with the Australian body be sought. It was decided to invite suggestions for a suitable membership badge. A lecture was given by Mr. Mulholland, who traced wireless developments in England where licenses are being issued for Receiving Sets, and in America where restrictions were removed so long ago as the beginning of October, 1919. Referring to the latest type of valve receivers, he expalined that this type of receiver made possible the reception of wireless signals up to 12,000 miles.

He regarded Wireless Telephony as the best medium for experimental work, and mentioned several directions in which experiments might be carried out to improve the existing apparatus.

Branches of the Institute have been formed at Dunedin, Stratford, New Plymouth and Hawera.

FOR THE WIRELESS EXPERIMENTER

THE DESIGN OF RECEIVING CONDENSERS

BY

RAYMOND EVANS.

Properly designed condensers are a valuable asset to a good receiver.

This is especially true of the modern type of apparatus, as the correct distribution of capacity in the various elements of the circuit, plays a most important part in "bringing in" those much-sought, long-distance "sigs."

In designing a condenser for any particular purpose it is desirable that the experimenter be in a position to calculate approximately the value of the desired capacity. In simple language it might be said that a receiving condenser is an apparatus designed to be used in a radio circuit to shorten the electrical length or periodicity of that circuit by its ability to store up electrostatic energy. It consists generally of a pair of conducting surfaces or plates, arranged with their surfaces relatively close together, and separated by an insulating medium known as the dielectric.

This dielectric can be either of air or any other insulator. It is one of the chief factors which will determine the capacity of a given condenser.

A table of various dielectric constants will be found on this page.

When the two conducting plates of a condenser are parallel, close together and of a large area, the capacity is given by the formula:—

$$C = 0.0885 \times 10^{-6} \frac{KA}{D}$$

where

C is in microfarads

A = area of one side of one conducting plate in square centimetres.

K = the dielectric constant as shown on table.

D = thickness of dielectric between plates in centimetres.

Another formula is shown below and is, perhaps, simpler:—

$$C = \frac{KA}{4\pi D \times 9 \times 10^5} \quad \text{where } \pi = 4.1416.$$

This formula can be reversed, so that should the capacity be known, the area of plates required can be determined when designing a condenser, thus:—

$$C 4\pi D \times 9 \times 10^5 = KA$$

These formulæ are only roughly approximate, but should be of considerable assistance to the experimenter when building his own receiver. The same formulæ can be used for condensers of more than two plates by taking the total area of the active surfaces of all plates attached to *one* terminal of the condenser. Thus it will be seen that the capacity of a condenser is proportional to the area of its plates, their distance apart and the value of the dielectric used.

We mentioned earlier in this article, that the function of a receiving condenser is to decrease the electrical length of a radio frequency circuit, which in other words means to increase the frequency and shorten the wave length. This is exactly the opposite effect to that obtained by the insertion of an inductance coil, this decreases the frequency due to its "loading" or "choking" effect.

A variable combination of these two elements, namely, inductance and capacity, either arranged in series as in Figure 2, or in parallel as in Figure 3, forms a very desirable arrangement and enables a more accurate balance than could otherwise be obtained.

If a condenser is placed in series with an inductance coil, it will tend to increase the frequency by partially neutralising the choking effect of the inductance coil, and is equivalent to removing a number of turns from it.

Thus a condenser, when placed in series with an inductance, shortens the wave length. In a like manner, should a condenser be placed in parallel with an inductance coil, it will tend to increase the choking effect of the coil, and is equivalent to adding extra turns to the coil.

Thus a condenser placed in parallel with an inductance increases the wave length. This statement requires most careful consideration, being a most important factor in the design of experimental receiving apparatus.

Dielectric Constants.

Paraffined rice-paper	3.65
Bees'-waxed rice-paper	2.53
Shellac-ed rice-paper	3.60 to 4.25
Mica sheet (pure)	4.00 to 8.00
Flint glass (light)	6.85
Common glass (radio freq)	4.21
Castor oil	4.80
Transformer oil	2.50
Ebonite	2.05 to 3.15
Air (at ordinary pressure)	1.00

Condensers used in modern receiving practice can be divided into three chief classes, namely:—

(*a*) fixed value condensers,

(*b*) variable or moving plate condensers,

(*c*) a combination of both fixed and variable.

