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AN EPOCH-MAKING VISIT

THE HON. ALEXANDER J. POYNTON, Acting Minister for Navy, travelled from Melbourne to Sydney to speak, on Saturday, July 27, at the launching of H.M.A.S. *Adelaide*.

This done, the Minister next day continued his journey North and returned to Sydney on July 30.

During this short interval an important Australian industry had suddenly sprung into existence.

Mr. Poynton had paid his first visit to Newcastle.

* * * *

The evidence of his own eyes satisfied the Minister on several material points:—

(*a*) That valuable hematite deposits exist in Australia;

(*b*) That they yield an infinitely higher percentage of metallic iron than those of any other country in the world (*i.e.*, 68% as against America's record of from 50% to 55%, the next best being Belgium, France and Germany with an average of 36% and Great Britain with 30%).

(*c*) That the steel works of the Broken Hill Pty., Ltd., at Port Waratah, convert metallic iron into steel at a lower cost than that at which it could be imported.

(*d*) That a plant is being installed whereby the steel can be rolled into plates to a thickness of .128 inch, or approximately one-eighth of an inch.

(*e*) That adjoining the steel works is an up-to-date naval dockyard capable of almost illimitable expansion.

On Monday, July 29, Mr. Poynton made a tour of the Broken Hill Steel Works and next day inspected the naval dockyard at Walsh Island.

Interviewed in his hotel at Newcastle the Minister informed *Sea, Land and Air* that this would be by no means his last visit to the port. Until that day, said he, he had never grasped its full significance or realised the tremendous part it must eventually play in the general advancement of Australia as a shipbuilding nation. The day has dawned when we shall cease to be dependent upon the steel exports of other countries.

"What I saw at Port Waratah has impressed me very strongly," said Mr. Poynton. "Our steel works at this juncture are of incalculable value to us and should be employed to the fullest possible extent. Immediately on my return to Melbourne I shall recommend that a contract be let at Port Waratah for the supply of material for at least twenty steel ships."

According to Mr. Poynton, the chief impediment to speedy construction has been delay in the delivery of steel plates from overseas. Sufficient of these for the building of six ships are now on order from America, and in the light of past experience it will not be remarkable if materials required during the initial stages of construction are again the last to be delivered. It is confidently predicted that by next month the Broken Hill Steel Works will be producing the whole of Australia's requirements in this direction.

Commenting on his visit to the shipyard on Walsh Island, the Minister, who has travelled extensively in Europe, Canada and the United States, announced that this was in every way the finest he had seen and that he had that day arranged for the building there of six more steel ships of the Isherwood type. If the material were available he would have no hesitation in increasing this contract by fifty per cent., for in the Walsh Island yards fully a dozen keels could be laid simultaneously and the slips kept continuously occupied without the slightest difficulty.

* * * *

The shipbuilding record recently established at the Commonwealth Naval Dockyard at Cockatoo Island is a record of which all concerned are justifiably proud and one to which universal publicity should be given. Australian labour, in the space of barely eight months, has built and launched the biggest battleship ever constructed in a British colony.

In the case of the *Adelaide,* however, the steel plates were imported from abroad and ordered subject to all delays arising from possible disorganisation at the other end besides being liable to all risks incidental to war-time shipment.

Mr. Poynton sees no reason why Australia's future battleships shall not be wholly built in Australia and launched without a penny of the labour bill going out of the country.

* * * *

May the Minister's prophecy be abundantly realised!

SONG OF THE SHIPBUILDER

We work in the oldest stuff of the world—
Water and iron and fire and air,
And the courage of men with a flag unfurled,
To build a bridge from here to there.
With a fleet of ships we'll span the sea,
To carry supplies to you in France—
Guns and food and T.N.T.—
And whatever you need for the big advance.
And what's the difference where we work—
At a bench with a hammer, or a trench at the front?
We all are needed and will not shirk;
We are done with delays! Count us in at the hunt?
And what's the difference how we fight—
With blood or money, labour or guns?
We'll keep the bridge building day and night,
Till we trestle the sea to get to the Huns.
And what's the difference where you are?
We're all on the job with a will to win;
So, boys, do your bit with your gun in the war;
We're doing our bit with the rivet machine.
We'll keep the bridge building night and day,
We'll speed up ahead of the submarine.
We'll build to you, boys, so keep 'em at bay;
We're doing our bit with the rivet machine.
Boys, keep up your courage, we're getting to you,
Khâki or overalls, count us all in—
Knapsacks or dinner-pails, we're fighting, too,
And doing our bit with the rivet machine.
In camp or shipyard we all of us swear
That the hope ye are building will span to Berlin;
We're all of us soldiers, to do or to dare;
And we're doing our bit with the rivet machine.—L.K.A. in *Wireless Age.*

LAUNCHING THE "ADELAIDE"

The launching at Cockatoo Island (N.S.W.) on Saturday, July 27, 1918, of Australia's latest warship, H.M.A.S. *Adelaide,* was the most impressive function ever held in any Australian dockyard, and was witnessed by some 12,000 persons.

The Vice-regal party comprised Their Excellencies the Governor-General, Sir Ronald Munro Ferguson, P.C., G.C.M.G., LL.D., and Lady Helen Munro Ferguson, attended by Captain Haskett Smith and Captain Barton, As.D.C.; Their Excellencies Sir Walter Davidson, K.C.M.B., and Lady Davidson, with the two Misses Davidson, attended by Captain Stanham and Captain Saltmarshe, As.D.C.; and Their Excellencies Sir Arthur Stanley, K.C.M.G., with Lady Stanley.

Invitations had been issued by the Commonwealth Government to all Federal and State Ministers, Senators and Members of Parliament, the State Premier, Lord Mayor and Aldermen of Sydney, and to the principal Parliamentary and Government officials, heads of Churches, judges, naval and military officers and many others.

Among those strongly in evidence were the Acting Minister for Navy, Members of the Navy Board, and, of course, the official staff of the Commonwealth Naval Dockyard, the latter being represented by Mr. J. J. King-Salter, R.C.N.C., M.I.N.A.,

Distinguished Visitors Offer Prayer for "Those in Peril on the Sea."

General Manager; Mr. J. W. Clark, M.I.N.A., Assistant General Manager and Shipyard Manager; Engineer Commander Barnes, R.A.N.; Mr. J. Payne, Chief Electrical Engineer; Mr. G. E. F. Lawes, Deputy Naval Store Officer; Dr. R. A. Eakin, Medical Officer; and other departmental officers.

In addition to the above, the captain and officers of the warship of one our neighbouring Allies were present, together with a contingent of the ship's company from the same vessel, also the officers and men of one of our own cruisers now in harbour, and the boys from H.M.A.S. *Tingira*.

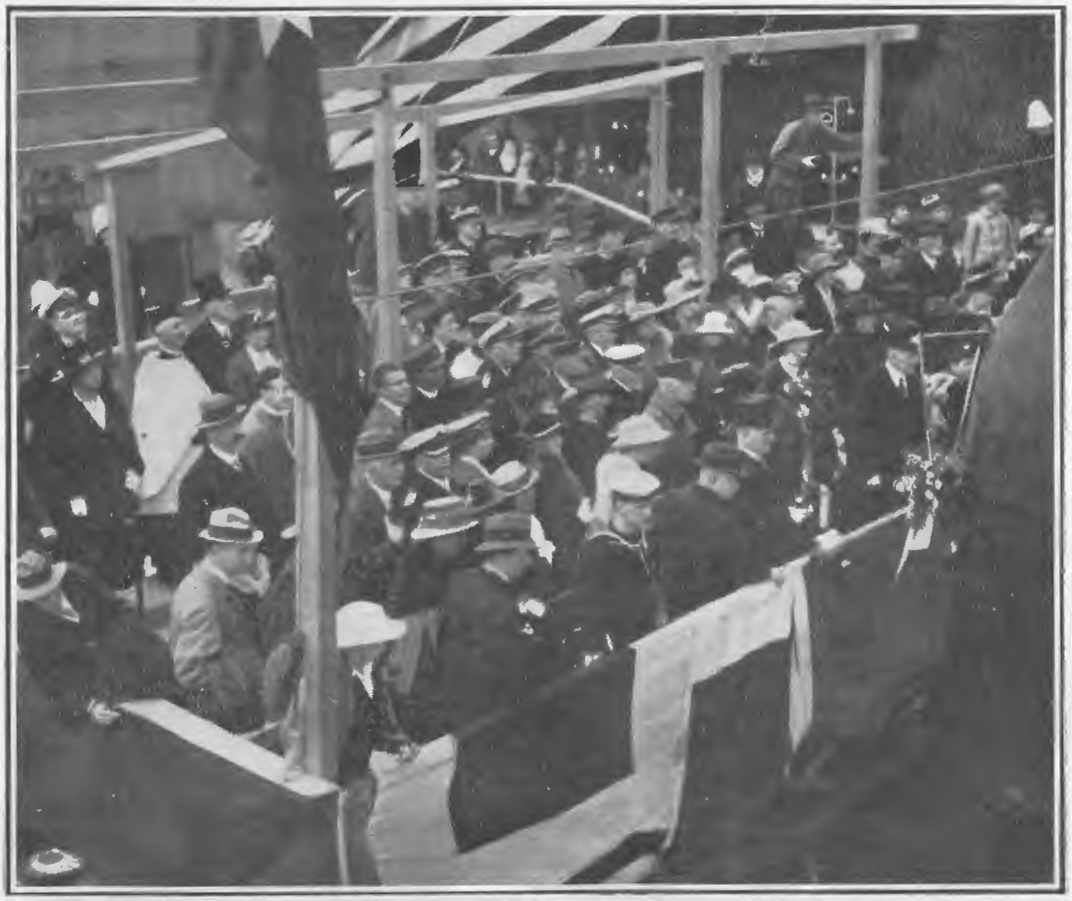
The principal guests were received by Mr. G. H. Wise (representing the Acting Prime Minister), Mr. A. J. Poynton, Acting Minister for Navy, Admiral Sir Walter Creswell, K.C.M.G. (representing the Navy Board) and Mr. J. J. King-Salter.

His Excellency the Governor-General, before proceeding to the launching platform, inspected the Naval Guard of Honour, supplied by the Naval Reservists (under Lieutenant Read, R.A.N.R.), after which Lady Helen was presented with a bouquet of flowers by Miss Peggy King-Salter, the General Manager's daughter.

As a final "preliminary" the Naval Chaplain, Rev. Allen Payne, conducted a short religious service, at the conclusion of which Lady Helen Munro Ferguson, in the following words, performed the baptismal ceremony:—

> "I name this ship *Adelaide*. May she ever be victorious and may the blessing of God rest on all those who sail in her."

Simultaneously Her Excellency broke a bottle of Australian wine on the bow of Australia's new warship. As the wine dripped from the bouquet in which its bottle had lain cunningly camouflaged, the slipway upon which the *Adelaide* rested



"She's Off!"

Launched.

was at once transformed into a veritable hive of industry. Chocks tightly wedged between the keel and the bed of the slip were now vigorously attacked by a staff of labourers who in a very few seconds had hammered away the last wedge.

The *Adelaide* was now held only by a single rope secured to the launching platform. The severance of this would release two heavy weights, and other machinery would at the same time be set in motion.

Lady Helen was handed a casket containing mallet and chisel. The moment for launching had arrived. The rope was duly severed and, following an anxious pause (as the tense faces on the official photograph will confirm) the warship began to move.

A few seconds later, to the accompaniment of deafening cheers from spectators and shrill "cock-a-doodle-doo's" from the sirens of countless launches, tugs, yachts, ferries, barges and other harbour craft, the *Adelaide* glided smoothly into her native element and anchored.

After an exchange of mutual congratulations on the launching platform the proceedings were terminated with speeches by His Excellency the Governor-General, the Acting Minister for Navy and the Acting Minister for Defence.

Mr. A. Poynton, Acting Minister for Navy, in formally moving a vote of thanks to Her Excellency Lady Helen Munro Ferguson, said that he had just received a cable from the Lords Commissioner of the Admiralty, the message being as follows:—

> "Wish God-speed to H.M.A.S. *Adelaide* and all who sail in her. We hope that she will follow the glorious traditions set by her sister-ships."

The speaker then announced that the

Minister for Navy, Sir Joseph Cook, G.C.M.G., had cabled from London the following:—

"Congratulations to all concerned in the fine achievement. The *Adelaide* will be another buttress of the steel wall of the Empire, a welcome addition to the Australian warships now so worthily maintaining the best naval traditions in the North Sea and a further assurance of our ultimate victory. Advance Australia!"

Mr. Poynton warmly congratulated and thanked all those who had been connected with the magnificent task of building and launching the warship and drew comparison between the time occupied on the slip by her and that taken in pre-war days by a similar vessel constructed in a British naval dockyard. The *Adelaide* was on the slip 8½ months, the British vessel 11 months. The average weekly weights worked into the hulls were 65 and 51 tons respectively, the maximum for any one week on the vessel just launched being 116 tons, as against 113 tons on the British cruiser.

Difficulties similar to those encountered in the construction of Australia's first ships had been experienced in the United States with regard to their earlier shipbuilding proposals. As an instance the speaker mentioned the first sixteen destroyers authorised, in 1898, by the United States Navy, the average time from laying the keel of these till the actual launching being almost exactly two years.

During the ten years prior to the present war, continued the speaker, Congress had authorised a yearly average of five or six destroyers, and records of their construction show their average time on the ways as almost exactly eleven months. In the case of the numerous American destroyers launched during the last year, however, the average time had been reduced to slightly over five months—or somewhat less than half the time occupied under peace conditions, but, added Mr. Poynton, a destroyer is only about one-fifth of the size of the vessel just launched and the record of the *Adelaide* was therefore all the more creditable.

The speaker had, he said, a further message to deliver, particularly to the workers. This message, he explained, was originally addressed to the workers on shipbuilding in America by Mr. Crawford Vaughan, an Australian war-worker now resident in the United States.

"Every man who drives a rivet is driving a nail into the Kaiser's coffin.

"Every man working in a shipyard is working in a fortress of freedom.

"Every man behind a compressed-air riveting machine should regard himself as behind a machine gun, for he is doing his bit as much as if he were in the firing line.

"A hail of rivets is as effective as a hail of bullets, for without rivets being sent home the bullets cannot be fired.

"There can be but one strike during this war; that is the strike for freedom, as your forefathers struck at Lexington and Bunker Hill.

"Of all Unions the one upon which no real American can go back at this hour is the Union of the American Republic."

These words, commented the Minister, were equally applicable to Australia in her present needs. He would paraphrase the last sentence thus: "Of all Unions the one upon which no real Australian can go back at this hour is the Union of Empire." (Prolonged applause.)

The Minister said that the slip just vacated would be occupied by a vessel of a mercantile type, to be built immediately. He could promise them that, if they could maintain their present good record, none of them need be idle for a day through lack of work. One of the Isherwood ships had been laid down on the other side of the yard and more would follow. He emphasised the urgency of building ships.

Continuing, the speaker called attention to records of losses through enemy submarine action. These, at the end of 1917, totalled approximately 12,000,000 tons, which could be made good only by the launching of two thousand four hundred vessels, each of a tonnage not less than that of the *Adelaide*. While the Imperial Navy had to some extent reduced the submarine menace, there was yet much to be accomplished in that direction and recent advices record losses for the month of June, 1918, of upwards of 300,000 tons of Allied shipping. For example, the recent loss of the liner *Justicia* (32,000 tons) represented in itself the equivalent of more than six times the tonnage capacity of the vessel they had just launched.

Mr. Poynton now referred to achievements of the British Navy. John Holland, in his discourse on the Navy, had written, in 1638:—

"The naval part is the thread that runs through the whole woof, the burden of the song and the scope of the text."

He recalled the spectacular demonstration by the British Fleet at Spithead in July, 1914 and the famous order to "Stand fast" given on the 26th of that month. War clouds already darkened the horizon and, although no ultimatum had yet been issued by Austria, it was evident that trouble was brewing in Europe. Normally, at the conclusion of the inspection of the First, Second and Third Fleets, these would have returned to home ports, and there most of the crews discharged. However, under sealed orders, the combined Fleets now proceeded full steam ahead to the North Sea and, in a comparatively short time, locked up the entire German Navy, with the exception of a few vessels which subsequently did raiding work. A well-known writer, continued Mr. Poynton, has described the North Sea as being of incalculable importance and vital to all operations of the Allies. Command of its waters and outlets is indispensable, for this sea represents the centre and hub of naval influence. It is the key of all hostilities, and solely because the Grand Fleet holds the guard in the North Sea, millions of men, horses, guns, munitions and stores of every conceivable variety had entered French ports for the service of the Allies.

If sea communication between the Allies had been broken what would have been our fate at the hands of the victors?

After bottling up the main German Fleet there still remained at large the East Asian Squadron, under Admiral Count von Spee. This was located in the East and comprised the armoured cruisers *Scharnhorst* and *Gneisenau,* with several additional warships, including the notorious *Emden.*

At about this time the Japanese declared war and on August 23 the Australian Fleet, under Admiral Patey, and the Japanese Squadron, under Admiral Kato, were stretched out to blockade and intercept it; but von Spee evaded them and remained at large until December 7, 1914, when Admiral Sturdee (with battle cruisers *Inflexible* and *Invincible* and other light cruisers), after having steamed 7,000 miles in pursuit, finally brought the raiding fleet to bay off Falkland Islands, and put an end to von Spee's activities.

Before concluding, he would like to mention what he regarded as one of the most magnificent instances of bravery recorded in naval history. He referred to the blocking of the channel at Ostende on April 22 by the *Vindictive* and to the blocking of the Bruges Canal at Zeebrugge by the *Intrepid, Thetis* and *Iphigenia* on May 9. *"As in life so in death, defying the enemy to pass!"* quoted Mr. Poynton.

The Hon. A. J. Poynton, M.H.R.,
Acting Minister for Navy.

Eleven Australians had been engaged in that brilliant undertaking and he had read with very great pleasure the cabled announcement that His Majesty the King had conferred honours on the majority of those participating.

In proclaiming the spirit of Britain and her Allies to-day, the speaker made reference to a famous author, who, as far back as 1558, said:—

> "There shall be neither sickness nor death that shall make us yield until this service is ended."

He strongly commended the resolution passed recently at Washington, wherein it was agreed that there should be no peace until Germany had been crushed.

In conclusion, he drew attention to Senator Lewis's warning to the American nation against the false propaganda now *en route* to America from Italian sources, in which

it is stated that "German plans involve the raising of an army of stupendous force, to assail the United States in the Pacific Ocean in a new war."

Mr. G. H. Wise, Acting-Minister for Defence, in seconding the previous speaker's motion of thanks, said:—

"On behalf of the Acting Prime Minister, who is unfortunately unable to be present to-day, it affords me great pleasure in extending my hearty congratulations to all those concerned in the successful launching of this fine vessel. We must always bear in mind that, no matter how strong our land forces may be, the British Empire cannot exist unless she has control of the sea. That is the great difference between the British nation and the German nation. Germany is a land power; Britain is a sea power. Before Germany is defeated we must be victorious over her land forces, as, in the old days, we were victorious over Napoleon's forces at Waterloo. On the other hand, if the war should end to-morrow and leave us without control of the sea, we could not exist as a nation.

"It is indeed very gratifying to me to be able to take part in the celebration of the launch of another vessel of the Australian fleet. There was a great difference of opinion at one time as to whether we should establish a fleet of our own; but I am sure that everyone is now of the unanimous opinion that the right thing was done. Lady Helen is closely connected with the Australian Navy; she launched the destroyer *Torrens* at this Dockyard and to-day she has launched this new cruiser, the *Adelaide*. I hope all these vessels will be successful, that they will keep up the traditions of the British Navy and that Her Excellency will live long to see the Australian Navy covered in glory."

His Excellency the Governor-General, in reply, said:—

"Your Excellencies, Mr. Poynton, Mr. Wise, ladies and gentlemen: I have to thank you in cordial terms for your vote of thanks and to assure you of the great satisfaction it has been to Her Excellency to launch to-day His Majesty's Australian Ship *Adelaide*. On behalf of us both I congratulate the Government, Mr. King-Salter and the whole Dockyard on their latest achievement. Her sister-ship, the *Brisbane*, is one of the best of her class afloat. May the *Adelaide* be her most formidable competitor!

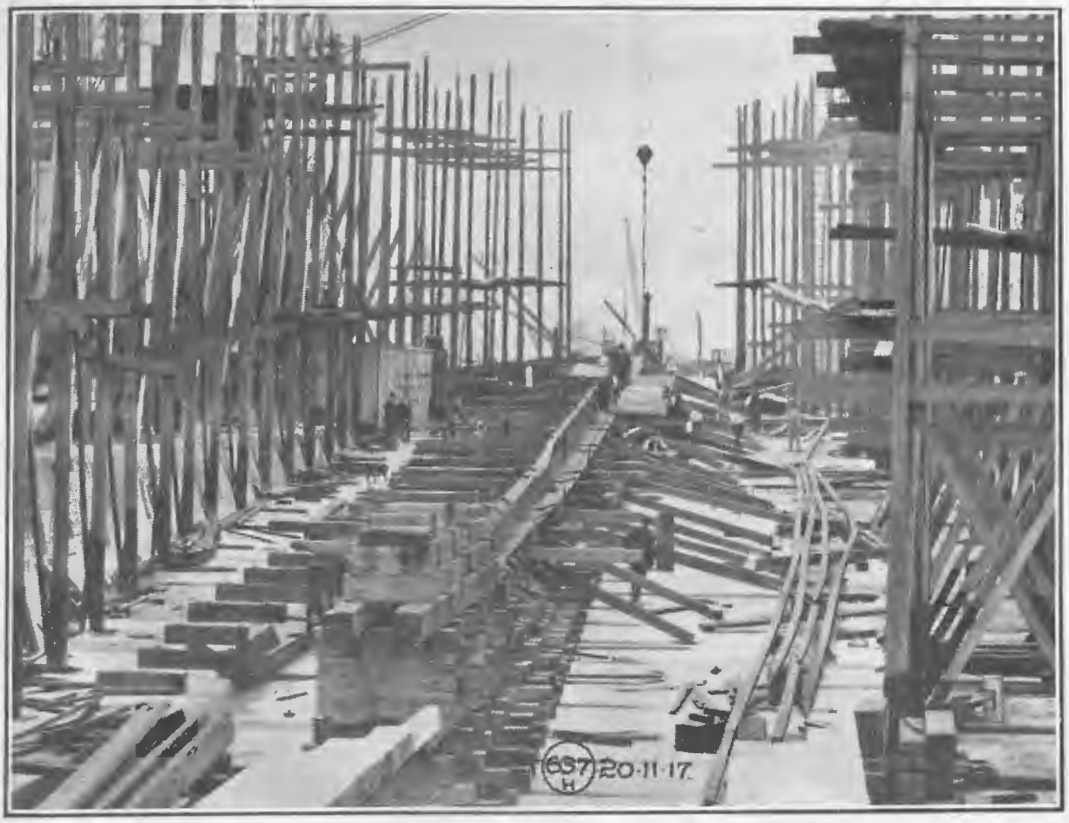
"Our new cruiser has done well by taking the water in double-quick time after the laying of her keel. Her record may be broken on the other side of the Pacific by the highly-organised American steel industry, but our record is very satisfactory and reflects the highest credit on all concerned. I hope it will open a new chapter in Australian industry. May the clang of the riveters keep time with the boom of the guns. We are out to win the war and by the efforts of our shipbuilders and workmen and by the industry of the whole nation in every shipbuilding centre of the Commonwealth, we shall do our part. May the estuary of the Hunter rival that of the Clyde! We are proud that the *Adelaide* is to take her place in the Navy that has bottled up the enemy fleet and that has conveyed millions of soldiers across the water and millions of tons of munitions and food, and protected the Empire with steel walls.

"I have received a telegram from His Excellency Lieutenant-Colonel Sir Henry Lionel Galway, K.C.M.G., D.S.O., Governor of South Australia, which reads:—

> "'Please convey to the Prime Minister congratulations of my Government on the successful launching of His Majesty's Australian Ship *Adelaide* by Her Excellency. May good luck always follow the gallant ship and every man who sails in her.'"

BUILDING THE "ADELAIDE"

By the courtesy of Mr. J. J. King-Salter, R.C.N.C., M. Inst. N.A., General Manager of the Commonwealth Naval Dockyard at Cockatoo Island, New South Wales, and with the personal approval of the Hon. Alexander Poynton, M.H.R., Acting-Minister for Navy, we are privileged to publish the accompanying official photographs, showing Australia's latest warship in various stages of construction; from the laying of her keel on November 20, 1917, until ready for launching by Her Excellency Lady Helen Munro Ferguson on July 27, 1918.

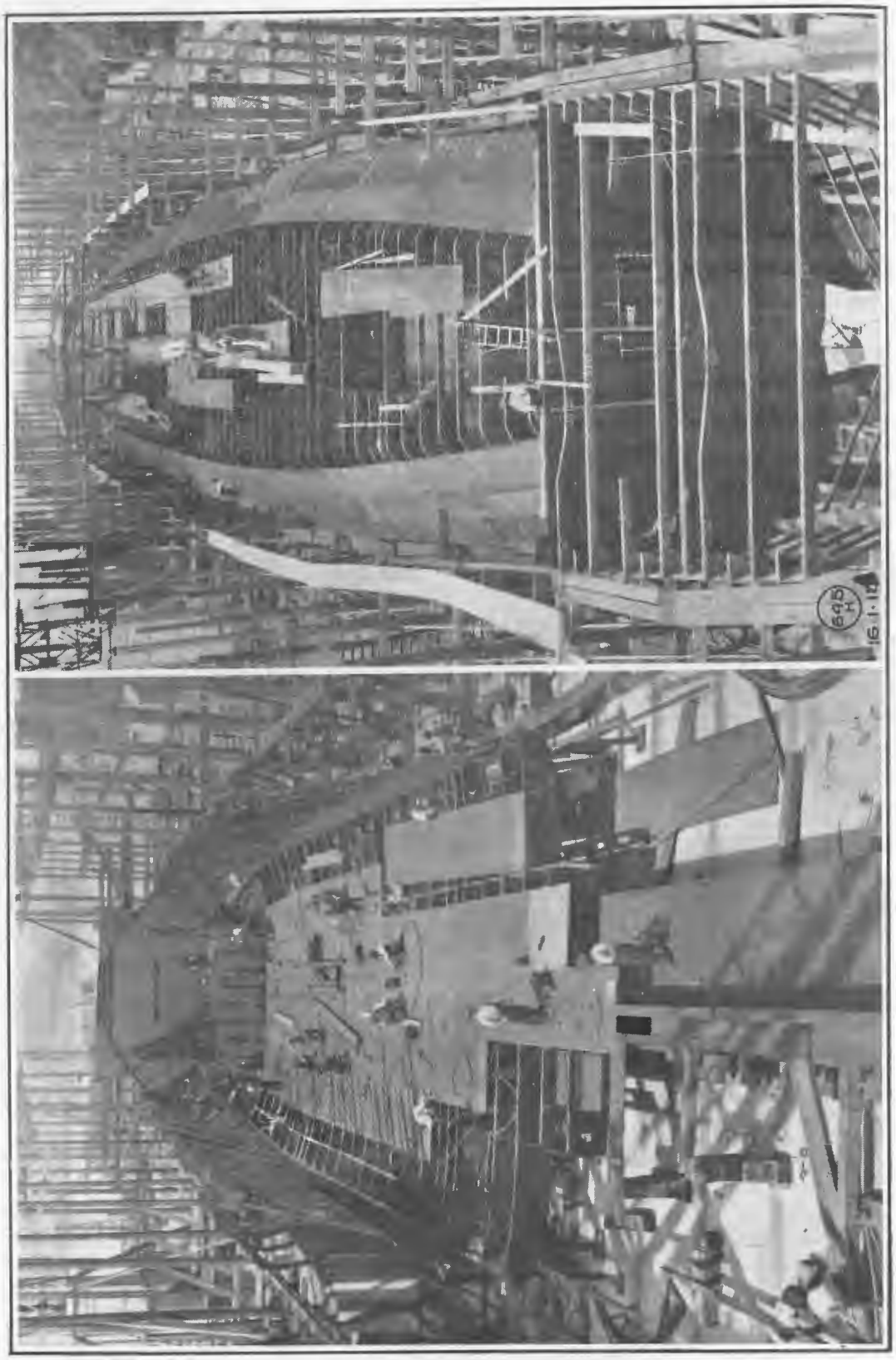


Laying the "Adelaide's" Keel, November 20, 1917.

The *Adelaide,* although generally similar to the *Brisbane,* is slightly larger than the latter vessel, being, indeed, the largest yet built in any British colony.

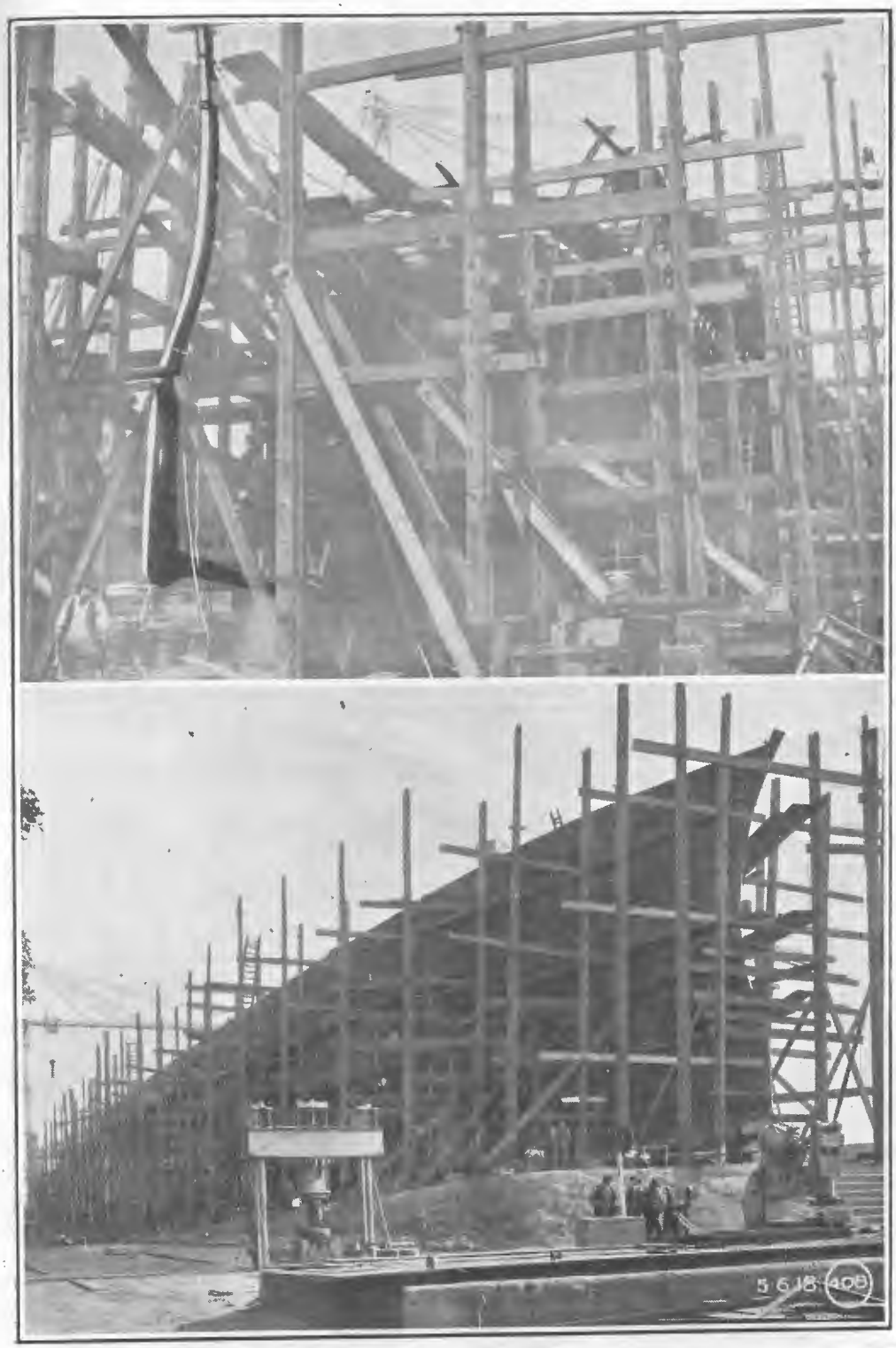
Had the original plans been capable of fulfilment her keel would have been laid and the preliminary work commenced some time before the completion of her predecessor, but owing to exigencies of the war and to the more urgent need in England for warships, much unavoidable delay was experienced, first in obtaining drawings, and later, in securing raw materials for the hull.

These essentials once to hand, the subsequent building operations were conducted with clockwork precision and completed within two hundred and forty-nine days—a record which fully justifies the laudatory speeches made at the launching ceremony and detailed in the preceding pages.

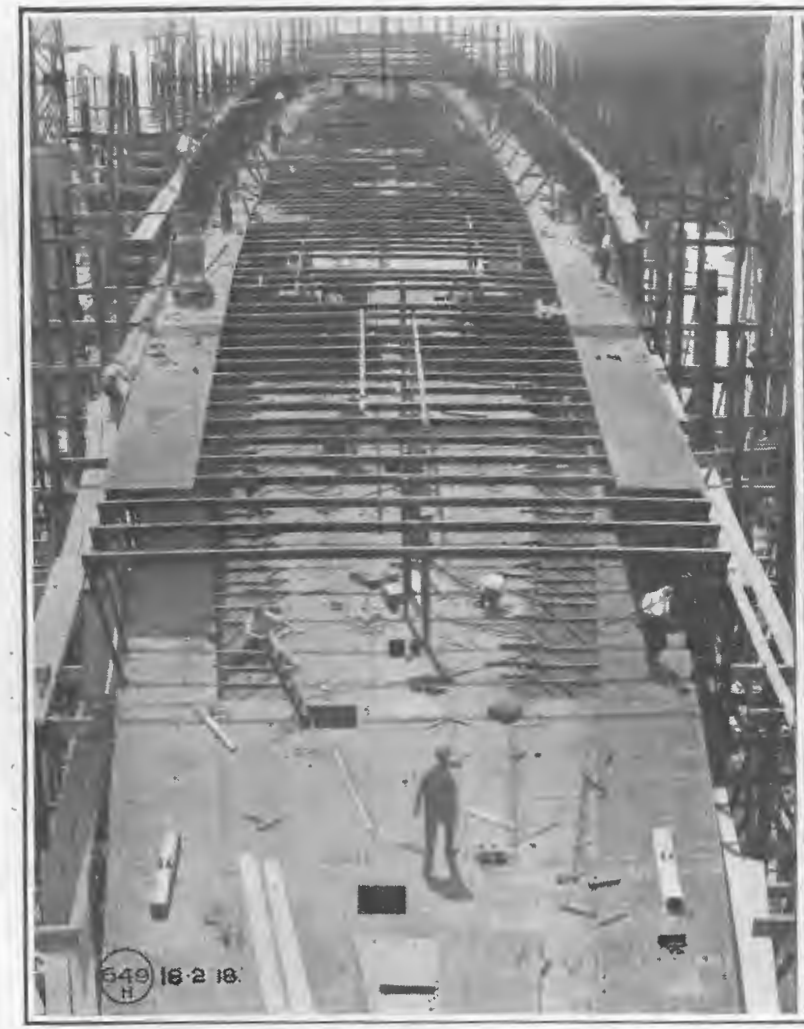


January 16, 1918.—Plating Lower Deck (59th Day).

November 29, 1917.—Nine Days After Laying the Keel.

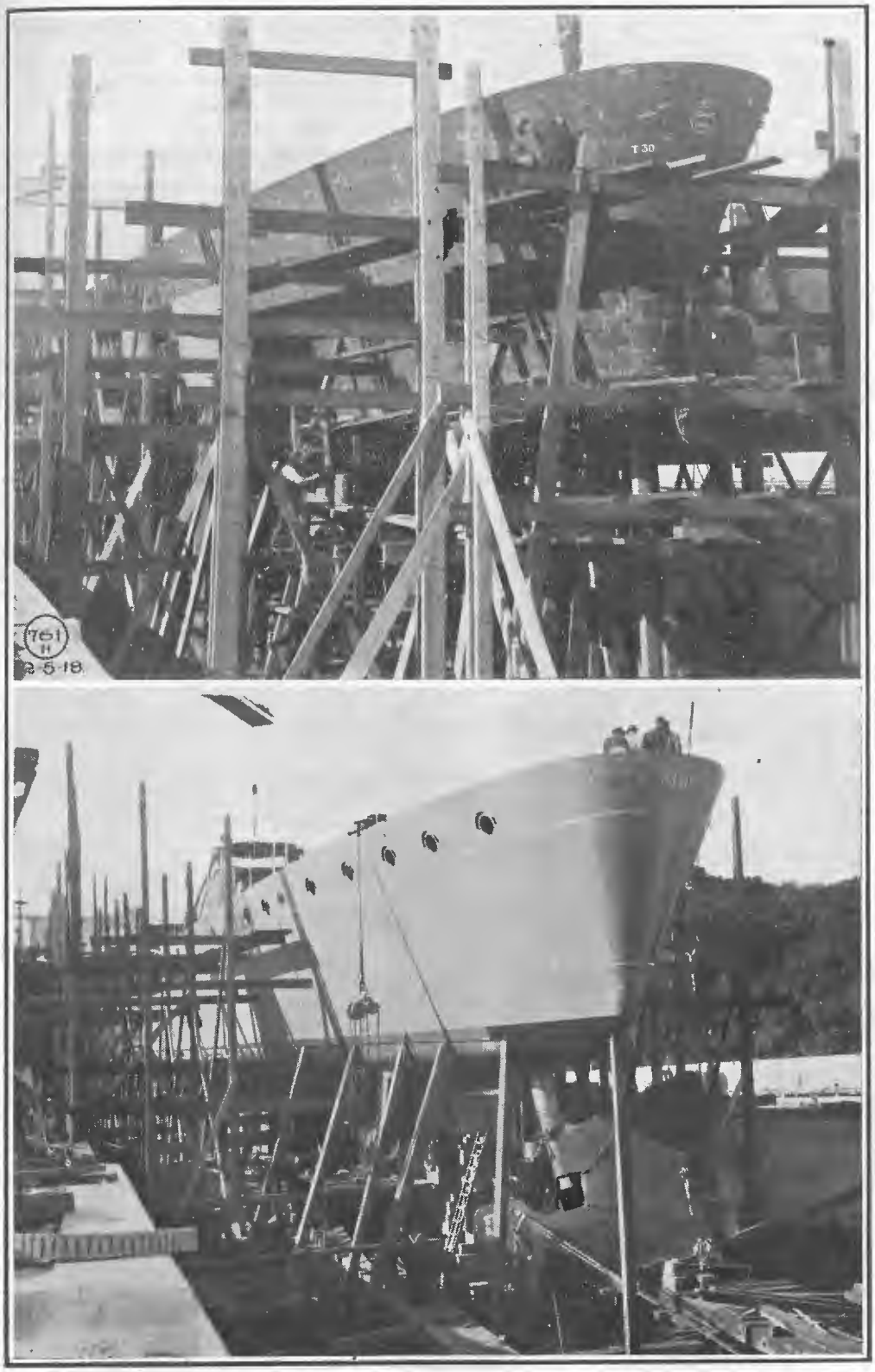


March 19, 1918.—Bow View. The Stem in Position (121st Day).
June 5, 1918.—Another Bow View (199th Day).



February 18, 1918.—Putting in Foc's'le Deck Beams (92nd Day).

July 4, 1918.—General Deck View Showing Searchlight Platform (228th Day). Note Lines of Compressed-Air Riveting Machines.



May 2, 1918.—The Stern Completely Plated (165th Day).
July 4, 1918.—Fixing Rudder in Position (228th Day).

As an example of shipbuilding enterprise this feat far outrivals the record established on the *Brisbane,* although the latter vessel was detained for other reasons on the building slip quite eighteen months longer than was necessary to build her to the launching stage. But there has, no doubt, been a considerable acceleration in speed of construction which is attributed to the happy combination of four distinct sets of circumstances:—

(1) Absence of industrial troubles and consequent increased output.
(2) Improvement in available machine tools, these being obtained as quickly as possible, despite delays due to war-time limitations.
(3) Skilled supervision by a qualified staff, notably Mr. J. W. Clark, M.I.N.A., Assistant General Manager and Shipyard Manager, and his assistant, Mr. F. E. Ellery, both of whom have striven incessantly to secure the highest standard of efficiency.
(4) Increased experience of the workmen.

The *Brisbane* was entirely constructed at Cockatoo Island, including the whole of her boilers, but not the main and auxiliary engines and armament. With the *Adelaide,* however, the Dockyard staff has accomplished considerably more, and has now under construction her main propelling engines. These comprise two sets of Parsons impulse reaction turbines, driving twin screws without reduction gearing. In addition to the main engines, the building of which entails the manufacture of some of the largest castings yet attempted in the Southern Hemisphere, the Dockyard has produced a considerable number of steel castings for the hull, including the stem, hawse pipes, etc., also the manufacture of a number of electrical fittings.

The date of completion for sea cannot yet be given, delay having been occasioned by non-delivery of certain large engine forgings of a type which cannot, at present, be manufactured in Australia. This delay is explained by the important demand for similar work on war vessels for our Allies.

Incredible Energy.
Billy Hughes: "And do I understand, sir, that you actually BUILT this ship?"

—Reproduced by Permission of the Sydney "Bulletin."

Profiting by lessons of modern naval warfare, the builders of the *Adelaide* are fitting her with numerous appliances of recent introduction, but, of the hundred-and-one improvements in warship equipment and installation—particularly as applied to the upper deck—little or nothing may, at this juncture, be published.

Mr. J. J. King-Salter, R.C.N.C., M.I.N.A., General Manager of the Commonwealth Naval Dockyard, Cockatoo Island.

The slip vacated by the *Adelaide* was occupied almost immediately by the keel of another vessel destined for the Naval Service, for supplying the fleet with coal and oil fuel. This collier will have a dead-weight tonnage capacity of approximately 7,000 tons and as practically all the materials to be employed in its construction are being manufactured in Australia, it is confidently predicted that the ship will be ready to take the water in about six months' time.

We are authorised to announce that all steel plates for the new vessel are being rolled at Port Waratah, New South Wales, by the Broken Hill Steel Works, Proprietary, Limited.

To the lover of statistics a summary of weights represented in the *Adelaide* at time of launching may be of interest. These are as follow:—

	Tons.
Main Structural Castings	50
Small Deck Castings	9
Plates (estimated)	1,200
Angles, Bulb Angles and other Sections (estimated)	580
Armour and Protective Plating ..	340
Piping and Fittings..	5
Fitters' Work (Watertight Doors, Valves, etc.)	16
Smithwork (Pillars, Stanchions, etc.)	7
Woodwork	12
Rivets, half a million	85
Total	2,304

WIRELESS ON RAILWAYS

BY ERNEST T. FISK,*
Member Institute of Radio-Engineers

All railways have complete systems of telegraphs and signals for the control of traffic and prevention of accidents. These systems are subject to numerous faults and breakdowns, which endanger efficiency and menace the safety of life. Telegraph lines are frequently damaged by blizzards, cyclones, dust storms, bush fires and other causes and signals are sometimes wrongly shewn or misunderstood through human error.