An example of a simple "fixed" condenser is shown in Figure 1. It consists of a number of sheets of tin- or copper-foil inter-leaved with larger sheets of paraffined paper, alternate sheets of foil being joined together, forming a lug for connection at each end.

This type of condenser is generally used in shunting across the terminals of telephone receivers in the ordinary crystal circuit, as in Figure 13. It is sometimes placed in a circuit to act as a path for an alternating current while acting as a "block" for continuous cur-

block condenser
fig. 1

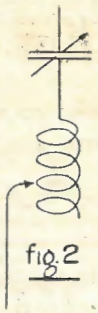


fig. 2

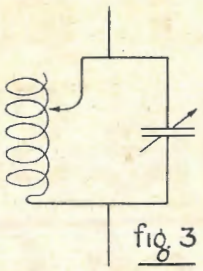


fig. 3

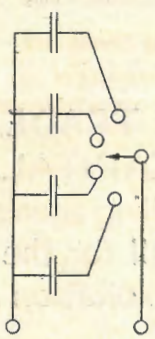


fig. 4

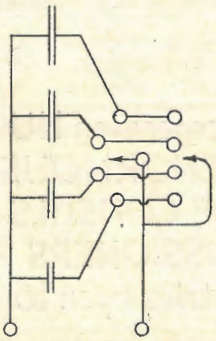


fig. 5

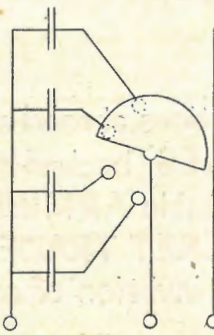


fig. 6

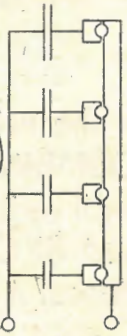


fig. 7

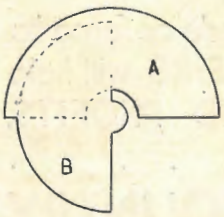


fig. 8

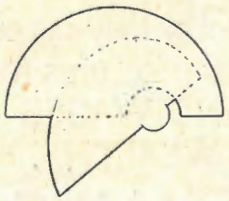


fig. 9

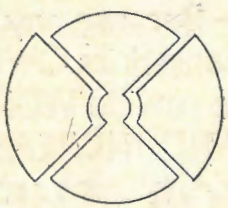


fig. 10

fig. 11

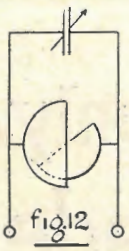


fig. 12

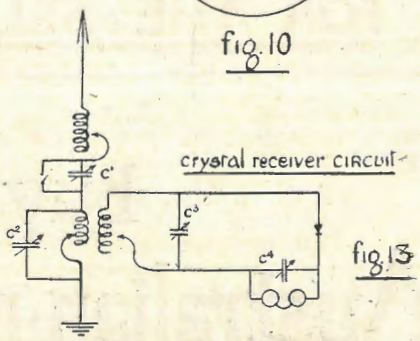


fig. 13

Modern Types of Receiving Condensers

R. Evans

rent. It is then called a "blocking condenser." This type can be arranged in units of various sizes and connected to the points of a switch, as shown in Figure 4. Another arrangement is shown in Figure 5, which enables the total capacity of any two units being brought in. The devicé consists of a point switch, a row of terminals and a flexible lead. Figure 6 illustrates what is generally termed a "collector switch" and consists o fa springy copper or brass fan arranged to move across the faces of a number of contact studs, thus short-circuiting those beneath the fan.

Still yet another device is shown in Figure 7, the necessary capacity being obtained by the insertion of plugs. All the above are very suitable for telephone capacities of crystal receivers, a rough variation beeing at least desirable in order to allow the use of telephones of varying resistance and inductance.