The telegraph system is a vital factor in railway management, and the several types of signals for moving trains are the main safeguard against disaster, yet both are frequently rendered useless by weather conditions, and neither provides direct communication between signalmen or stations and moving trains.

How often we learn the sad story of a signalman's mistake, discovered too late to prevent a headlong smash, which the distracted man is powerless to avoid, because, once the last signal has been passed, he cannot communicate with the driver of the doomed express; or we are told of the driver who mistakes his signals, and, without warning crashes into the rear of a stationary train. Again we learn frequently of railway services being disorganised for long periods because of the breakdown of telegraph lines.

The dislocation of telegraph service occurs because we have miles and miles of heavy wires and hundreds and thousands of lofty posts exposed to the forces of weather, earthquake and fire. Broken in-

* Managing Director, Amalgamated Wireless (Australasia), Limited.

"Lackawanna Limited" Express Train Equipped with Wireless Apparatus.

sulators, branches of trees, icicles, cobwebs and other minor troubles add to the difficulties of telegraph systems.

Railway smashes, on the other hand, frequently arise out of human error, therefore, most, if not all, of such disasters could be averted if we had some satisfactory system of communication between signal boxes or stations and moving trains and between trains themselves.

Wireless (or radio telegraphy as it should be termed) is available and competent to minimise the deficiencies of our past methods and if courageously adopted on a sufficiently wide scale will go a long distance towards increasing and maintaining both the safety and efficiency of railway operations.

There are no enormous stretches of wires and posts along thousands of miles of railway, only a simple mast and aerial system at each station or signal box. For most railway purposes the mast and aerial system could be far more simple than we are accustomed to see at ordinary coastal wireless stations. It could be so simple that the possibility of breakdown in bad weather would be extremely small and even if breaks occurred repairs could be effected in a few minutes or a completely new system erected in an hour or two.

Complete Portable Wireless Station, Suitable for Passenger Trains, Tugboats and Yachts.

The installation of wireless apparatus on moving trains is a problem which has already been solved and successfully applied in England, France and America. There are no difficulties in that direction which cannot be overcome by collaboration between railway officials and wireless engineers.

Wireless Possibilities.

If we examine the scope and possibilities of wireless for railways we shall see that they are so wide and numerous that radio-telegraphy appears almost indispensable to any complete modern system.

In fact, the benefits offered in railway services are as great as the benefits which have been so vividly shewn to the world by wireless communication among ships at sea.

In the first place, there are the unquestionable advantages, already mentioned, of being able to communicate at any time with a moving train, as well as the importance of supplementing the existing wire communication between stations and between signal boxes, by wireless.

Railway officials will at once recognise the benefits, apart from safeguards, which can be derived from a means of quick and certain communication with an express train during any stage of its journey, and

passengers will readily appreciate the advantage to themselves from the same system.

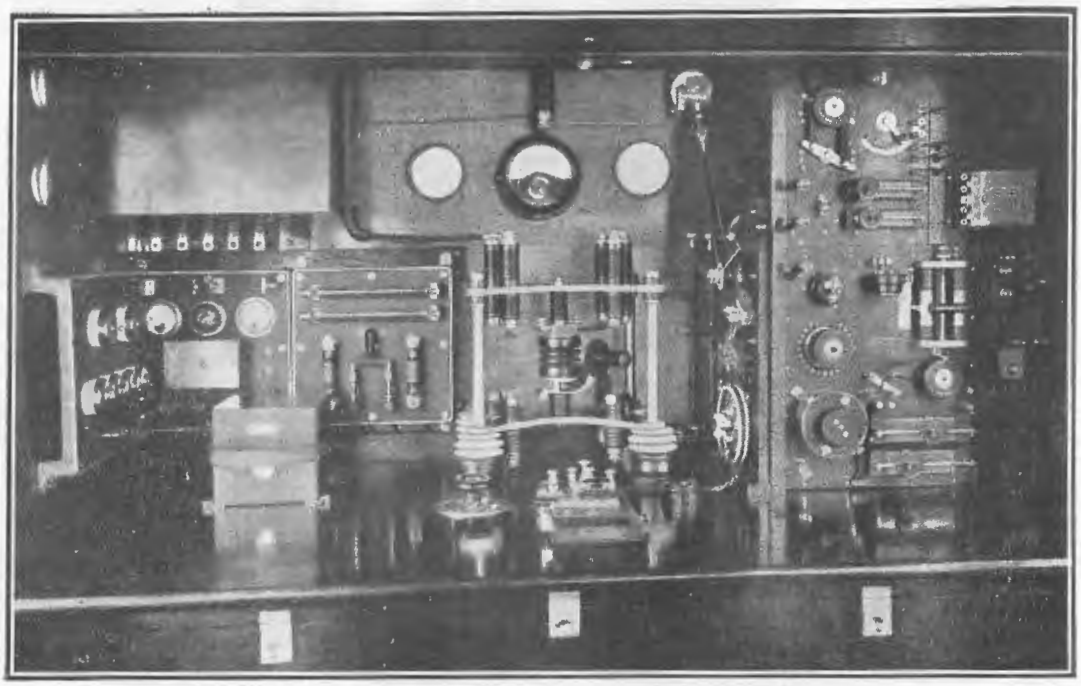
Equally great advantages will arise from the same means of communicating between two trains, whether travelling in the same or in opposite directions.

Communication with long-distance freight trains offers possibilities of almost equal value to the railway management and to certain sections of the trading community.

In addition to those applications the value of small wireless equipments for communication between front and rear guards of very long trains, particularly freight trains, has been suggested by railway officials in America.

There are great possibilities for the development of an auxiliary signalling system, by means of which trains could be safely run at normal speed through dense fogs and by the same means an audible check could be maintained upon the position of passing or approaching signals at all times. Development along these lines might also produce a method by which stationary trains would give a continuous wireless warning similar to the warnings now being sent to ships approaching dangerous rocks and coastal spots.

With an extensive wireless equipment on any railway system still further beneficial uses would be quickly developed. Correct time, for instance, is a factor of great importance and all railway stations, signal boxes and trains equipped with receiving apparatus could obtain accurate time once or twice daily from a central sending station directly connected to an observatory chronometer. Weather forecasts could be received simultaneously in all parts of the country from a central wireless station.



Interior of Motor Waggon, Showing Complete Marconi Equipment.

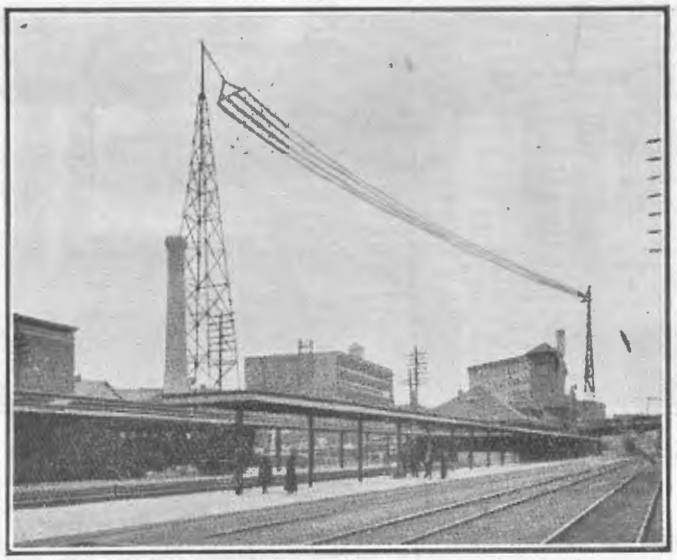
For these two services special stations would not be required, both time and weather signals could be received from the same stations which send them to ships at sea. I do not suggest that neither time nor weather signals are used at the present time, in fact I believe every railway has daily time signals sent throughout its system but the wireless method tends to be more accurate and widespread and no additional expense is involved where the wireless system is already in existence.

At a later stage in railway development the wireless telephone could be largely employed although it would not supplant

the wireless telegraph entirely. In future years direct telephonic communication between a moving train and a private city subscriber will not be impossible and the method will probably extend to communication between trains and ships at sea.

Since aerial navigation will develop rapidly after the war, the system of wireless telegraph and signal stations along main railway lines could be utilised with great advantage for aerial navigation, as well as for general communication over land. That is apart from the possibility of social communication between railway passengers and aerial passengers, which naturally appeals to our imagination.

In times of war, when railway transport for troops, munitions and supplies becomes a matter of national safety, the advantage of a complete system of railway wireless communication would be incalculable, particularly in a country like Australia.



A Railway Central Wireless Station for Long-Distance Communication.

We can also imagine the possible value of rapid communication between troops travelling by land and ships of the fleet at sea. In this the wireless communication from a moving train, either direct or through one of the railway wireless stations, would be immeasurably more rapid than the best of other methods.

The space at my disposal is inadequate to describe all the possible uses of wireless on railways, even without stretching the imagination beyond features which are patent to all radio-engineers, but the subject cannot be left without directing attention to the simplicity and value of portable wireless stations, similar to those employed by moving armies, for railway construction works. These stations can be made in all sizes and weights, down to those which can be carried by two or three men. In floods, snowdrifts and other causes of railway and telegraph destruction the co-operation of portable with permanent wireless stations offers assistance of the greatest value.

The great factor in the successful development of a complete system will be the co-operation between railway experts and wireless engineers. In fact, the majority of radio (wireless) engineers will remark that their part is simple. Wireless apparatus can be designed for almost any class of service, and there are no new principles to be discovered for this particular work. The co-operation of railway men is necessary to deal with such problems as accommodation, extent of service, provision of power, erection of aerial gear on railway property and trains and system of working in conjunction with existing telegraph and signal arrangements.

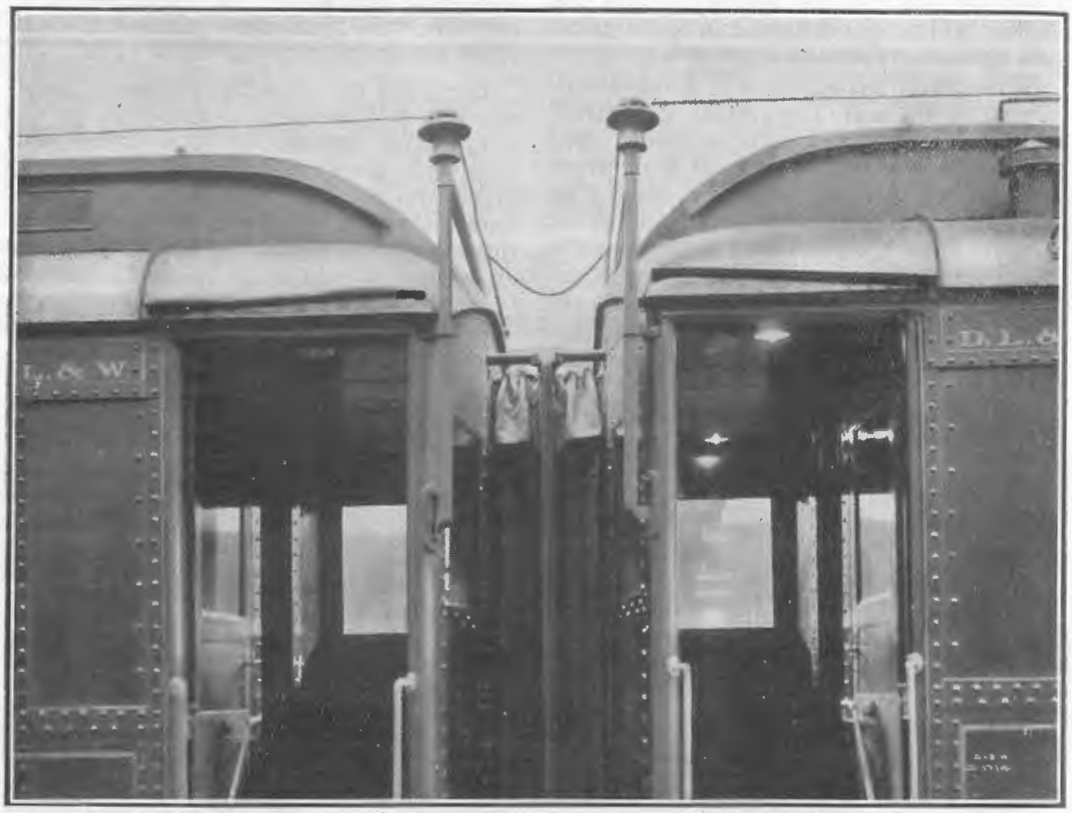
Practical Application.

Briefly, the methods might consist in the erection of moderately powerful central stations at all important railway centres, small equipments for all signal boxes and minor railway stations and specially constructed apparatus on all express passenger and freight trains.

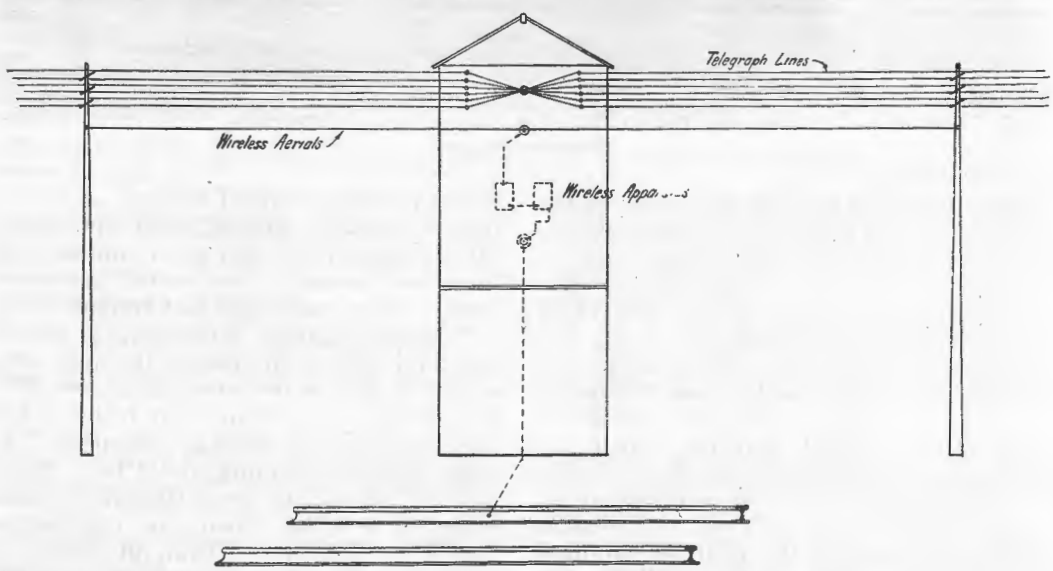
Training railway telegraphists, signalmen and guards to operate the apparatus would be left to the wireless experts after the methods of working and training had been approved by railway executives. In most cases the training would be a simple matter, because no great technical knowledge of wireless science or engineering would be necessary. That, of course, is parallel with other occupations, such as the line telegraphists, from whom only

operating skill is required and no knowledge of telegraph engineering is necessary.

In certain cases trained telegraphists might be carried on express passenger trains, but in all other cases where the apparatus is used only for signalling, spe-



The Aerial on Passenger Coaches, Showing Method of Attaching Wireless Aerial to Cars.



Sketch of Railway Signal-Box, Showing Wireless Aerials Connected to Telegraph Posts, also Showing Apparatus Connected Between Aerials and Rails.

cial danger warnings and simple communications the train guards could operate the apparatus after very short training. Similarly for signal boxes and minor stations, the training and skill required would be no greater than that now required in other duties from the employés at those points.

The central stations would be able to communicate directly with one another and with all intermediate points, but the range of signal boxes and minor stations would be intentionally limited, and those latter would preferably use directional apparatus. On the trains the apparatus would differ according to circumstances and the class of communication desired. For instance, important express passenger trains might carry signalling and safety apparatus, like all other trains, in addition to a special plant for exchanging passengers' telegrams with the central stations and with other important expresses.

Railway Wireless in Successful Operation.

A notable example of the successful use of wireless on an important railway was reported some time ago in the *Wireless World* and *Wireless Age*.

The Delaware, Lackawanna and Western Railroad Company, in conjunction with the Marconi Wireless Telegraph Co. of America, erected permanent wireless stations along the road at Hoboken, Buffalo, Scranton and Binghampton, also a specially-designed equipment on the "Lackawanna Limited," an important express train. The results have been entirely satisfactory and numerous incidents have been quoted describing the value of wireless communication between the stations and with the train. On one particular occasion a severe blizzard blocked the railway, destroyed all telegraph lines and interfered with the signalling system. This occurrence vividly emphasised the superiority of "wireless," which worked throughout without a hitch and resulted in the saving of much valuable time and money. Mr. L. B. Foley, Superintendent of Telegraphs for the Lackawanna Railroad, speaks in unmeasured terms of the value and importance of railway wireless.

It is also a significant fact that Mr. David Sarnoff, then Chief Inspector of the Marconi Company, was unanimously elected a member of the Association of Railroad Telegraph Superintendents, and later the Vice-President of the Marconi Company, Mr. E. J. Nally, was elected an honorary member, in company with Mr. T. N. Vail, President of the American Telegraph and Telephone Company.

Wireless Apparatus on a Passenger Train.

Cost and Value

Many readers will inquire about the cost of a complete system of wireless for railways and refer particularly to the desirability of economy in these difficult times. The cost of any system cannot, of course, be given without careful estimation, but in all utilities cost is merely a function of value. Therefore, a few remarks about value will probably answer the question of cost.

Actual values will be understood from what has been written above, separate values might be assessed by railway officials dealing with efficiency, officials and passengers considering safety, railway officials and military authorities considering military value. In such manner all possible values could be weighed before actually testing the system.

If only one or two of the uses described

Wireless Operator at Scranton Railway Station, U.S.A.

Automatic Wireless Fog-Signalling Apparatus Installed on Gourock Pier, Glasgow. Note the Simple Aerial Arrangement.

in this article are successfully demonstrated, any possible cost would appear small in comparison, but it can be said with every assurance that the prevention of one disaster would more than compensate for the entire cost on any railway system.

Wider Application.

In the year 1900 one or two merchant ships were equipped with Marconi apparatus, to-day more than two thousand British merchant vessels alone are so equipped. Nothing could prove more effectively the value and efficiency of wireless communication. If the total cost of all those equipments were stated, the figure would appear large, but there is no shipping man ashore or afloat who would say that the cost is in any way comparable with the value of the service.

The life-saving value alone is enormous beyond computation, yet in times of peace more human lives are sacrificed yearly in railway accidents than are lost at sea in all classes of ships.

All wireless engineers will readily admit that the development of wireless for railway systems presents fewer problems in the light of our present knowledge and experience than were presented in its application to shipping a few years ago.

THE CANKER OF NATIONS

BY C. A. JEFFRIES

WHATEVER crimes and faults the late Czarina of Russia may have been guilty of, lack of foresight was certainly not among them. From the first whisper of trouble she strove her utmost to prevent war. Among the most interesting of the letters published by the Bolshevik Government were the reproductions of those of the Imperial Cassandra to Wilhelm Hohenzollern and her husband, Nicholas Romanoff, warning them both of the dynastic dangers of arming whole populations. To her the danger to royalty that the precipitation of a European conflict reeked with were so obvious that she could not understand that neither of the sovereigns could see it. When it became obvious that the Berlin gang was intent upon war at any price, she begged Nicholas to be for peace at any price, but the Czar would not abandon France, at whom Germany had already struck, and embarked on the great adventure.

The Czarina was right. The gathering together of great masses of men gave the chance of spreading the Bolshevik doctrines; and Russian idealists and demagogues and traitors, all well supplied with German gold, made hay while the sun shone. As long as discipline was maintained, Russia was invincible. The Bolshevik doctrines were a dry rot. The mystic nature of the Slav responded easily to gilded arguments about the brotherhood of man. He was told he should not kill his brother German working-man, and that his German brother working-man was just aching to throw down his rifle and go home, if only the Russians would set the example. It was also urged upon him that the enemy was the capitalist, not his German brother working-man with the rifle.

Cassandra Romanoff has fulfilled her own gloomy prophecy. Her husband, son and daughter are all dead, murdered miserably in captivity, and her own fate is doubtful. She was a kinswoman of the Kaiser, and it is possible that, in her unhappy ending, he may read an augury of his own. For, although he is still alive, on his throne in apparent security, and so far the war has extended his sway over nearly 70,000,000 extra subjects and made him the greatest conqueror since Tamerlane, his position is horribly precarious. His people, ground into misery by the war, are embracing Bolshevism fast. His great military chiefs are said to threaten him if he baulks their enterprises, and from America comes the cry of no negotiations with the Hohenzollerns. So *his* position is far from being gay. As long as he can rely upon his army he is fairly safe. His greatest danger is that the Bolshevism which he has fostered in every enemy country is now infecting his own army, and if the infection spreads past a certain proportion, his army may turn on him, as did that of Nicholas Romanoff. He has created something that begins to look horribly like Frankenstein.

* * * *

Before the outbreak of war there existed in America an association of unskilled toilers known as *The Industrial Workers of the World*. It was led by men who, whatever their faults, had in them some of the stuff of which martyrs are made. It was numerically insignificant, and was a declining force. When war came it suddenly displayed signs of revivification. It became wonderfully active. Its speakers were suddenly able to dispense with honest labour and devote all their time and energy to propaganda work. It also seemed to have acquired control of half-a-dozen printing presses. It displayed violent anti-British tendencies. It denounced the war as a sordid struggle between rival sets of capitalists, and demanded that the United States should cease supplying Britain with munitions, and so bring to an end the slaughter of the working classes. It backed up its demands by strikes, incendiarism, *sabotage*, and finally by blowing up works

and murdering individuals. The United States Government investigated, and discovered that the character of the organisation had changed enormously. It had developed into something like a secret society, presided over by men who had plenty of money at their command. The same membership of unskilled workers existed, of course, but it had been reinforced considerably by large numbers of skilled workers, especially chemists and engineers. In fact, the number of new members of scientific attainments was phenomenal.

The United States Government very shrewdly debited all this to the activities of Count Bernstorff, von Papen and Boy Ed. A considerable number of these intellectual members of the *I.W.W.* found their way to the interior of the nearest gaol before ever the U.S.A. entered the war. When the Republic did come in, the Government made a clean sweep, and the society was made an illegal organisation.

* * * *

Australia received the *I.W.W.* from the United States. At first the propagandists made little or no progress. Their monetary resources were extremely limited, and their propaganda did not fall on fruitful soil, for the Australian Labour Party was at that time the strongest constructive force in Australian political life. It aimed at reform, and not revolution, and was responsible for such projects as Universal Military Training, the creation of an Australian Navy, the founding of the Commonwealth Bank, the passing of Commerce and Pure Foods Acts, and so forth.

With constructive achievements the *Industrial Workers of the World* had no sympathy. Their doctrines were wholly destructive. Their ideal weapon was the "Go-Slow Policy." Their literature openly advocated *sabotage.* So their recruits were confined to the wastrel classes, and the vast body of trade unionists refused to take them or their propaganda seriously. The society was without numbers or influence, and was a mere collection of pariahs mouthing impotently at a monstrosity styled "the boss." They were a mere whisper in the wilderness, and one but rarely heard of them. Even in the Domain of Sydney they could make no impression and attract but few hearers.

With the outbreak of the war the *I.W.W.* suddenly acquired a new lease of life. New propagandists, wearing expensive American store clothes, suddenly appeared, with, apparently, money to burn after the arrival of each American mail boat. This affluence seemed to ebb somewhat a week or so before the American mail fell due.

Hitherto the *I.W.W.* had denounced trades unions as "effete" and derided them on every possible occasion. With the revivification of the society its members began to take a profound interest in the welfare of these hitherto despised unions, and tried to establish friendly relationship with them. It secured control of a printing press and the cities and towns of the Commonwealth were dotted over with "stickers" comparing bosses to bed-vermin. Men who enlisted were referred to in most opprobrious terms. Britain and everything British were scoffed at, not with arguments, but with blasphemous and often obscene abuse. *I.W.W.* men began to appear in genuine Labour quarters and it was whispered they had "bought their way." During the anti-conscription campaign the society was very active. Its advocates were not ignorant men, quite the contrary, and they all seemed to have a wonderful capacity for statistics. They were forceful, and some of them distinctly brainy. And they were well supplied with money. Sundry politicians, some of them prominent, some of them notorious, rubbed shoulders with avowed *I.W.W.* agents, and fraternised with them.

Meanwhile, the infiltration of *I.W.W.* men into the other Unions went on apace. By some mysterious means they rapidly acquired positions of influence and trades unionism began to show distinct traces of *I.W.W.* influence. Terrorist tactics were introduced and the power of expulsion was employed to the uttermost. To disagree with the proposals of the *I.W.W.* element in a Union was to court expulsion. Freedom of speech in Union discussions was abolished. Men made speeches in local Political Labour Leagues and found a week or so afterwards they had been expelled for something said in a debate a month or six weeks ago. The *I.W.W.* element had secured temporary control and used it to eject and socially proscribe all who opposed it. At Broken Hill they went so far as to hound a woman out of the town by threatening to boycott anybody who employed her. She had been guilty of expressing her candid opinion of them and all their works.

To-day in Australia there is no denying that the *I.W.W.* element exercises a controlling influence in the majority of Trades Union and Political Labour League circles and its work is virulently anti-British, anti-Australian and distinctly pro-German. This evil influence dates back to the days when Bernstorff and his German plotters had a practically free hand in the United States. It is a reasonable conclusion that the sudden rise of the *I.W.W.* element to its present influential position is due partly—but only partly—to monetary resources supplied by German agents in the United States. But while their rise to power may be ascribed to German financial assistance the same cannot be said of their retention of it. These causes lie deeper and require treatment by other methods than the criminal law. What made the Australian Labour soil suddenly fruitful for the *I.W.W.* propaganda? A period of industrial unrest had made the Australian Labour mind distinctly vulnerable to mob suggestion. But even that would not account for its continuance and the fact that it is continuing suggests that there is something rotten in the state of our country. President Woodrow Wilson noted in 1913 a similar state of affairs in the United States, and wrote as follows:—

"Don't you know that some man with eloquent tongue, without conscience, who did not care for the nation, could put this whole country into a flame? Don't you know that this country, from one end to the other, believes that something is wrong? What an opportunity it would be for some man without conscience to spring up and say: 'This is the way, follow me!'—and lead to the paths of destruction. . . . We are in a temper to reconstruct economic society as we were once in a temper to reconstruct political society."

It is the same in Australia to-day. The whole country believes there is something wrong. The workers are impatient. They have waited in vain for their millennium—to be brought about by, first, Trades Unionism, and then by Political Labour Leagues. It never occurs to them that, perhaps, there is no millennium possible. The *I.W.W.* man has arisen and declared that the only way to bring along the millennium is to shatter the present form of society to bits, and, like Omar, remould it from the ruins. The *I.W.W.* spirit reigns at both poles of society. At the top the profiteers, the greedy, unscrupulous exploiters of their country and their fellow-men; selfish savages, who had regard for neither their country, their Empire—our Empire—nor our common race. At the bottom, the *Industrial Worker of the World,* with his crazy, go-slow policy, his encouragement of the enemies of his race, his country and civilisation generally; his selfish disregard of the rights or welfare of everyone but himself. These two repulsive classes threaten to grind society like grain between the upper and the nether mill stone.

What is the remedy?

Briefly, I should say a better care of our child life and a reorganisation of society, so that, in its reconstructed state, the various classes shall co-operate with, and not exploit, one another. The competitive system may have some advantages but our present racial and national mess is one of its disadvantages. The spectacle of the great bulk of our population sullenly deserting its own flesh and blood fighting a sanguinary war against a scientific and ultra-capitalistic barbarism like Germany is a spectacle that cannot be ignored. The reasons why must be ascertained and swept away.

If the economic and political state of Australian Labour were healthy it would never have come under the influence of a handful of German propagandists. That it remains under the influence of the mob suggestion that is now being ladled out to it is ominous. It is a symptom of serious disease in the body politic.

Civilisation is in the melting-pot and when it comes forth into the mould of the future it will be necessary to arrange that, in that future state, there shall not be one child between Thursday Island and Cape Leeuwin that is not well fed, well shod and clothed, and well educated. We must abolish slums and arrange, as far as possible, that every worker has his own home; for a good home is the most potent factor in shaping the character of the child. In a word, our country and civilisation must be made worth fighting for and the children taught to understand how worthy it is of being fought for, and if necessary, being killed for. At present it is only so to a section of us. To the married man with young children to rear, and whose income is less than £3 10s. per week, it must be honestly admitted that it is not.

And in that fact lies the root of the remarkable influence the *I.W.W.* pro-German propagandists, disloyalists and traitors exercise over Australian organised Labour to-day.

THE LAST VOYAGE OF THE "KYARRA"

BY ARTHUR ROY MANCER,
Formerly Chief Wireless Operator, s.s. "Kyarra."

Two years ago, somewhere at sea, something happened.

I shall not attempt to particularise, for in affairs of this nature it behoves us to be vague; suffice it that the incident—whatever it was—made unpleasant reading in Berlin and placed the *Kyarra* on the debit side of Grand Admiral von Tirpitz's ledger.

Mr. Arthur R. Mancer,
Wireless Operator on s.s. *Kyarra.*
—Photo. Oxford Studios.

The mess prophesied that Herr von Gabriel, or whatever name the German Recording Angel may trade under, would continue to lose sleep until this account had been ruled off. The prophecy was accepted with befitting composure, as has been its ultimate fulfilment. Meanwhile, we congratulate ourselves on a charmed existence passed in the meanwhile.

In pre-war days the *Kyarra* was one of the best-known vessels in the Australian coastal trade and a general favourite among inter-State passengers. A seven thousand-tonner, built by Denny's of Dumbarton, N.B., for the "Western" run, she subsequently followed the Northern route and was coasting to Cairns (Queensland) when requisitioned as a transport in 1914. Since then she has safely carried many thousands of our troops.

The last voyage of the *Kyarra* commenced on a Friday in May, when we left the bustle of a well-known British Dockyard and proceeded down an equally well-known waterway *en route* for our "Second Port of Call," under orders to embark there some twelve hundred A.I.F. invalids and bring them home to Australia. The military advance party, comprising Adjutant, Quartermaster, Senior Medical Officer and some forty-odd members of the Australian Army Medical Corps, had been embarked at the first port.

Before twelve hundred invalids can be

taken aboard a considerable amount of preliminary organisation is essential. Hospital wards must be equipped with mattresses, blankets, etc.; instruments, drugs, pills and plasters, lint and bandages (and the hundred-and-one other items connected with medical and surgical "short-cuts to the grave") must be unpacked, sterilised and properly set out in the ship's dispensary and operating theatre, mess-utensils drawn from the Quartermaster's Store and a general scheme of allotment of disabled patients to special berths thoroughly rehearsed and stage-managed before the vessel reaches that port. This work, supervised by the Senior Medical Officer, is based on certain particulars and statistics contained in nominal rolls of invalids, these being compiled at A.I.F. Headquarters, Horseferry Road, London, by members of the staff of the Director-General of Medical Services, taken down to the ship by the Staff Officer for Embarkation and personally handed to the Senior Medical Officer. The S.M.O. is thus informed of the nature of wound, sickness or disability of every soldier about to embark and, with the assistance of a large staff of A.M.C. men, is able to arrange for their accommodation. In so doing care is exercised that crutch-cases be allotted, wherever possible, to upper-deck berths, involving little or no stair-climbing in the event of the hospital ship being struck by a stray torpedo. Since Germany's open declaration of "war on wounded" these precautions have been fully justified.

On reaching the "second port" the advance party would assume temporary command of the gangways and direct patients to their respective berths, in accordance with pre-arranged plan. With the exception of the advance party aforesaid, there were no troops aboard, which, in view of subsequent occurrences, was undoubtedly fortunate.

We spent our second night at anchor and resumed our last journey soon after sunrise on Sunday, May 26.

It was 8.30 on an ideal morning; clear sky, calm sea; the kind of day that impels one's thoughts rather in the direction of church than of Fritz's underwater skiffs. But, no! the Teutonic Gabriel stalks abroad, his recording quill itching to write *Bezahlen* (which is German for "paid") to the *Kyarra's* long-outstanding account.

Most of the ship's officers had finished breakfast when, at 8.30 a.m., Mr. Norquay, our "Third," strolled in, seated himself at the mess-table and consulted the menu.

Addressing the steward, Mr. Norquay was heard to remark: "I'll have some——" But whatever his choice for the matutinal repast, he didn't get it. What he did get—and nothing more—was a splinter of glass in the right eye; had his selection fallen upon fish, entrée, grill, omelette, or just plain rolled oats, the result would have been identical. "I'll have some——" said the "Third"; the remainder of his sentence, if it were ever completed, was lost in the roar of a terrific explosion. Bang! Fritz had got one home on us, and a jubilant Gabriel sheathed his pen; but the final balance was not struck until about 9 o'clock that evening, when the neighbourly skipper of a motor patrol boat settled the *Kyarra's* adversary with a couple of extra-large depth-bombs.

The *Kyarra*, shaken from stem to stern, gave a lurch, heeling from port to starboard and *vice versa*. Glass, ironwork, cutlery and the pantry mirror were among the many objects which suddenly filled the atmosphere; tables and chairs, jerked from their sockets by force of the explosion, collided with the mess-room walls. In the for'ard galley the chief cook, bending daintily over the range, was preparing a mixed grill for the skipper's breakfast. As a result of the explosion, his stove soared heavenward to the boat-deck, landing finally on the bridge, almost at the door of the "Old Man's" cabin. And the grill was "some" mixed!

The vessel at once began to settle on an even keel and all hands hurried to boat-stations. As a precautionary measure the life-boats had been swung out overnight and to release the falls and lower away was but the work of a few seconds.

There was never the slightest suggestion of panic. Every man knew his job and did it.

In the wireless room the high-power set had been rendered totally useless.

The torpedo had struck our for'ard stokehold, killing outright every man on watch, besides blowing out the main steam pipes and stopping engines and dynamos.

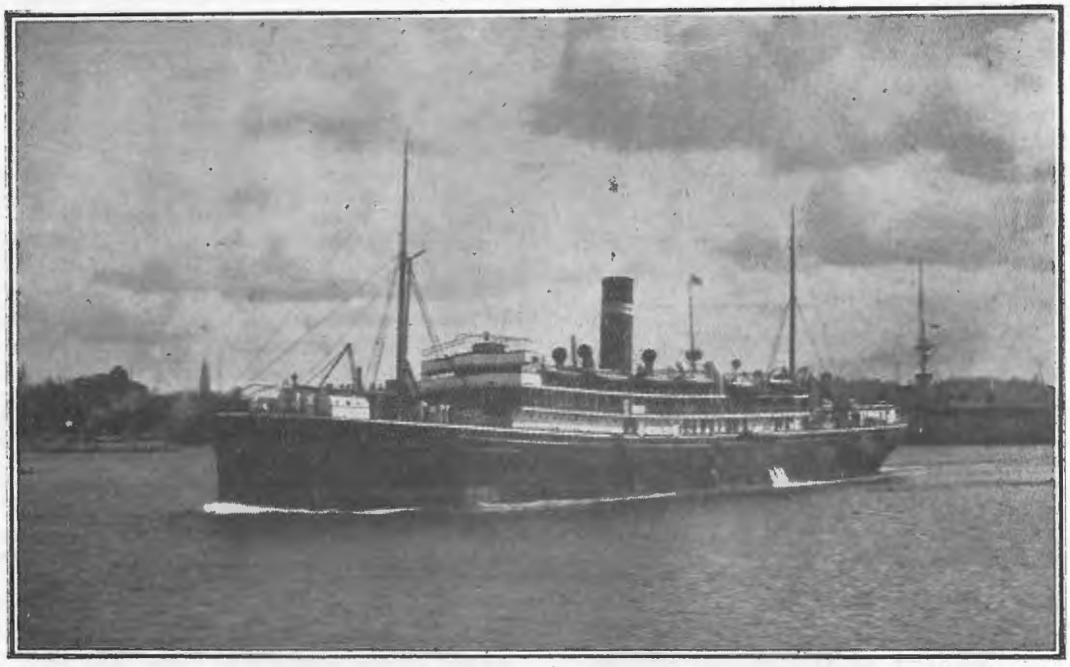
The engine room, within one minute of striking, was under twelve feet of water. In escaping from this death-trap the watch had a distinctly tough proposition to

tackle and in their scramblings and scalings of the machinery to the topmost platform, a height of some seventy feet, it is a remarkable fact that serious permanent injuries were not sustained.

The ship's dynamo being *hors de combat,* we therefore operated our emergency wireless apparatus and called for assistance. This was immediately forthcoming, our messages being picked up by a war vessel engaged on convoy work, and within five minutes of the explosion we were off the crippled steamer, which, by now, was submerged to just abaft her funnel. She remained thus for three or four minutes, then turned completely over on her starboard side, in which position she hung for about five minutes. Finally, with a gradual downward slide, amid dense columns of steam and much disturbance of the surrounding water, the gallant old vessel disappeared beneath the surface of the English Channel, exactly fourteen minutes after receiving her death-wound.

Meanwhile, all survivors had taken to the lifeboats, and pulled towards Swanage, our oars swinging to the accompaniment of "A Perfect Day," rendered, with singular inappropriateness, by the crew of the leading boat. The melody, however, broke off with startling suddenness on the line referring to something about "the sun goes down in a flaming ray," for bearing down upon us was a submarine, generally accepted as our late assailant, returning to administer the *coup de grace.* But to our great relief she proved to be a British submarine, which, at the time of sending my S.O.S., was being convoyed by the vessel that had replied to it.

An A.M.C. man, who had immediately dived overboard, was restored to our midst with the aid of a boathook and rallied by us for attempting to run away from the supposed U-boat. His indignant repudiation is worth recording:—



Hospital Ship "Kyarra" (A.U.S.N. Co.), Torpedoed May 26, 1918.

"Run away from a Fritz! *Me?* Not on your life! I was just hopping down to finish the cow off with my bare knuckles!"

At 11 a.m., on arrival at Swanage, a roll-call showed that six of the *Kyarra's* crew on duty in the stokehold at the time of the explosion had already answered a Higher Call.

The engineer on watch in the stokehold was Mr. Small, of Balmain, to whose bereaved relatives I, on behalf of brother officers and men of the *Kyarra,* would take this opportunity of extending our heartfelt sympathy and condolence in their loss of one of the best men we ever sailed with.

At Swanage we were received with splendid hospitality. Food, coffee, in fact everything that the residents could possibly supply, was instantly procured for us.

Later we were taken by trawler to Poole, on the border of Hampshire and Dorsetshire, where we were accommodated at the Naval Barracks. Here again we enjoyed marked kindness on every hand. The local Relief Society supplied all immediate requirements, including much-needed clothing, many of the *Kyarra's* crew having manned the lifeboats in night attire.

Leaving Poole the same afternoon, we reached Waterloo Station, London, at 8.30 p.m., within twelve hours of the explosion.

The crew, repatriated by the British Government, sailed for Sydney, accompanied by our Fourth Officer, Mr. Beck, in a Commonwealth liner which had formerly flown the German flag.

With two exceptions, all other officers of the *Kyarra* returned to Australia *viâ* Canada, per s.s. *Makura,* arriving in Sydney on August 2. Their names are as follow: Captain Donovan; First Officer, Mr. White; Second, Mr. Mills; Acting Fifth, Mr. Bailey; Chief Engineer, Mr. Kilpatrick; Second Engineer, Mr. Wharton; Third, Mr. Conroy; Fourth, Mr. Norman; Sixth, Mr. Marshall; Seventh, Mr. Watt; Electrician, Mr. Tonks; Chief Wireless Telegraphist (the present writer); Second, Mr. Betteridge; Third, Mr. Hardy; Chief Steward, Mr. McCutcheon.

The Purser, Mr. Pattinson, did not accompany us, having been transferred to the *Indarra.* Mr. Norquay subsequently joined the *Barunga* as "Third" and was aboard that ill-fated vessel when she was torpedoed. We hope to hear that he had breakfasted before his second adventure.

In conclusion, it need scarcely be added that we were delighted to see Australia again and many of us will wistfully recall the happy years spent aboard our one-time good home—the *Kyarra.*

IS THE CONCRETE SHIP A SUCCESS?

MR. POYNTON AWAITS CONFIRMATION

The Acting Minister for Navy (Hon. A. J. Poynton) was recently interviewed by *Sea, Land and Air* regarding the possible construction of concrete ships in Australia.

On this subject the Minister is, at present, somewhat sceptical and expresses himself as being far from satisfied that concrete shipbuilding—in the case of deep sea vessels of from 3,000 to 5,000 tons—has yet advanced beyond the experimental stage.

"We have heard," said he, "a good deal concerning the recent launch at San Francisco of America's 5,000 ton 'stone jar,' *Faith,* but of her behaviour during the maiden voyage no report is yet to hand." Early last month Mr. Poynton cabled to the United States for definite information, and the builders' silence on this point leaves grave doubts in the Minister's mind as to whether they have yet succeeded in so constructing these vessels as to withstand the stress of heavy seas.

Concrete ships could be produced in Australia at least one-third more quickly and more cheaply than wooden ships which, at present, cost £26 per ton, deadweight.

"If I were satisfied on the point already mentioned," concluded Mr. Poynton, "nothing would please me better than to start at once on concrete shipbuilding in Australia. I have already let contracts for steel ships which, in my opinion, will absorb all the skilled labour at present available for that industry; whereas the entire work of concrete ship construction—which consists principally in shovelling cement—could, with the exception of perhaps four or five experts, be done quite satisfactorily by ordinary unskilled labour."

TYPES OF MILITARY AEROPLANES*

THE POSSIBILITIES OF THE BOMBER

BY COLONEL V. E. CLARK

The military types of aeroplanes, as influenced by the military functions and as influencing the design of the engine that goes into the aeroplanes, will be the subject of this brief discussion.

The Allies have run to more types than the enemy. One of the main reasons for this is that the Allies have listened more to the demands of their fliers, who have exerted much influence on plane and engine design. Thereby, standardised production has been sacrificed to individual requirements.

Part of the aircraft programme will be to select those types that best lend themselves to big production—to look ahead six or twelve months in an endeavour to anticipate the advance requirements, and then design those types in such a way that they can be built on a large scale. Standardisation means fewer types—greater numbers of machines. We must select perhaps five or six types, develop them, and *produce* them by the thousands. We should select for standardisation from the following types:—

(1) Aeroplanes of Observation.
(2) Aeroplanes of Combat and Pursuit.
(3) Aeroplanes of Destruction and Harassment.
(4) Special Types.