They can also be made use of for increasing the natural wave length of the aerial circuit, by placing in position C^2 Figure 13, or for decreasing the natural wave length in the position C^1.

If used in both positions, provision should be made for "shorting" the condenser C^1 by means of a small switch.

Moving plate condensers are divided up into several patterns, the chief of which are the semi-circular airvane pattern, the sliding plate, the tubular and the variable space, or "Doule" condenser.

Figure 8 illustrates the principle of the airvane condenser, *A* being the fixed and *B* the moving plates. These plates are generally made up of medium gauge brass, copper, or zinc sheet pressed perfectly flat, and spaced about ⅛ in. apart by means of brass or copper washers. An average sized condenser of this pattern would contain about 20 fixed and 19 moving plates of an approximate diameter of 4 in.

It can be readily undersood, that, on turning the knob attached to the spindle of the moving plates, they will interleave with the fixed plates, the amount of plate actually enclosed determining the capacity.

Airvane condensers are generally mounted in a case of wood or metal, whereon is engraved a pointer and scale, to indicate the relative capacities. If the case is of metal, it can be filled with castor or transformer oil, thus increasing the capacity from 2.05 to 3.15. Modifications in the form of plates in airvane condensers will be mentioned at a later stage.

Sliding plate condensers are generally provided with rectangular plates secured between strips of ebonite, the moving plates sliding in slots in the ebonite strips provided for the purpose. In a certain condenser of this type the plates measure 6 x 4 in., there being 4 fixed and 3 moving plates.

Tubular condensers are very useful in positions where a small, though continuously variable capacity, is required. They consist generally of a tube or tubes of brass, arranged to move over a tube or rod, also of brass, and of smaller diameter, the small space intervening being the dielectric of either air, ebonite, mica or waxed paper.

A commercial type of this condenser is known as the "billi," and is connected across the terminals of the secondary coil as in the position C^3 Figure 13.

The variable-space or "Doule" condensers consist of two circular plates arranged so that the space between them can be varied by means of a coarsely threaded rod to which the knob is attached in lieu of a nut, the lower end of the rod being secured to the bottom plate as shown in Figure II. The dielectric is of mica .001 in. in thickness. These condensers are quite suitable for all positions requiring very small capacity as in "Audion" control, or secondary tuning.

Of the various types of condensers just described, none are more universally used than the rotary or airvane type These can be used either in series, with the primary coil as C^1, in parallel as C^2 or across the secondary as C^3. They may also be used in all three positions, a very small condenser being required in the latter position—.0005 microfarad is a usual value.

A combination of both the adjustable block condenser and the variable airvane condenser is a very desirable adjunct to any set, a variable capacity of large value is then obtained (Figure 12). The best position for this arrangement is either C^1 or C^2 or both.

A particular shape of plate used in a certain airvane condenser is shown in Figure 9. It is known as the "decremeter" pattern, and has this advantage: the change of percentage capacity is the same throughout the entire range of the condenser.

Another shape of plate is known as the butterfly pattern, both the fixed and moving plates being shown in Figure 10. The scale used with the above only occupies 90° of the circle. Its main advantage lies in the fact of its ability to preserve its balance while in a horizontal position, thus lending itself readily to panel use.

Ordinary semicircular vane variable condensers are sometimes adapted for panel use by means of either a counterbalanee weight on the main spindle, or a tightening adjustment which causes a spring cup to bear on the moving part, and eliminating the necessity for compensating for the weight of the moving plates.

It is considered to be the correct practice nowadays to provide all condensers used on valve circuits with handles at least 8 in. in length. The reason for this is that the circuit is generally so delicately sensitive that the proximity of the experimenter's body throws the set out of balance, on account of the extra capacity thrown into the circuit. These extra capacities exist in all parts of the valve circuit and are particularly undesirable because they vary when part of the circuit or conductors adjacent are moved. Thus it is difficult to keep the capacity of the circuit constant.

This effect can be minimised by keeping the condenser at a considerable distance from conducting masses, and likewise from the body of the operator.

(END OF VOLUME 2.)