None of these types is new. All can be developed to a far greater degree of efficiency than those now being used. Each type has a different function. Aeroplanes of observation must aid the army on the ground in successfully performing its operations. Those of combat and pursuit must prevent enemy aircraft from doing damage in any way. Those of destruction and harassment will inflict direct damage on the enemy. With special types we have little concern. Of chief concern to me—to the Aircraft Board—in fact, to the world, are those planes that will inflict direct damage on the enemy. They are the bombing machines, upon which depends a substantial part of the measure of victory, of that I am convinced.

The need for these being recognised and vital, and the hour of their initial production being at hand, I shall confine my remarks to a limited discussion of their possibilities.

Bombing operations provide practically all the real damage that it is, at present, possible for an aeroplane to inflict upon the enemy. In comparison to these the slight damage caused by bringing down his aeroplanes, each containing one or two men only, or shooting up his trenches or truck trains, is negligible.

The enemy should be harassed continually from the air. Two classes of bombers must be employed—day bombers and night bombers.

Use of Day Bombers.

Under present conditions along the Western front *material* damage must be done at night. Day bombers will be used solely for the moral effect of inflicting perpetual unrest except in a few special cases when vulnerable objectives are difficult to locate at night.

The primary military functions of the day bomber are:—

(1) To bomb important points, such as small objects difficult to find by night, Head Quarters, small ammunition "dumps," small storehouses containing munitions or supplies, small railway junctions, and small aerodromes.

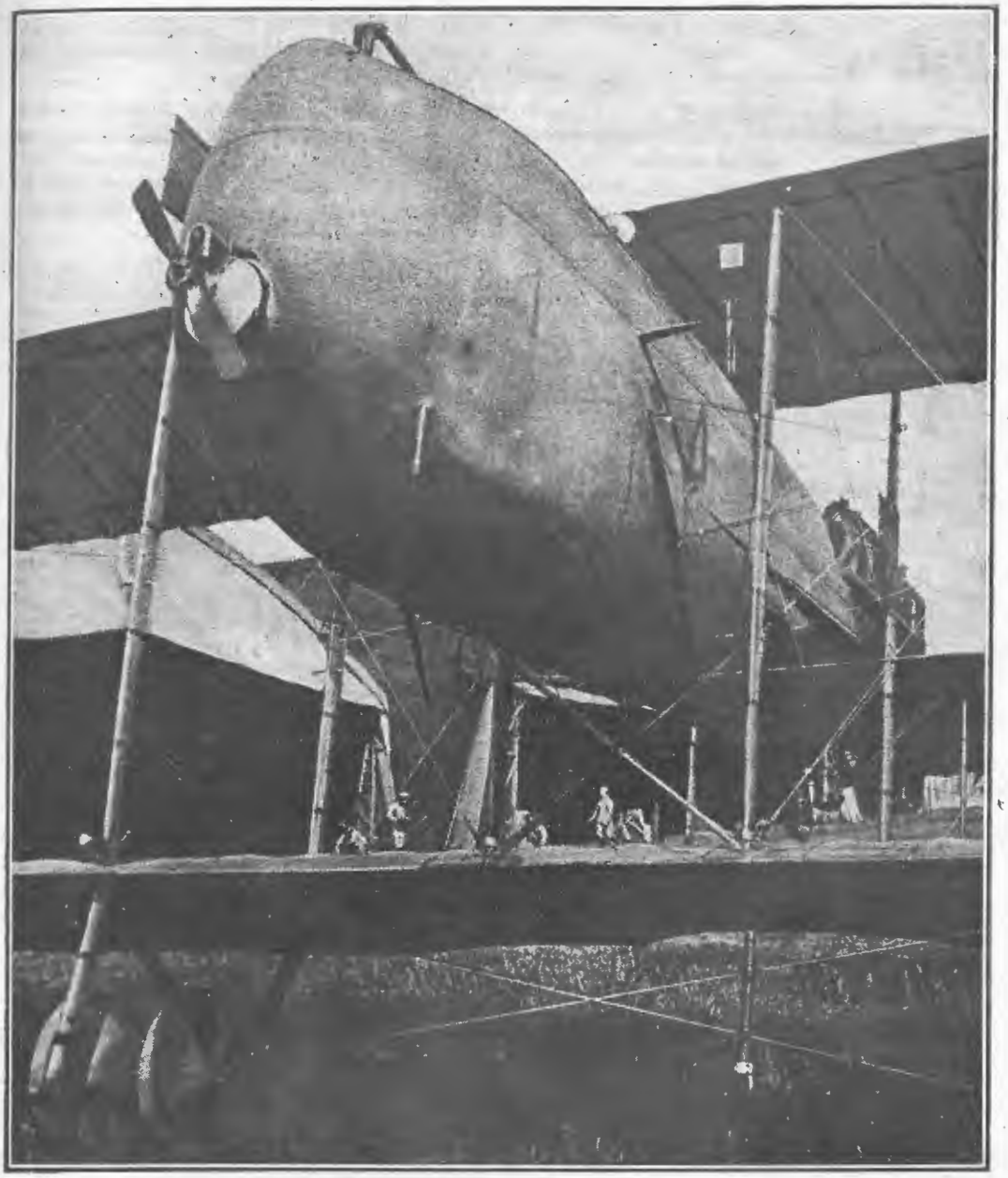
(2) To bomb such communities as is considered desirable, especially factories and factory towns.

(3) To conduct long-range reconnaissance, strategical reconnaissance, reconnaissance by staff officers, or with camera.

(4) To do special photographic work so far beyond the lines as to necessitate great altitude, demanding a camera of great focal length and therefore great size and weight.

The primary requirements for this aeroplane in order that it can effectively perform its military functions are:—

* A paper presented at the Annual Meeting of the Society of Automotive Engineers and published in the *Journal* of the Society.



Latest Type of French Bombing Aeroplane. It is Fitted with Wireless and has an Observation Window in the Bottom of the Car.

—French Pictorial Service.

(1) Ability to protect itself effectively against all hostile aircraft, which demands good speed at altitude, strong climbing ability, powerful and reliable armament, and a satisfactory degree of "handiness."

(2) Reliable power plant.

(3) Power plant with good fuel efficiency.

(4) Capacity for as many bombs as will not prohibit satisfactory provisions for protecting itself against enemy aircraft, as discussed above. I believe that, at the pre-

sent time, it is not an economic proposition to send a trained pilot and a trained "bombardier" a great distance beyond the enemy's line unless at least 6 cwt. of bombs are carried.

(5) Effective provision for accurate sighting of and dropping bombs.

(6) Ceiling should be high enough to give the machine a good chance of escaping detection as it crosses the line.

(7) Muffler for the exhaust capable of being cut in and off at the will of the pilot.

(8) Two or three machine guns, one firing through the propeller disc and one or two with all-around fire, with good field to the rear.

(9) Provision to carry two men.

(10) Reliable compass.

Typical aeroplanes of the day bomber type are the De Haviland-9 (British), with 300-h.p. Fiat engine; the S. I. A. 7-B (Italian), with 200-h.p. Fiat engine; the S. I. A. 9-B (Italian), with 500-h.p. Fiat engine, and the Breguet 14-B2 (French), with 300-h.p. Renault engine. The German Gotha twin-engine machine (two 260-h.p. Mercedes engines), while rather too slow and too unhandy for the purpose, has done some service bombing by day over London.

Night Bombers.

The type designed for bombing by night, in my opinion, must be depended on to inflict real material damage upon the enemy. I believe that the consistent employment of these machines in large numbers on every good moonlight night to bomb Germany's munition factories, factory towns, important railway junctions, large munition depôts, the bridges across the Rhine, the Kiel Canal, important docks, submarine bases, and certain cities, would end the war in a shorter period of time than is possible by any other means.

The primary requirements for these machines in order that they can effectively perform their functions are:—

(1) Great bomb capacity.

(2) Reliable powerplant.

(3) Power plant with good fuel efficiency.

(4) Proper degree of stability and controllability to permit a pilot of ordinary skill and a limited amount of training to fly and land at night.

(5) Effective provision for accurate sighting for and dropping of bombs.

(6) Accurate compass and other instruments necessary for navigation by night, with provision for reading conveniently at night.

(7) Provision for carrying two to five men. Probably the best practice is a crew of three—a chief pilot, a "bombardier" and another to man a gun forward or to the rear, as may be necessary, and to act as relief pilot.

The load of bombs that can be carried will depend upon the total power available at an altitude of 10,000 feet and upon the distance of the objective (which will regulate the initial fuel-supply). The ratio of total weight of aeroplane, with full initial load, to the total power available should be small enough to permit a ceiling of at least 11,500 feet, starting with full load. The power plant will be divided into two or possibly three units. Suppose that two twelve-cylinder engines be installed; if no device is incorporated to maintain the power constant with change in altitude, the total power available at 10,000 feet altitude should be about 450 horse-power. Suppose that the objective lies 155 miles beyond the lines, a bomb load of approximately one ton weight can be carried, and the necessary initial ceiling obtained, provided the general design of the aeroplane be good.

Limiting Weight.

The total weight of the aeroplane in pounds with full initial load should not be more than 22 times the number of horse-power available at 10,000 feet. The total weight should be not more than 5.63 pounds per square foot. The machine should have possible horizontal speed, at an altitude of 10,000 feet, of not less than 85 miles per hour. Starting with full load the aeroplane should be capable of climbing to an altitude of 10,000 feet in not more than 27 minutes. For every 16 miles increase in radius necessary to reach the objective, 100 pounds of bombs is sacrificed.

Typical aeroplanes of the night bomber type are the Caproni triplane (Italian), with three 273-h.p. Isotta-Fraschini engines; the Handley-Paige (British), with 320-h.p. Sunbeam engines, and the Caproni biplane, with three 210-h.p. S. P. A. engines. The German Gotha, with two 260-h.p. Mercedes engines, is typical.

The number of night-bombing aeroplanes built and supplied should depend

solely upon the number of pilots available for this work. A far lower degree of flying skill is required to pilot a large, slow night bomber than for a fast fighting machine, although more mature judgment is necessary.

Air Raids with Bombs.

Consider, for example, a fleet of several hundred of night-bombing aeroplanes, each carrying a ton and a half of bombs, flying from large aerodromes located say 25 miles to the rear of the line. The fleet penetrates to Essen, for instance. Each machine locates its objective and drops ten 160-pound bombs of the high-explosive type on the factories and forty 25-pound bombs filled with poisonous gas, and twenty-four 25-pound bombs of the incendiary type throughout the factory town—and returns home.

In the existing phase of the present war were our night-bombing aeroplanes of sufficient numerical strength it would be no longer a matter of individual and isolated raids on selected places at which the maximum of injury could be inflicted, but rather a continuous and unrelenting attack on every point of strategical importance.

Depôts of every kind in the rear of the enemy's lines would cease to exist; rolling stock and mechanical transport would be destroyed; no bridge would be allowed to stand for twenty-four hours; railway junctions would be subjected to continuous bombardment and the lines of railway and the roads themselves broken up nightly by giant bombs to such an extent as to baffle all attempts to maintain or restore communication.

In this manner a virtually impossible zone would be located in the rear of the enemy fences, a zone varying from 100 to 200 miles in width. As soon as this condition has been brought about, the position of the defending force must be considered as precarious, and eventually impossible. The defence will be strangled from the uncertainty and lack of supplies of all kinds. Ultimately retreat will become impossible. The defending force will find itself in a state of siege under the worst possible conditions. Its position will be in the form of an extended line along which the forces of all arms will be definitely immobile, for the lateral communications will suffer no less than the lines from the rear. In short, a reign of terror would exist. Such a condition presents all the elements conducive to complete and irreparable disaster.

Everyone here, I think, will realise that even consistent bombing of factory towns would end the war surely and quickly.

COMMERCIAL AVIATION IN CHINA

THE POSSIBILITIES OF THE COUNTRY.

BY ALAN J. DANIELS

As the question of the possibilities of the aeroplane as a means of commercial transit is creating such an amount of interest at present, it might be as well to bring to the notice of enterprising firms and individuals the possibilities, in this direction, of the country of China.

China, to a great number of people, conveys the idea of a large uncultivated country peopled by millions of semi-savages. As a matter of fact, the country is as different as possible from such a state. The land is cultivated in every inch of fertile soil, the people are solid, industrious and far ahead of many so-called civilised countries. The Germans were the first to distinguish between the real and the unreal, and had made huge progress in establishing themselves in the country. The Japanese soon got on the heels of the Germans, but the latter were still far ahead of them at the outbreak of the war.

It is quite true that the British were the first people to establish themselves in any large numbers in China, but so far they have not made enough of the opportunities that are theirs by virtue of their pioneership. The latest bidder for the trade of China is the American, and, without doubt, he is making good progress.

I must apologise for seeming to get away from the primary object of the article, but it is essential that any firm, or individual, who may think seriously of China as a field for present and future commercial aviation enterprise, should know from the start exactly how things stand from an international point of view in this country, which, so far, has only developed a small fraction of its real capabilities. The mineral resources of China are, as yet, practically untouched, but the near future will see a great change.

Need for Communication.

One of the greatest drawbacks to China's progress at the present time is the lack of means of communication. By far the greater portion of China's internal commercial traffic is carried on by water. Railways are only in their infancy; they are slow and very unreliable. On the so-called long-distance journeys there is usually only one train up and one down per day and it takes one, on an average, three times as long to accomplish a distance as it would do on a European line.

Postal Needs.

It is really only quite recently that a postal system has been inaugurated, but the people have been very quick in learning its uses and have taken up its advantages with enthusiasm, as will be seen from the fact that the receipts for the last financial year exceeded the expenditure by nearly £400,000. The Chinese have taken very kindly to the Express post and a great amount of mail is carried Express now and the volume increasing daily.

It is safe to say that the Chinese would welcome any means that would accelerate the mails to the utmost. Of course, as the railways increase in number and efficiency, the mails will be greatly accelerated, but I feel convinced that, should a system of mail-carrying by air be introduced, it would take but a very little time to make it a good paying enterprise.

The Waterplane's Chance.

According to *Aeronautical Engineering*, the waterplane would be a far more useful machine for the purpose of mail-carrying than the land 'plane, at least for the next few years, as there are very few places of importance that are not close to some waterway. And it is safe to say

that a good-sized waterplane would find little difficulty in rising from or landing on any of the rivers of this country.

A notable exception to the above is the great western plain in Szechuan and Hunan, but at present this rich field is only very little developed, although large land-going aeroplanes could, if necessary, be used in this district. Naturally, there are other places besides the great plain that would have to be reached by aeroplanes instead of by waterplanes, but such routes would be only sub-lines for transhipping from the main water routes.

The reason I advocate waterplanes as against land aeroplanes is on account of the lack of landing places for the latter type. I fully realise that vast strides have been made towards perfecting the landing chassis of land aeroplanes since I left for the East, but the difficulty would not be only the nature of the ground, but the fact, as previously stated, that most of the ground is under cultivation, even right up to the very gates of the cities. Naturally, in course of time, suitable landing-places would have to be made, but I feel sure that for initial experiments the water plane is the machine for China.

Fuel.

With regard to the fuel supplies, this would present no difficulties whatever, as there are already two large oil companies in China with a network of agencies and sub-agencies over most of the country. These companies are spreading rapidly, and will, in a very short while, embrace the whole of China.

I have spoken with representatives of various importing firms and in every case have been informed that, should any aviation enterprise come to China that would justify them carrying stocks of spares, steel, and other metals necessary for the manufacture of spares, there is no doubt that they would do so.

Native Pilots.

The Chinese themselves could easily be trained as mechanics and, if necessary, as pilots. They have proved themselves to be very apt motor-car drivers with little or no nerve. There are hundreds of motors and steam-boats in China run entirely by Chinese engineers, and I feel confident that with special training the Chinese would become expert aeroplane mechanics.

Military Aviation.

China is taking an interest in aviation from a military point of view and there are one or two machines and pilots capable of flying, as will be seen from the fact that the Military Governor of the Province of Hunan, who is at the time of writing trying to quell a rebellion in his Province, has asked the Central Government to help him by sending a couple of aeroplanes. Whether they will be sent or not, I cannot say, but the fact remains that the Governor has asked for them.

I have not mentioned passenger traffic, or dealt with any other uses to which the aeroplane can be put in China, as these can be incorporated in any scheme for mail carrying.

I sincerely hope that this article may induce readers to investigate the possibilities of this country, and will lead to questions being asked that will keep the matter constantly before them and be taken up after the cessation of hostilities.

[Mr. Daniels, the author of the foregoing article, has been resident in China for some years, and has studied aviation as closely as possible since he left England. He is, therefore, well acquainted with the possibilities both of aeroplanes and of the Chinese people.—ED.]

COMMERCIAL AVIATION IN NORWAY

According to a consular report a meeting of Norwegian business men, held at Christiania, March 1, took the initial steps toward the organisation of a company which is to maintain an aerial transportation service for freight and passengers between various places in Norway and also between Norway and other countries. Hydroplanes of the latest models are to be used. One route is to skirt the Norwegian coast, connecting Christiania, Christiansand, Stavanger, Bergen, Trondhjem and Kirkenes. There will also be cross-country routes between Christiania, Trondhjem and Bergen. Finally, it is hoped to maintain regular service between Stavanger and Aberdeen (Scotland), and between Christiania and Copenhagen.

THE UNITED STATES AERO-MAIL

DEVELOPMENT OF AERIAL TRAFFIC

The establishment of a permanent aerial route for the delivery of first-class mail between Washington, Philadelphia and New York, on the basis of one round trip each day, weather permitting, has been decided upon by the Post-Office Department and the service is already in active operation. Special-delivery letters only will be carried, and, including the stop at Philadelphia, the trip each way will require less than three hours.

Thus material too lengthy or too complicated for the telegraph or long-distance telephone may be mailed in Washington for delivery in New York, or *vice versa*, in less than four hours. The Government, business men, bankers and others in need of a fast mail service will find that the aero-mail will fill a long-felt want. The fee will be reasonable. By law it cannot exceed one shilling per ounce or fraction thereof and it will be fixed at the lowest figure that the expense of operation will permit.

The Post-Office Department does not regard this as an experimental service. Its practicability has been assured, because the flight is considered extremely simple; its popularity alone remains to be demonstrated. Once the public has evinced its willingness to use it, it is to remain a permanent service, which will be expanded as future circumstances warrant.

An arrangement has been concluded, meanwhile, between the Post-Office Department and the War Department whereby this aerial postal route will be conducted for one year in conjunction with the Signal Office of the War Department. It has been said that the flights would become a part of the training course of student aviators, but this is erroneous. At the present time there are nearly four thousand army aviators who could make the flight between New York and Washington with no more effort than would be required to drive a motor-truck between those two cities.

The flights, of course, will be primarily for the purpose of carrying United States mails. Distinctive insignia borne by the machine and by the pilot will identify the service they are performing. Their duties and responsibilities will be in accordance with the Federal postal laws. Technically, however, the flights will be under the control and operation of the War Department, which will furnish, at least during the first year, the aviators and mechanics, as well as the aeroplanes. The Post-Office Department will supply gasolene, and will pay for the upkeep of machines, the necessary motor-truck service, and the clerical force employed in handling the mail.

The Problem of Landing-places.

In New York difficulty was experienced in finding a landing-place owing to the high rentals asked for the available spaces. For a time the choice seemed to lie between Van Cortlandt Park and Mineola—the latter, by the way, having been the birthplace of the aeromail service in America. Then the Westchester Racing Association, in a commendable spirit of patriotism, tendered the use of Belmont Park free of charge and the offer was accepted. A special train service on the Long Island Railway has been arranged to carry the mail from the park to New York.

The great difficulty in the way of finding a suitable site in a location sufficiently central to ensure the speedy delivery of the arriving mails, was the requirement of a field about two thousand feet square for starting and landing. It is probable that in time it will be found possible to use a more restricted space. This depends upon the efficiency of devices now under development which will permit the starting and landing of aeroplanes within a much smaller area. It is hoped that it may ultimately be possible to use the roof of a post-office or other large building, and very satisfactory and encouraging progress is being made in this direction.

Necessarily, the amount of mail that can be carried is not great. First-class mail not exceeding 3 cwt. and occupying a space of not more than twenty-five cubic feet, will be carried on each trip. This would mean forty-eight hundred letters weighing one ounce each; but allowing for a certain proportion of heavier packages, the average number of pieces carried on each trip, if the service is utilised at its maximum, will probably be about thirty-five hundred.

Much of the detail concerning the actual operation of the service will depend upon the results of the initial trips. At the time of writing no decision had been reached as to the type of machines that will be used, but preference was leaning toward the heaviest type of Curtiss biplanes, equipped either with standard or with the new Liberty motors. Twelve powerful machines will form the first fleet of aeromail carriers. The words "United States Mail" will appear on the planes, in addition to the standard army aircraft device—a five-pointed star within a circle, in red, white and blue.

It is natural to expect that in the operation of a regular service, covering the same distance, along the same routes, under all sorts of meteorological conditions, certain types of planes and motors will be found better than others; but these are details with which the Post-Office Department is only indirectly interested, as the responsibility for providing the right type of carrier has been undertaken by the War Department.

Meanwhile, the bids submitted in response to the advertisement of the Post-Office Department for the construction of mail-carrying aeroplanes, which were rejected when the existing temporary agreement was made with the War Department, may be submitted anew at a later date; for additional planes may be required if the service is found so popular as to warrant extension. Congress has appropriated £20,000 for the preliminary expenses of the aeromail.

Army Aeroplanes Made Available.

That the Government departments are endeavouring to co-operate in establishing this new service is demonstrated by the result of a conference, approved by President Wilson to obtain Congressional authorisation permitting the Secretary of War to turn over to the Post-Office Department all military aeroplanes and motor-vehicles not serviceable for military purposes, or which, after the war, may be dispensed with for military service. The Post-Office Committee of the House of Representatives immediately adopted an amendment which reads as follows:—

> Provided that the Secretary of War may, in his discretion, deliver and turn over to the Postmaster-General from time to time, and without charge therefor, for use in the postal service, such aeroplanes and automobiles, or parts thereof, as may prove to be, or as shall become, unsuitable for the purposes of the War Department; and the Postmaster-General is hereby authorised to use the same, in his discretion, in the transportation of the mails, and to pay the necessary expenses thereof out of the appropriation for inland transportation by steamboat or other power-boat or by aeroplanes, or from the appropriation for inland transportation by Star Routes.

The bill, which is likely to be adopted speedily, provides that aeroplanes which have become obsolete for military purposes, or which for any reason are not available for military use, but which have carrying capacity and speed, will be placed at the service of the Post-Office Department for mail delivery. The motor-trucks procured from the War Department at this time, or at the close of the war, will be available for the parcel-post truck service.

Italy and France have adopted this same idea of transferring aircraft from one department of the Government to another. Italy has an aerial mail route from her western coast, usually starting at Civitavecchia, to carry mails to Sardinia. On an average 5 cwt. of mail is carried in two hours, the distance being about one hundred and forty miles. France has a similar aerial route between her southern coast and Corsica.

The Beginnings of the Aeromail.

To America, however, belongs the credit of fathering the aeromail. The first case in which the carriage of mail by aeroplane was officially authorised by any Government occurred as far back as November, 1910, when Postmaster-General Frank H. Hitchcock formally approved arrangements for the transportation of a pouch of mail by J. A. D. McCurdy, one of the pioneers in the

science of aviation, from the steamship *Kaiserin Augusta Victoria* to New York. The attempt, however, was unsuccessful, because of stormy weather.

Subsequently Postmaster-General Hitchcock arranged to co-operate with the managers of the International Aviation Meet held at Nassau Boulevard, Long Island, in September, 1911, in experiments in the carrying of mail by aeroplane. A postal station was established at the aviation field and more than forty-three thousand pieces of mail were despatched from it to Mineola, Long Island—a distance of fifteen miles. This was the first successful experiment of the sort in America, although during that same month the British Government began a series of tests of aeromail service between Hendon and Windsor.

During the progress of the Long Island Aviation Meet mail was regularly collected and despatched by plane. Eight different aviators were engaged in the service, all of whom had been duly sworn-in as aeroplane mail-carriers. Inspectors were on hand to see that all details were carried out according to the rules and regulations of the Post-Office Department. Street letter-boxes were placed about the aviation field for the convenience of the people attending the meet and a postman made periodical collections, which he delivered at the aeroplane station.

Mr. Hitchcock on one occasion accompanied an aeromail carrier. He was greatly pleased with the result of the experiments and ordered that a complete report of them should be carefully filed, as a record of the inauguration of mail service by aeroplane.

In his subsequent annual report Postmaster-General Hitchcock was prophetic:

> Since the first despatch of United States mail by aeroplane, which occurred in September, 1911, the department has authorised about fifty temporary routes, and for brief periods considerable quantities of mail have been carried in this manner. Decided improvements were made during the year in the construction of aeroplanes, and there is reason to believe that in due course of time they will be so far perfected as to render them an important agency in the transportation of mail.

A comparison between the fifteen-mile aeromail route of 1911 and journeys of some eight hundred miles recently made by military aviators, will attest the remarkable development of aircraft during the last seven years. For some time flights of a hundred miles behind the lines in the theatre of the war have been common and commanders have frequently communicated with one another by plane where the wireless or other means of communication were found unsuitable.

Earle L. Ovington, who made the first long-distance flight with United States mails, started from New York for the Pacific Coast in October, 1911, carrying letters for Chicago and for Los Angeles. He was designated by the Post-Office Department as a special mail messenger for the trip and his machine bore a small sign reading: "United States Mail."

The Practical Value of the Service.

It is not believed that long-distance flights will be undertaken until the service has proved successful between points closer together. The postal administration is desirous, in the beginning, to demonstrate to the utmost the feasibility and utility of carrying special-delivery letters between Washington and New York. It is probable (says *Munsey's Magazine*) that the time for starting from Washington will be so arranged as to permit the arrival of mail at New York in time to be of use to banks, the exchanges, and other places where the closing hour is three o'clock. Mail from New York will be so timed as to ensure its arrival at Washington and its delivery before the Government offices close.

Assuming that the aeroplanes leave New York for Washington at noon and leave Washington at the same hour for New York, rail connections for destinations beyond these cities and Philadelphia will be made which would otherwise be impossible. Besides the quicker delivery of letters addressed to New York, Philadelphia and Washington, much time will be saved through making these connections for other points.

An aeroplane leaving Washington on this noon schedule would make the late afternoon delivery over the entire city of New York. To make this delivery by train, letters now have to be mailed before 9 a.m., which is practically a prohibitive hour for business correspondence.

As at present decided, one round trip will be made each week-day, exclusive of

holidays, and it is hoped that the service will be maintained, even in stormy weather, without interruption from any cause.

A question of prime importance in determining the future of the aeroplane for carrying mails, particularly to cover cities farther apart than two hundred miles, is speed. The call for bids by the Post-Office Department required that the craft should be capable of carrying 3cwt. of mail a distance of not less than two hundred miles without stop, at a maximum speed, full load, of one hundred miles per hour and a minimum speed, full load, of forty-five miles, with a climbing speed of six thousand feet in ten minutes. One hundred miles per hour, however, is now considered a low speed, as many aeroplanes can to-day make one hundred and twenty and even one hundred and fifty miles. Italian aviators have experimented at Langley Park, U.S.A., with a special machine which is said to be capable of a speed of two hundred miles an hour.

For the Guidance of the Public.

In anticipation of the numerous flights that will be made between large cities, where the intervening country is also thickly populated, it may be worth while to set forth the rules to be followed by the public in its treatment of Government aeroplanes which may be forced down by accident. These rules have been adopted by the Aircraft Board.

When a machine comes down, and the aviator is seen to be uninjured, the public is warned to keep away from it. Particularly should no one touch its controls or instruments. Derangement of the delicate devices by an untrained person, without the knowledge of the pilot, might lead to a serious accident later.

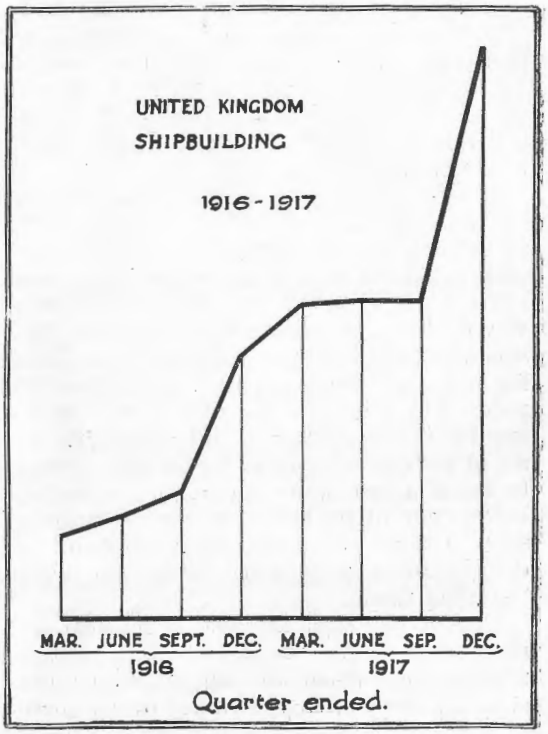
Guards will be sent promptly from near-by military camps or posts, or from post-offices, when a machine falls or makes a forced landing. If no military guard is available the police of the locality are requested to furnish protection for the machine.

When a machine falls out of control and is wrecked, the authorities are urged to see that no part of the wreckage is disturbed, except to the extent necessary in freeing the aviator. It is indispensable that every means of determining the cause of the accident should be preserved, in order to avoid other similar accidents.

Railroads are requested to ask all employees to keep watch for aviators landing in isolated regions, and to furnish assistance. All trains of steamships are required to take on stranded aviators, and also to stop at whatever point the aviator may desire for the purpose of leaving the train or boat.

MERCHANT TONNAGE
AN OFFICIAL DIAGRAM

The increase in the output of merchant tonnage from the shipbuilding yards of the United Kingdom formed the subject of a statement recently made in the House of Commons by the First Lord of the Admiralty. Since that statement was made a diagram has been issued through the Press Bureau showing strictly to scale the development, quarter by quarter, for the years 1916 and 1917, of the output of merchant vessels. The general curve of increasing output referred to by the First Lord is apparent.



THE PHENOMENA OF SOUND

BY MRS. D. M. SELWYN LEWIS, B.Sc., University of Sydney

(Continued from July Issue)

The essential difference between noise and music is that of an irregular motion taking place in the air, and, on the other hand, a movement perfectly in rhythm. It must be due to this regularly repeated rhythm that dancing, skating and rowing give such pleasure.

Soldiers, when crossing a suspension bridge, are generally told to break step, lest the vibration caused by their steady tramp set up dangerous vibration in the bridge.

If a piano be opened, exposing the strings, and a singer with a powerful voice sings a loud note perfectly in tune and then suddenly stops, it will be found that the one particular string of the piano is set vibrating that would have given out the self-same note if it had been struck, all the other strings remaining silent.

The evenly repeated vibrations coming from an organ pipe are caused by a steady current of air being blown in at the foot of the tube, this impinges on a sharp edge there and sets up alternate compression and expansion of the air in the tube. When the upper end of the pipe is opened a note is given out which has a wave length equal to double the length of the pipe.

The increase of air pressure in a pipe is not the only method of producing a note therefrom. Lord Rayleigh experimented with a long iron pipe suspended from the ceiling. He adjusted iron-wire gauze a little way up the pipe and found that, when this was made red hot by a gas burner, the pipe for a few moments gave out an organ-like note. The column of air was so set vibrating by the in-draughts and out-rushes of air at the ends that quite a cold blast would be felt if a hand were placed just below the bottom end of the tube. The same happens when a small jet of hydrogen gas is introduced into a glass tube; hence the term "singing flame."

One of the most interesting musical instruments is the violin, which is but a wooden box, along the top of which are stretched four strings, strained over a piece of wood known as the bridge. These strings are set in vibration by drawing over them a well resined bow of horse-hair. The bridge stands on two feet, one of which rests over a block of wood in the interior of the box, called the strong-post. The box is again strengthened by a bar of wood glued to it, just beneath where the active part of the bridge rests. The wood must be elastic and varnished, otherwise it will not take up the vibrations imparted by the strings. Two scroll-like slits in front of the body and on each side of the bridge are the sound-holes; these, when the strings are touched, give full scope to the sound waves set up by the vibration of the body of the instrument.

Edison must be given all the credit for making the first talking-machine, yet it is clear that he owed a great deal indirectly to Graham Bell's invention of the telephone. The first phonograph consisted of a speaking horn, the upper end of which was left open to receive sounds, the lower end being fitted with a short brass tube.

Over the end of the tube a flexible membrane was fixed like the parchment head of a drum. On the outside of the membrane was fastened a steel needle which acted as a pen; just in front of the needle and within reach of it was a cylinder covered with tinfoil; this was turned by means of a handle, and as it turned it also moved forward. The membrane vibrated under the influence of sound waves made in the air by the human voice; this caused the pen to write on the cylinder, and this sound-writing consisted of wave-like indentations on the tinfoil.

The phonograph was not only a sound-writer; it was a sound-maker. For, when the steel pen began to travel again over the indentations it had made, it caused the membrane to vibrate, just as the membrane of a telephone receiver vibrates in answer to the electric current set up by human speech at the other end of the wire.

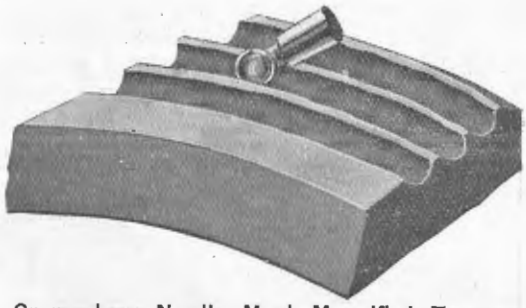
As the membrane vibrated it produced waves in the air; these were sound-

waves. The first talking-machines that Edison devised reproduced sounds that were tinny and unmusical, and the motion given to the cylinder by turning the handle was irregular. The pace at which the membrane is vibrated has an important effect on the quality of the sound. Edison improved on this later, using a wax cylinder and a tiny agate point which made minute depressions on the wax. The sound-waves are represented by actual waves in the wax, each wave sloping upwards and downwards, like the rippled surface of the sea. In 1887 Berliner invented the gramophone, in which the records are thin, flat discs. The disc is spun around by a single movement of a turntable and works the instrument.

He improved on the "hill and dale" method of recording sounds by making a tiny lane running round the flat disc, and the waves are cut out of the sides of the two minute walls, so that the needle works forward from side to side.

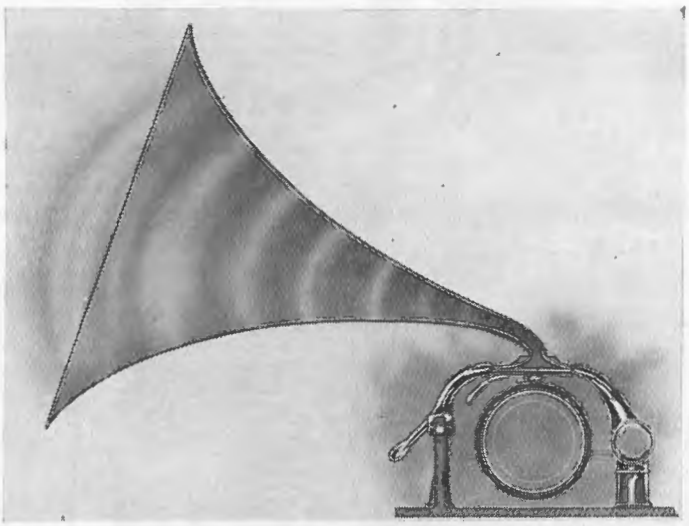
Friction noises could be heard distinct from the musical tone, as in the ear there is a mechanism for detecting noises of high pitch as distinct from musical sounds.

When a number of orchestral instruments are filling a hall with various kinds of musical sound waves, these waves do not reach the ear singly. That is to say, the drum of our ear does not first record the music of the high violins, then register the melody of the second violins, and then go on to note the waves from the other instruments. It simplifies all the effects into one single sound-wave. The membrane of a gramophone acts in the same way. In the case of an orchestral record, the waves in the wax are formed by the blending together of many large waves, yet all this is recorded in a single jagged curve in the wax which cannot be distinguished by the eye. The steel needle, hurrying past this tiny rugged curve, causes the membrane to vibrate with such delicate complexity that all the original sound-waves



Gramophone Needle, Much Magnified, Traversing Groove Made by Air-Vibrations Produced by the Human Voice.

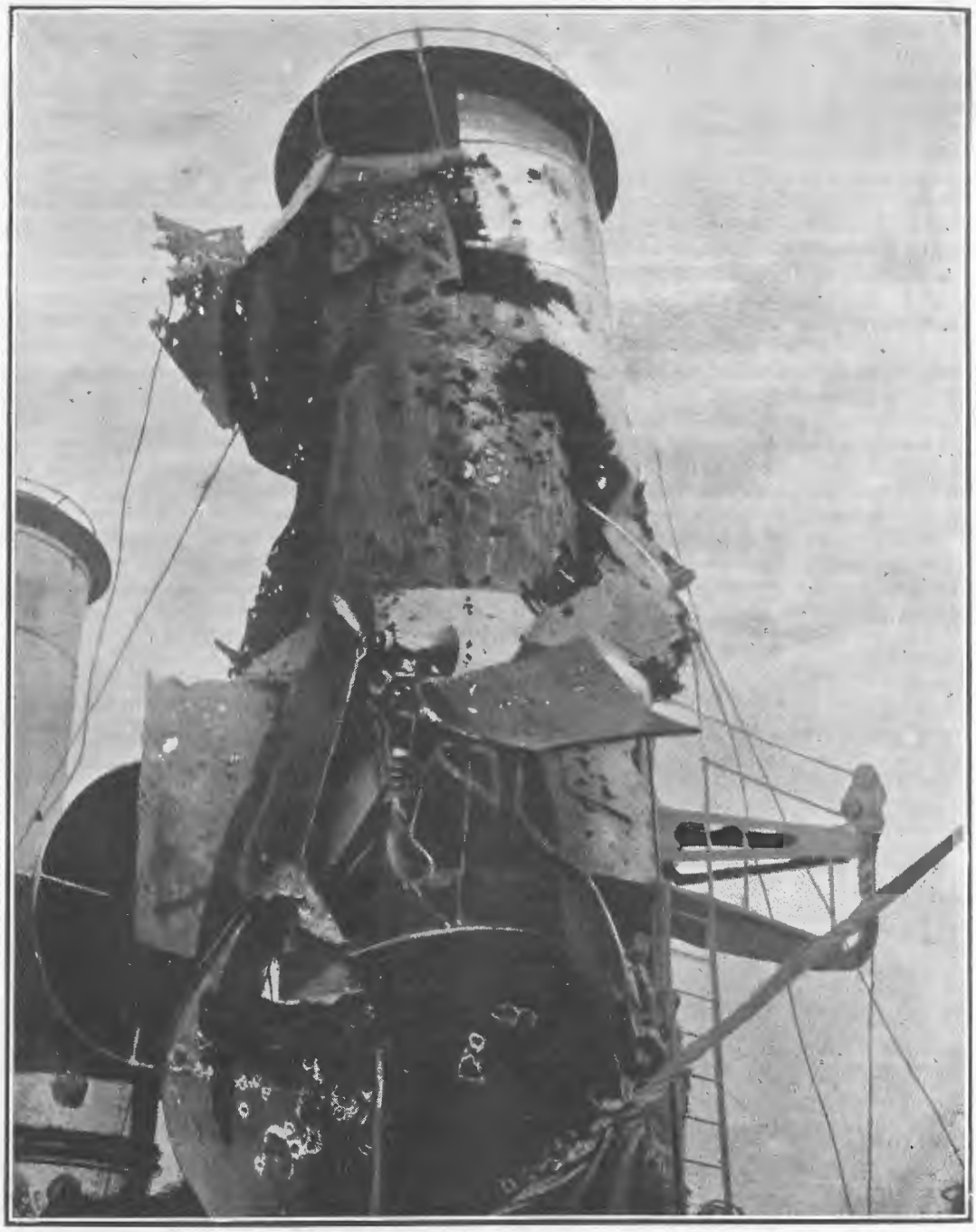
In following the groove the needle creates a duplicate series of sound waves, thus reproducing the voice.



The Phonograph Gives Back as Sound Waves the Impressions on the Cylinder.

This Sketch Shows Mica Disc Receiving Vibrations by Friction of Rounded Point Against Revolving Grooved Cylinder. Sound Waves are seen Issuing from Mouth of Trumpet.

are recreated in the air and sent into the ears of the listeners. The telegraphone is regarded as the talking-machine of the future; in it neither wax disc, cylinder nor needle is employed—in their place is a steel wire only $^{1}/_{100}$ inch thick. This wire can be full of music, speech or song, yet nothing will be visible on it.



Funnel of H.M.S. "Vindictive" on her Return from her First Visit to Zeebrugge on April 23, 1918.

DEFINITIONS OF TERMS USED IN WIRELESS

Compiled from the Report of the Committee of Standardisation of the Institute of Radio Engineers and from other sources,
BY DR. J. ERSKINE MURRAY, D.Sc., F.R.S.E., M.I.E.E.

Definition of Terms.

Note.—Terms are generally arranged alphabetically, according to the *noun* referred to.

1. AERIAL.—The system of conductors designed to radiate, or absorb electro-magnetic waves.

2. AERIAL CIRCUIT.—The circuit comprising the aerial conductors, the earth conductors, and all inductances and condensers connected between them, and the capacity aerial—earth within the limits outside of which radiation takes place.

3. AERIAL RESISTANCE.—*See* Antenna Resistance.

4. ÆTHER.—*See* Ether.

5. ALTERNATING CURRENT.—One which reverses its direction periodically with time.

6. ALTERNATOR.—A rotating machine, which transforms mechanical energy into electrical energy, producing at its terminals one or more alternating E.M.F.'s (single phase or polyphase).

7. AMMETER (HOT BAND: HOT WIRE).—An ammeter dependent for its indications upon the change in dimensions of an element which is heated by a current through it.

8. AMMETER, THERMO.—An instrument for measuring current, depending for its indications on the voltage generated at the terminals of a thermo junction heated either directly or indirectly by the current to be measured.

9. AMPLIFIER *or* AMPLIFYING RELAY.—An instrument which modifies the effect of a local source of energy in accordance with the variations of received energy, and, in general, produces a larger indication than could be had from the incoming energy alone.

10. AMPLIFICATION, CO-EFFICIENT OF.—The ratio of the useful effect obtained by the employment of the amplified to the useful effect obtained without that instrument.

11. AMPLITUDE.—The maximum value of current or voltage attained during any half period of an alternating current or voltage is called the amplitude during that half period.

12. ANGULAR VELOCITY.—Of a periodic alternating current in radians per second equals 2π times the frequency in cycles per second.

13. ANODE.—(*a*) In an electrolytic cell. The conductor through the surface of which the current enters the liquid.

(*b*) In a primary cell. The metal (usually zinc) through which the current enters the electrolyte, also termed negative terminal.

(*c*) The terminal by which the current enters a cell or other apparatus, such as a vacuum tube, etc. (B.E.C.).

14. ANTENNA.—*See* Aerial.

15. ANTENNA, DIRECTIVE.—An antenna having the property of radiating a maximum of energy in one (or more) directions.

16. ANTENNA, FLAT TOP.—An antenna having horizontal wires at the top covering a large area.

17. ANTENNA, HARP.—An antenna having an approximately vertical section of large area and considerable width.

18. ANTENNA, INVERTED L.—A flat top antenna in which the leading down wires are taken from one end of the long narrow horizontal section.

19. ANTENNA, LOOP.—An antenna in which the wires form a closed circuit, part of which may be the ground.

20. ANTENNA, PLAIN. — An approximately vertical single wire.

21. ANTENNA, T.—A flat top antenna in which the horizontal section is long and narrow, the leading down wires being taken from the centre.

22. ANTENNA, UMBRELLA.—One whose conductors form the elements of a cone from the elevated apex of which the leading down wires are brought.

23. ANTENNA, RESISTANCE. — An effective resistance which is numerically equal to the ratio of the power in the entire antenna circuit to the square of the R.M.S.

current at a potential node (generally the ground).

Note.—Antenna Resistance includes:

Radiation resistance.

Ground resistance.

Radio frequency ohmic resistance of antenna and loading coil and shortening condensers.

Equivalent resistance due to corona, eddy currents, and insulator leakage.

24. APERIODIC CIRCUIT.—A circuit which has no definite time period, this being due either to its resistance being large enough to prevent natural oscillations occurring, or to its having no capacity or no inductance by which it can be tuned.

25. ARC.—"A luminous discharge of electricity through a gas in which the material of one or both the electrodes is volatilized and takes part in the conduction of the current, whether continuous or alternating" (B.E.C.). ARC.—The passage of an electric current of relatively high density through a gas or vapour the conductivity of which is mainly due to the electron emission from the self-heated cathode. Under present practical conditions the phenomena take place near atmospheric pressure (I.R.E.).

26. Arc Oscillator.—An arc used with an oscillating circuit for the conversion of direct to alternating or pulsating current. The oscillations generated are classified as follows:—

Class (1).—Those in which the amplitude of the oscillation circuit current produced is less than the direct current through the arc.

Class (2).—Those in which the amplitude of the oscillation circuit current is at least equal to the direct current, but in which the direction of the current through the arc is never reversed.

Class (3).—Those in which the amplitude of the initial portion of the oscillation circuit current is greater than the direct current passing through the arc, and in which the direction of the current through the arc is periodically reversed.

27. ARRESTER, EARTH.—A spark gap with a small gap and large sparking surfaces; used to protect receiving apparatus from powerful discharges.

28. ASYNCHRONOUS.—"A term applied to an A.C. generator or motor, the speed of which has no fixed relation to the frequency of the current" (I.E.C.).

29. ATMOSPHERIC ABSORPTION. — That portion of the total loss of radiated energy due to atmospheric conductivity, reflection, and refraction.

30. ATMOSPHERICS. — Disturbances produced in the receiving circuits, caused by electrical action in the atmosphere or in the earth's surface. They are also known as "X's," "Strays," and in the U.S.A. as "Static."

31. ATTENUATION (RADIO).—This is the decrease, with distance from the radiating source, of the amplitude of the electric and magnetic forces accompanying (and constituting) an electro-magnetic wave.

32. ATTENUATION, CO-EFFICIENT OF (RADIO).—The co-efficient, which, when multiplied by the distance of transmission through a uniform medium, gives the natural logarithm of the ratio of the amplitude of the electric or magnetic force at that distance to the initial value of the corresponding quantity.

33. AUDIBILITY.—The ratio of the telephone current variation producing the received signal to that producing a just audible signal, *i.e.*, one which permits the mere differentiation of dots and dashes.

The measurement of audibility is an arbitrary method for determining the relative loudness of telephone response in radio receivers, in which it is stated that a signal has an audibility of given value. The determination of the above ratio may be made by the non-inductive shunt-to-telephone method, except that a series resistance should be inserted to keep the main current constant, and that the shunt resistance should therefore be connected as a potentiometer.

34. AUTO-JIGGER.—*See* Jigger.

35. AUTOMATIC RECEIVER.—A receiver which records signals so they can be translated at any convenient time after reception.

36. AUTOMATIC TRANSMITTER.—A transmitter which has the usual operating key replaced by any mechanical telegraph sender, such as a Wheatstone transmitter.

37. BALANCING AERIAL.—An aerial used in duplex wireless telegraphy. It fills a purpose similar to that of the artificial line in duplex wire telegraphy.

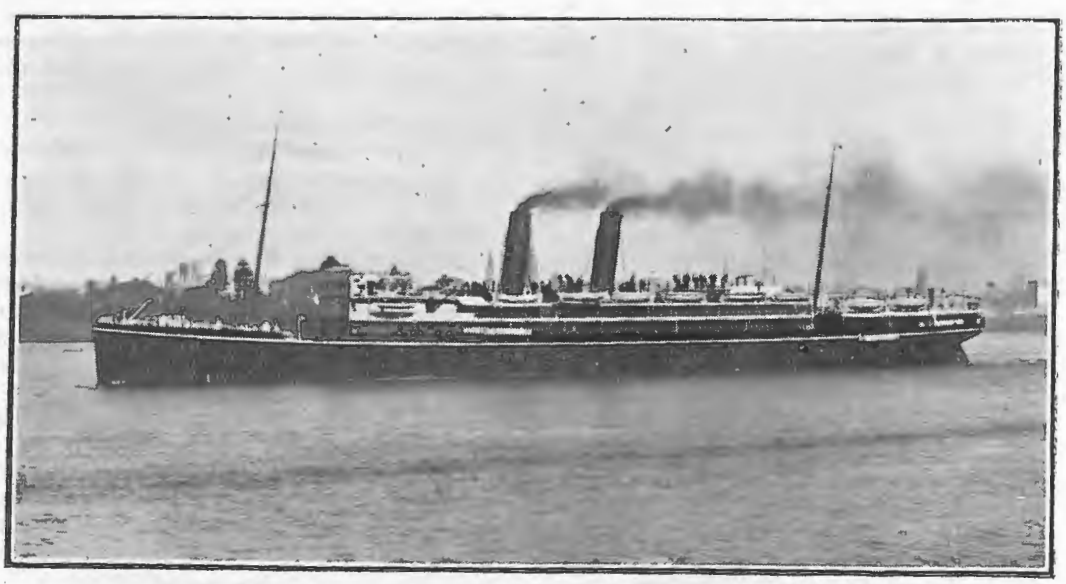
38. BATTERY.—A primary or secondary cell for producing electric current, or a collection of such units. A collection of condenser units.

(To be Continued.)

THE TOLL OF THE U-BOAT

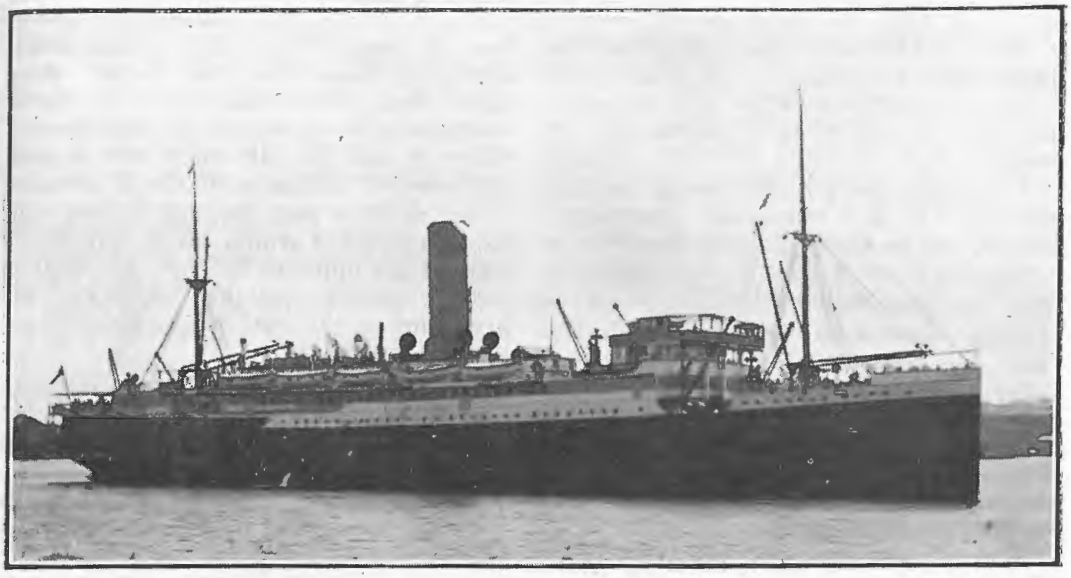
TWO RECENT VICTIMS

R.M.S. "Omrah," 8,130 tons (Orient S.S. Co.), Sunk by "Enemy Action."



R.M.S. "Marmora," 10,509 tons (P. & O. Co.), Sunk by German Submarine, July 23, 1918.

ANOTHER RECENT EXAMPLE OF "KULTUR"



Australian Hospital Ship "Warilda," 7,713 tons (Adelaide S.S. Co.), Sunk by German Submarine.
—Photo. Star Studios.

Wireless Operator John Durrant,
Rescued from the *Warilda.*

NO SMALL SHIPS ALLOWED TO CROSS ATLANTIC

The Shipping Board by a recent order has forbidden all vessels of 2,500 tons dead weight, or less, to engage in transatlantic shipping. About 1,400 ships of various sizes are included in the order. Many of these have been operating in opposition to those taken over by the Government and have been charging rates which are exorbitant. The order has been issued to effect conservation of tonnage, it being believed that the small craft cannot be operated economically or with safety between America and Europe. The steamships affected will be used in coastwise, West Indies and other service.

NEW STEAMERS FOR FRANCE

Twenty torpedo-proof and non-sinkable steamers of 4,200 tons each are to be constructed in America for the French Government, each to be built on the Le Parmentier design, it is announced. Contracts were signed in France on April 5, and the work of rushing to completion the 20 vessels will be in the hands of the Foundation Co., New York.

AT SEA.

BY ETIENNE

Time: 11.50 p.m.—Bang-bang on the cabin door, the heavy tread of a marine sentry, a crash as he trips over *the* chair, and then a flood of light bathes the tiny cabin.

Lieutenant John Smith, owing to long practice, is by this time thoroughly awake, but he closes his eyes and tries to believe it is all a dream, and that it is only his imagination which is saying:

"Ten minutes to eight bells, and Mr. 'ill's compliments, Sir, and it—it's—rainin' and blowin' very 'ard — oil-skin and sea boot weather, if I might 'azard a remark, Sir!"

This effort of chattiness on the part of the marine sentry rasps on Lieutenant Smith's sensitive nature.

Sitting up abruptly he remarks, "For Heaven's sake get out of my cabin!"

The sentry withdraws and tells his own relief that "Smithy 'as the 'ell of a fat 'ead."

He also privately registers the resolve to mistake a quarter to twelve for ten minutes to the hour, when next he calls Lieutenant Smith.

But let us return to this gentleman and observe attentively his movements and listen to his conversation.

Having carefully examined his wrist watch he springs ponderously out of his bunk. The ship is pitching heavily, and it is with some bitterness that he notices a photograph of a girl—much esteemed—has fallen from its frame into his wash basin.

He quickly dresses, putting on several layers of Shetland waistcoats, a special inflatable waistcoat, and finally sea boots, an oil-skin, a pair of reputed waterproof gloves and a sou'-wester hat.

He flings a pair of binoculars round his neck, and with a lingering look at his warm bunk, from which (O, shame!) a hot-water bottle leers at him, he staggers on deck.

His progress to the bridge is lengthy and somewhat painful. Funnel guys and other wires strike him smartly across the face at regular intervals; a bluejacket hastening below for four hours' sleep rams him, then disappears in haste. Eventually Smith reaches Monkey Island,* where he and Mr. Hill enter into a short conversation lasting a couple of minutes.

Mr. Smith's contributions to this consist of a series of grunts, but it apparently satisfies his opposite number, for, with a parting remark that the "sea-cows" are five miles on the port beam, Mr. Hill retires to his bunk.

Let me explain, *en parenthèse*, that the "sea-cows" are an extremely respectable squadron of cruisers, once attached to the Grand Fleet.

Amongst other yarns, passed from ship to ship, concerning the squadron, runs one to the effect that the "sea-cows" were late at a rendezvous. On inquiries being made by wireless, a reply was received as follows:—

"We are zigzagging 90 degrees in each direction every quarter of an hour, in order to cope with the submarine menace."

But we have lost sight of our protégé. Smith soon finds that it is in very truth oil-skin weather. About every ten seconds the cruiser buries her fo'c'sle deep into creamy foam, then, without effort, she lifts and her "flared bow" flings many tons of North Sea back along the upper deck.

Much of this is caught by the gale, and, rising in a curved sheet, is hurled against the bridge.

Smith and his companion (for another unfortunate is also keeping a weary vigil) manage to dodge most of these by ducking behind a canvas screen at the critical moment, but every now and then they miscalculate and receive the penalty in the shape of stinging, blinding spray.

An indeterminate distance ahead, a feeble blue light glimmers in the gloom; Smith watches it carefully—he must keep

* Monkey Island is the name given to the fore upper bridge.

four hundred yards from that light, which marks the plunging stern of the next ahead. Whenever he can he sweeps the horizon and imagines dark spots, though common sense tells him that there is little chance of the Hun destroyer being out on such a night.

In this manner the minutes pass, and slowly (oh! so slowly sometimes) they become hours.

As 2 a.m. rings out on the ship's bell, a dripping figure appears at his side, holding in one hand a pulpy mass of signal sheets.

"One or two signals come through, Sir; shall I read 'em?"

"Carry on," says Smith.

The dripping one produces a shaded torch, switches it on, and intones various signals.

"One more, Sir," "Fleet will alter course at 2.15 to North."

"Thank heaven for that," comes from the other corner. "We shall have this sea behind us."

" 'Ear! 'Ear! to your sentiments, John, they does yer credit," adds Smith.

At 2.15 a.m. course is altered satisfactorily, though not before Mr. Smith has gone through an unpleasant five minutes, during which he first lost his guiding stern light, then, having increased to twenty knots in a flutter of excitement, he suddenly notices a black shape on his beam. However, with no lights showing such things often happen, and he drops into station without anyone being the wiser.

The rain has kindly stopped, and on the new course the bridge is comparatively dry.

Thoughts of cocoa obtrude themselves.

"Messenger!"

"Sir!"

"Go down to my cabin and in my basin you will find a cup, saucer, and spoon, a coffee cup full of milk, another one full of brown sugar, a tin of cocoa, and an electric kettle. Bring it all up—got it?"

"Yessir!"

In the fulness of time, the small boy, aged about fifteen, reappears with the necessary impedimenta for cocoa. The kettle is plugged up, and the brew mixed.

Soon both officers are enjoying the cup that cheers, but does not inebriate. Under cover of a screen, pipes are lit, and Mr. Smith, revived by the cocoa and soothed by the pipe, known as the "gum-bucket" to his pals, becomes quite affable.

"You know," he remarks, "that drop of leave we gathered in the other day seems like a dream, a vision punctuated with lovely ladies. . ."

"Yes," interposes the other, "it is like a dream until you look at your cheque book; I had not observed mine closely until I got a screed from my bankers requesting me to do so. The shock was terrific."

"Ah yes, Jacko! but what a devil of a good time one had in those four days! By the way, did you get engaged?"

"No, thank heaven, but I had a dashed narrow escape. It was on the river, and in the dusk, about the time you darken ship, savee? And 'pon my word I was just losing my head, when our punt was rammed amidships by a tinker in a skiff, one of the 'grabbies,'† taking his young lady out for a row—of course that brought me to: I sweated with fear when I thought about it."

Mr. Smith murmured sympathetic condolences, then, apropos of nothing in particular, he remarked:

"It's marvellous how noble, how sympathetic some girls are! Now last leave I met——"

He was rudely interrupted.

"Look here, old chap, it's a quarter to four. What about the reliefs?"

"Good lor! So it is. Here, Hi! messenger, nip down and tell the sentry to call Mr. Blanche and Mr. Burrell. Tell 'em it's a fine night, and see they turn out. . . . Signalman, bring the books, and send a hand down to report 3.50 to the navigator! . . . Bosun's mate, send a hand up here to take the crockery down!"

At four a.m. a sleepy figure arrives on the bridge, and takes over from Smith's companion. "Night, Smithy," says the latter, "I'll smooth your sheets for you as I pass your house."‡

"See if that slug Blanche has turned out would be more to the point," is Mr. Smith's reply.

4.2 a.m.—"If there is one thing I

† Grabbies—Soldiers.

‡ House—Cabin.

abominate, it's being relieved late," remarks Mr. Smith.

4.4 a.m.—"I say, Burrell, did you see if Blanche was turned out?"

"No, my eyes were not unstuck then," replies Burrell.

4.6 a.m.—"Blast his sluggish liver! Here, messenger!"

"Yessir."

"Take my compliments — *compliments*, savee, to Mr. Blanche, and tell him—Oh! here he is—wash out."

"Sorry, old sport," remarks the new arrival with forced joviality. "I'm a wee bit adrift."

"Not at all, I like it," says Smith with heavy sarcasm. "Well, here you are, Course North, etc."

4.15 a.m.—"Sentry!"

"Sir!"

"Call me at eight o'clock, a good shake."

"Very good, Sir."

4.20 a.m.—Heavy breathing.

THE MARCONI CASE

From *The Electrical Review* we reproduce the following editorial comments on the famous "Marconi Case":—

The Imperial Wireless Chain.

Seldom, if ever, we should think, has a Government contract of world-wide importance had such a chequered history as that of the famous Imperial wireless chain. Almost from the inception of this great scheme it was made the sport of party politicians; the first agreement between the Postmaster-General and Marconi's Wireless Telegraph Co., which was signed on July 19, 1912, providing for the erection of six stations to maintain communication between this country and our African and Asiatic possessions, was promptly challenged directly its terms were made public, and a Select Committee was appointed to inquire into the circumstances attending the negotiations. Rumours began to take shape regarding alleged financial transactions in which even Ministers of the Crown were involved, and the erection of the Imperial chain, declared a matter of national urgency by the Committee of Imperial Defence in December, 1910, was delayed for more than two and a half years by the machinations of the political wire-pullers.

Not one of those six stations, incessantly demanded by our military authorities as urgently needed for the defence of the Empire, was ever erected! Grim light is thrown on the subject by the facts revealed in the speech of Sir Edward Carson, in opening the case for the Marconi Co. in its action for damages against the Government. The war broke out before a single station was ready, and it is not surprising that the Government decided not to go on with the scheme; what is a matter for astonishment is that a great department of the Government attempted to shuffle out of the agreement and that it continued to shilly-shally and to refuse to admit its liability to compensate the company for its heavy outlay and the loss of prospective revenue of which it was deprived by the decision to abandon the scheme. No wonder the Attorney-General and Solicitor-General were unable to persuade themselves that a position so utterly untenable could be seriously maintained in a court of law, and they acted rightly in "throwing up the sponge" before a single witness had been called.

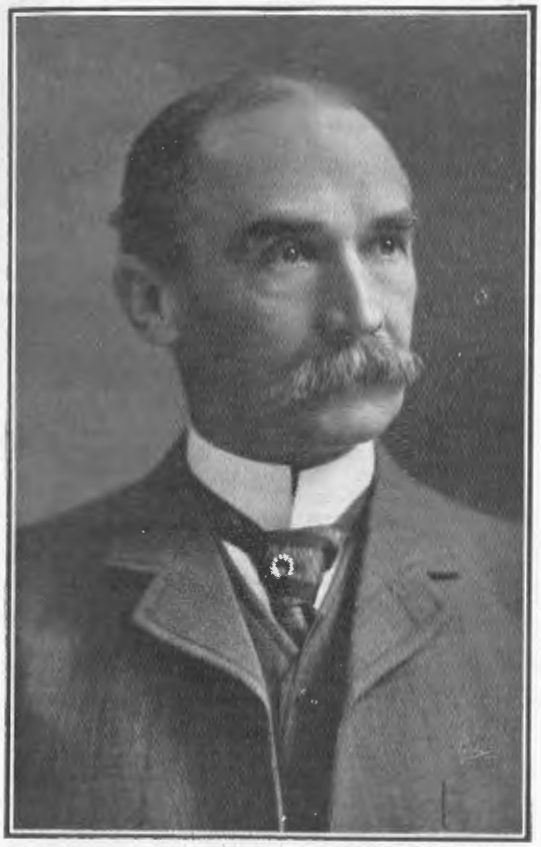
Throughout the whole course of events, from the first proposal of the Marconi Co. to erect a chain of long-distance stations, to the present date, Mr. Marconi and his Company have emerged, from the mire through which the politicians have dragged his name, with an unblemished record; not a single item of the charges that have been brought against the Company has ever been substantiated, and it has never been shown that the Company has acted otherwise than in accordance with the dictates of commercial rectitude. We feel that the nation owes to the Company, and in particular to Mr. Marconi, a frank and ample apology for the unfair, un-British and unscrupulous treatment accorded to them by Parliament and the Post Office.

THE LATE MR. JOHN BOTTOMLEY

VICE-PRESIDENT MARCONI WIRELESS TELEGRAPH CO. OF AMERICA

A distinguished figure in the world of wireless telegraphy passed away on Sunday, June 16, in New York.

Mr. Bottomley was one of those exceptional men sometimes met with in the great American metropolis, who impress the visitor with an idea that they might have spent the whole of their lives in England.



The Late Mr. John Bottomley.

The history of Mr. Bottomley's activities in the world of wireless is worth relating to our readers. He met Senatore Marconi in the year 1898—that was in the very early days of Marconi's work — and he took up the responsible task of introducing wireless telegraphy to the American world of commerce. Four years later Mr. Bottomley became the active head of the American Marconi Company.

The deceased gentleman was born in Belfast, Ireland, in 1848. He received his early education in Belfast and later entered Queen's College, Dublin. At the ago of twenty-two he was placed in charge of a large exporting house, a position which he successfully occupied for ten years.

Mr. Bottomley went to America in the year 1880 and during the thirty-eight years which he spent in that country his activities and interests covered a wide field and one of considerable distinction.

Upon his arrival in the United States he studied law and was admitted to the Bar, where he was successfully engaged until he entered the field of wireless telegraphy.

During the period from 1898 to 1918 Mr. Bottomley had been president of the New York Electrical Society, an active member of the Engineers' Club, vice-president of the Harlem Library, vice-president of the Harlem Dispensary and trustee of the Empire City Savings Bank.

Mr. Bottomley was loved by all who were associated with him, no less for his sympathetic and gentlemanly manner than for his sense of justice and keen interest in the work of himself and associates.

It is a particular distinction in the eyes of wireless men that Mr. Bottomley was a nephew of Lord Kelvin, the great scientist and electrician, who was keenly interested in the development of Marconi's work.

At the time of his death Mr. Bottomley was vice-president, treasurer and a director of the Marconi Wireless Telegraph Company of America, vice-president and director of the Marconi Telegraph-cable Companies, treasurer of the Pan-American Wireless Telegraph and Telephone Company, treasurer and director of the Wireless Press Incorporated, and treasurer of the Marconi Institute.

RECORD OF THE DEVELOPMENT OF WIRELESS TELEGRAPHY AND TELEPHONY AND INTERESTING ITEMS IN RELATION THERETO

The record below is intended to constitute, arranged in chronological order, a résumé of the outstanding events in wireless telegraphy from year to year.

(Continued from July Issue.)

1898.

In May, 1898, Mr. Marconi experimented in London between St. Thomas's Hospital and the House of Commons. In the same month experiments were carried out between Ballycastle and Rathlin Island, a distance of 7½ miles.

On June 3 Lord Kelvin visited the Needles Station and sent from there the first paid marconigram.

On July 20 and 22 the events of the Kingstown Regatta were reported by wireless telegraphy, for the Dublin *Daily Express*, from the steamer *Flying Huntress*, equipped with Marconi apparatus.

On August 3 wireless telegraphic communication was established between the Royal yacht *Osborne* and Ladywood Cottage, Osborne, in order that Queen Victoria might communicate with the then Prince of Wales. Constant and uninterrupted communication was maintained during the sixteen days the system was in use.

In September the installation at Bournemouth was removed to Poole Harbour, Dorset.

By arrangement with Trinity House, wireless apparatus was installed in December, 1898, on the East Goodwin Lightship and at the South Foreland Lighthouse, the intervening distance being 12 miles.

1899.

During a gale in January, 1899, the East Goodwin Lightship was damaged, and the mishap reported by wireless telegraphy to Trinity House.

On March 2 Mr. Marconi read a paper on "Wireless Telegraphy" at the Institution of Electrical Engineers.

On March 3 the s.s. *R. F. Matthews* ran into the East Goodwin Lightship. The accident was reported by wireless telegraphy to the South Foreland Lighthouse, and assistance was promptly sent.

On March 27 communication was established between Wimmereux, near Boulogne, and the South Foreland Lighthouse.

During the naval manœuvres in July three British warships, equipped with Marconi apparatus, correctly interchanged messages at distances up to 74 nautical miles (about 85 land miles).

In September Marconi Stations were installed at Chelmsford and Dovercourt.

During the meetings of the British Association at Dover and of the *Association Française pour l'Avancement de Science* at Boulogne, in August, communication was maintained by means of apparatus installed at the Dover Town Hall and at Wimmereux.

The international yacht races, which took place in September and October, were reported by wireless telegraphy for the *New York Herald*. At the conclusion of the races, series of trials were made between the United States cruiser *New York* and the battleship *Massachusetts*, signals being exchanged between the vessels at distances up to about 36 miles. On the return journey from America Mr. Marconi fitted the s.s. *St. Paul* with his apparatus, and on November 15 established communication with the Needles Station when 36 miles away. Reports of the progress of the war in South Africa were telegraphed to the vessel, and published in a leaflet entitled *The Transatlantic Times* printed on board.

In October the War Office adopted Marconi apparatus for use in the field in South Africa, and on November 2 six electricians left for South Africa with sets of apparatus. These proved of considerable service to the army and the navy, to which latter they were subsequently transferred.

On November 22 the Marconi Wireless Telegraph Company of America was formed for the purpose of exploiting Marconi patents in the United States of America and possessions.

1900.

On February 2 Mr. Marconi delivered a discourse on "Wireless Telegraphy" at the Royal Institution.

In March the Marconi system was adopted by the Norddeutscher Lloyd Steamship Co., and apparatus installed on the Borkum Riff Lightship, Borkum Lighthouse, and *Kaiser Wilhelm der Grosse*.

On April 25 the Marconi International Marine Communication Company was incorporated, with offices in London and Brussels, and agencies in Paris and Rome, for the maritime working of the Marconi system.

On July 4 a contract was made with the British Admiralty for the installation of apparatus on twenty-six of His Majesty's ships and six Admiralty coast stations.

In October the erection of the High Power Station at Poldhu was commenced. The aerials were supported by 20 masts, each 210 feet high.

In November the first wireless telegraph station in Belgium was installed at La Panne.

1901.

On January 1 the barque *Medora* was reported by wireless as waterlogged on Ratel Bank. Assistance was immediately sent.

On January 8 wireless telegraph experiments on the *Princesse Clémentine* were carried out during a storm, communication being maintained the whole way from Ostende to Dover. On January 19 the *Princess Clémentine* ran ashore, and news of the accident was telegraphed to Ostende by wireless.

In February communication was established between Niton Station, Isle of Wight, and the Lizard Station, a distance of 196 miles.

On March 1 a public Wireless Telegraph Service was inaugurated between the five principal islands of the Hawaiian group, *viz.*, Oahu, Kauai, Molaki, Maui, and Hawaii.

In April communication was successfully established and maintained between a station at Calvi, Corsica, and another at Antibes, in the Riviera.

On May 15, 1901, Mr. Marconi read a paper on "Syntonic Wireless Telegraphy" at the Royal Society of Arts, London.

The first British ship, the s.s. *Lake Champlain,* was equipped with wireless telegraphic apparatus on May 21.. About the same date coast stations in England and Ireland were opened for communication with ships at sea as follows: Crookhaven, Co. Cork; Rosslare, Co. Wexford; Holyhead; Caister, near Yarmouth; North Foreland.

The masts at Poldhu were wrecked during a very heavy gale on September 20, and the masts at Cape Cod shared a like fate in the November following. The masts were then replaced by four towers, 210 feet high, built of timber.

On September 26 a 14 years' contract was made for the installation of wireless apparatus at ten of Lloyd's Signal Stations.

The *Compagnie de Télégraphie Sans Fil* of Brussels was formed on October 26, to develop and work the Marconi system on the Continent.

On December 12 and 13 signals were received by Mr. Marconi at St. John's, Newfoundland, from Poldhu Station, Cornwall, a distance of 1,800 miles.

1902.

In February Mr. Marconi received on board the s.s. *Philadelphia* readable messages up to a distance of 1,551½ statute miles, and signals up to a distance of 2,099 statute miles from Poldhu Station, Cornwall.

Mr. Marconi lectured on the "Progress of Electric Space Telegraphy" at the Royal Institution of Great Britain on June 13.

On July 14 to 16 Mr. Marconi received messages from Poldhu on the Italian battleship *Carlo Alberto,* lying at Cape Skagen, a distance of 800 miles; and at Kronstadt, 1,600 miles.

The Colonial Premiers, who were in England for King Edward's coronation, witnessed a demonstration of Mr. Marconi's invention on board the *Koh-i-noor.*

The Marconi Wireless Telegraph Company of Canada was formed on November 1, and in December wireless messages were despatched by the Cape Breton Station from Mr. Marconi and from the Earl Minto to His Majesty King Edward VII. Mr. Marconi also sent a message to King Victor of Italy. Mr. Marconi was made a member of the Italian Order of Merit.

1903.

President Roosevelt sent a Transatlantic message to King Edward VII., *viâ* Cape Cod and Poldhu Stations, on January 19. High-power and other stations were ordered by the Italian Government, and the Italian Senate and Chamber of Deputies tendered a vote of thanks to Mr. Marconi for the results obtained with wireless telegraphy.

The first Transatlantic marconigram was published in *The Times* on March 30.

On April 5 the first license for the erection of an Italian high-power station was granted.

The *Compagnie Française Maritime et Coloniale de Télégraphie Sans Fil* was formed on April 24 to exploit the Marconi system in France.

An agreement was made on July 24 by the British Admiralty for the general use of the Marconi system in the Navy.

The first International Conference on Wireless Telegraphy was held in Berlin on August 4.

On August 22 a wireless telegraphic service of news to ships at sea was inaugurated.

The passengers of the Red Star liner *Kroonland,* which was disabled on December 8, 130 miles west of the Fastnet, were saved great inconvenience by wireless communication being established with the Crookhaven Station.

Mr. Marconi was made a Knight of the Order of St. Anne of Russia.

1904.

Meteorological information was supplied by wireless to the *Daily Telegraph.*

Accidents to s.s. *New York* and the s.s. *Friesland* early in the year were reported by wireless telegraphy.

1905.

Judgment given by Judge Townsend in New York on May 4 in favour of the Marconi Company in its action against the De Forest Wireless Telegraph Company for infringement of patents.

On May 12 the Canadian Government ordered stations for Cape Sable (N.S.) and St. John (N.B.), and on May 30 instructions were given for five more lightships to be installed with wireless apparatus for Trinity House.

Erection of the Clifden High-Power Station (Ireland) was commenced in October.

Mr. Marconi was made a Civil Member of the Royal Order of Savoy.

In 1905 Mr. Marconi took out his patent for the horizontal directional aerial (No. 14,788), which marked a step of great importance in the progress of long-distance work.

1906.

In May a contract was entered into between the British Post Office and the Marconi Company, whereby the latter was charged with the erection of wireless stations at Tobermory and Loch Boisdale, Scotland.

On August 4 the Argentine Marconi Company was formed, to work Marconi patents in Argentina and Uruguay.

In October and November an International Radiotelegraphic Conference was held at Berlin, and a convention signed by most of the countries of the world.

1907.

Marconi Transatlantic Stations at Clifden, Ireland, and Glace Bay (Nova Scotia) were opened for limited public service on October 17.

1908.

On February 3 Transatlantic Stations were opened to the general public for transmission of messages between the United Kingdom and the principal towns in Canada.

Mr. Marconi lectured on "The Commercial Application of Wireless Telegraphy" at Liverpool on February 24.

The Russian Company of Wireless Telegraphs and Telephones was formed on October 8.

(To be Continued.)

WITH THE ANZAC WIRELESS MEN IN MESOPOTAMIA

BY MAJOR C. W. C. MARR, M.C.,
Commanding Anzac Wireless Squadron in Mesopotamia.

Early in 1916 the Australian and New Zealand Wireless Squadron commenced their work in Mesopotamia with the Army operating against the Turks. They spent some time at Margil (which is a few miles above Basra, on the Shat-el-Arab) completing their equipment and training and doing some work on lines of communications.

After about three months at the base, they took over the whole of the wireless work in the army; and, with stations attached to every part of the force, they have continued up to the present to carry out their important work in a most efficient manner and have earned praise from the whole of the staff.

Major C. W. C. Marr, M.C.
—Photo. Oxford Studios.

For military reasons, mention cannot be made of the size of the unit, or of the work that it is engaged upon, although this would be of great interest to wireless men generally.

Some of the best men from the radio services of Australia and New Zealand and from the post offices of both countries, as well as operators from ships and the Marconi School of Wireless, joined the unit, in which there has always been keen rivalry for a position.

Every man in the unit is mounted, and therefore an essential qualification is to be able to ride a horse. It was necessary, however, to teach most of the earlier operators to ride, and to the onlooker their antics and grimaces were amusing; the horse persisted in getting on a longer wave than its rider, or *vice versâ*, and it took some of the best wireless men quite a time to find out what wave the horse was on.

However, the man who makes good at wireless will invariably make good at most other things, and the horse was soon mastered.

The campaign in Mesopotamia has been a hard one, and the men have been tried physically and also in regard to their technical qualifications and they have *not* been found wanting. In the early days of 1916 the hardships were many and varied, and one had to be there to appreciate the difficulties under which the army was working. Difficulties, however, are only made to be overcome and the British Army, with its superb organisation, has overcome them all.

Mesopotamia is a wonderful country for wireless working and stations that have a normal range of fifty miles can be worked over distances up to three hundred miles.

Of course, as they get near the hills of Persia the distance decreases a good bit.

Most of the work is of a quick, mobile nature, and many hundreds of miles have the men travelled with the Army. At every halt of the force to which the stations are attached, the men have to erect their station, send off and receive their messages and dismantle and pack up their gear and be ready to move on again. This probably happens half-a-dozen times a day; and while the men of other units in the Army are resting during these halts there is no rest for the wireless men, for they have their station to erect and dismantle. At the end of these long and weary days of marching, when most of the Army can get a night's rest, again the wireless men are called upon to keep their continuous night watch; and yet one never hears them growl; their work has always been carried out cheerfully and they have proved themselves worthy representatives of Australia and New Zealand and it has been a pleasure to command them.

At Rest in Mesopotamia.

To the memory of the Late Captain W. H. Payne (1st Divisional Wireless Signalling Squadron), died on Active Service, near Bagdad, December 10, 1918.

So far the unit has won the following distinctions: one Distinguished Service Order, three Military Crosses, two Military Medals, one Distinguished Conduct Medal, eight Meritorious Service Medals, one Indian Distinguished Service Medal, one Italian Medal, four Russian Medals.

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Major C. W. C. Marr, M.C., writer of the foregoing notes, is now in Sydney on short furlough.

Major Marr, who for the past two years has commanded the Australian and New Zealand Wireless Squadron in Mesopotamia, is a native of New South Wales and was born 38 years ago at Petersham.

By profession an electrical and mechanical engineer, he has for the past twenty years been connected with the Commonwealth and New South Wales Government Services. In 1911 he was selected to supervise the construction at Pennant Hills of the first of the Commonwealth Wireless Stations, and although at present seconded for service with his military unit in Mesopotamia, he is still an officer of the Royal Australian Naval Radio Service. He organised two wireless troops in New South Wales and for two years commanded both.

Major Marr was practically reared to a military profession and in September next will have completed twenty years' service. He took part in the recapture of Kut and in the fighting at Bagdad. The first Australian flag to be erected in that historic city is now in his possession.

Among the many interesting relics of Babylon brought back by him to Australia Major Marr takes especial pride in a collection of bricks from the throne-room of Nebuchadnezzar, the Oriental characters and hieroglyphs carved thereon being as clear to-day as a modern *bas-relief*.

Major Marr's Military Cross was awarded for conspicuous gallantry during the advance on Bagdad.

THE POWER OF THE PEOPLE

BY L. P. JACKS

In what does the "power of the people" consist, and how can we ascertain whether it is on the increase or on the wane?

We might begin with statistics of population and wealth. But these by themselves prove nothing. A community may increase in population and yet become degenerate; it may increase in wealth and become corrupt. As everybody knows, the Roman Empire was losing power at the very time when it was increasing in population and in wealth. It will be agreed that we must look for other signs.

Shall we fall back then upon success in war and take that as our test? But this again proves nothing, or nothing to the purpose. To begin with, the "power" to which conquest bears witness is power of a special kind which may co-exist with marked weakness in other directions; and is hardly what we have in mind when *the power of the people* is in question. But waiving that, success in war does not prove that even the special kind of power which war requires is on the increase. It might be that this power was declining in all the nations together, but declining less rapidly in the nation which conquers than in the others. To beat your enemies in war it is not necessary that you should increase in warlike power; it is enough if you decrease less rapidly than they.

Let us try for another test. What shall we say to the extension of the franchise? That people, we might argue, is growing in power which is giving to its members a larger share in the business of government, the greater the number of persons who possess a vote the greater will be the power of the people. This at first sight looks more promising; but, unfortunately, the promise is damped by further consideration. What looks promising is that the people, all of whom we will assume now possess the vote, have the power to get what they want. What damps the promise is that the people seldom know what they want. Shall we keep Mesopotamia or shall we give it up? Some of us are for the one, some for the other. Shall we establish Home Rule or try something else? Some of us are for the one, some for the other. Consequently, the people break into parties or factions, and instead of concentrating their power on a prompt settlement of Ireland or Mesopotamia, waste it in a war of minds which goes on for a half century and generates so much bad temper that the questions at issue become almost insoluble. Is that a sign of power?

But we are not yet at the end of our tether. Instead of thinking of the questions on which the people seem unable to make up their mind, let us turn to those which by one means or another do get themselves settled. Let us judge by accomplished results, by the legislation actually turned out, by the elaboration and the efficiency of the government machinery, of one kind or another, which an enfranchised people sets up for the purpose of defending its house and keeping the inmates in order.

There are the Army and Navy, equipped with all that science and skill can devise. There are the Constitution, the laws, the rules of Parliamentary Procedure, the Courts of Justice, the goals, the police. Behold this vast organisation, and as it develops and extends and imposes its rules on ever widening circles of the normal life, may we not say that the people, whose will it represents, is growing in power?

At last, then, we seem to have discovered a sound test by applying which we can ascertain whether the power of the people is increasing or the reverse. The test is organisation, as revealed by the laws enacted and enforced.

But even this test is not infallible. Unless the greatest care is used in its application it may lead to mischievous conclusions, and has, in fact, done so already to an extent which is alarming. It may give us an inflated notion of the power of the people. And it may blind us to their weakness.

We must ask not merely *how much* organisation there is, but what is its purpose, *what is it for*? Suppose that the greater part consists of laws and rules for compelling people to do what they ought to do for themselves without compulsion — for example, keeping their promises, or providing for their old age, or educating their children, or behaving themselves decently in the streets. Should we not now begin to draw conclusions contrary to those to which our first impressions led us? Should we not say that all this governmental machinery which seems at first sight to speak of nothing but power is rather the sign of weakness further back? Evidently we should argue, these people are weak in the principle of honour, weak in the sense of parental duty, weak in self respect and intelligence, or they would not require so many laws and so many policemen to compel them to keep their promises, to educate their children, to provide for their old age, and to behave decently in the streets. Suppose some genial philosopher should take us to a chemist's shop and say, "Here are the signs of the health of the people. See how powerfully science is grappling with the ills of the body. An appropriate remedy for every disease! Not one of them without its corresponding bottle of physic! Lethal weapons for the microbe! Death for colic, gout, measles! You are in the very temple of health."

What should we answer to our genial philosopher? "Your argument," we should say, "is a bad one."

Let us try a bolder image still. Suppose we could be introduced in turn to two planets. The first we will imagine to be roaring with "government" of the type or types that now exist on this earth; parliaments in full swing everywhere; laws pouring out from the Senate house like sausages from a Chicago pork-factory; an incorruptible policeman at every street corner; and a good substantial gaol to cheer the eye of the traveller at the entrance of every town. Our second planet shall have none of these things. Its inhabitants shall manage their affairs by means of an understanding, such as exists in every well-regulated family, that they are to trust one another for decent behaviour. On which of these two planets should we see the plainest signs of the *power* of the people? I give my vote, without hesitation, for the second.

But all this, it may be said, is not quite fair. Granted that the laws and the courts of justice and the goals and the policemen and all the other means the people take to keep themselves in order do suggest what you say—namely, that the principle of order must be weak to begin with. But they suggest something else as well, which is that the people *know* their weakness and are taking the appropriate means to make themselves strong. It is because they recognise the importance of their duties and are resolved to acquire the habit of doing them that they set up a government and continually increase its scope. The government is a sign of power after all.

Functions of Government.

Very good. But now, if this line of reasoning is sound, what are we entitled to expect? We are entitled to expect that as time goes on there will be a gradual diminution of the function of government. As the people acquire the habits of order and goodwill which the laws and the police are intended to teach them, the output of law and the number of policemen will steadily decrease. But they don't decrease. They increase by leaps and bounds. Day by day there are more orders to obey and more compulsion to submit to. The habit of spontaneous good behaviour is not being acquired. The habit that *is* being acquired is of a very different kind. It is the habit of relying upon government to effect everything which we might easily effect for ourselves. And my contention is that the growth of that habit measures not the power of the people but its weakness.

So then I am driven to the conclusion that the true test of growth in the power of the people lies not in the amount of government it creates, but in the amount of government it can dispense with; not in the number of laws it enacts, but in the number it can do without. This is my answer to the question with which I set out.

The cry is ever for more government and more laws; and when one pleads, as I am always doing, for less government and fewer laws, and argues that a sovereign people should show its sovereignty by abstaining from the misconduct which renders policemen necessary, there is an inevitable shout of derision: "What! No courts of law! No gaols! No lawyers!

No elections! No secretaries of state!'' Thus the London *Spectator,* not long ago, in criticising certain pacifist proposals of a rather foolish nature, had this sentence: ''There would certainly be greater waste of money and greater human suffering if we disbanded our police force, pulled down our gaols and placed no check on private greed and private passion.'' Quite true. But my point is that whatever sign of a poeple's power may be read in the gaols and policemen appointed to check its evil passions, there is a sign of greater weakness in the evil passions that need to be so checked.

There is a much shorter cut to the same end than that provided by the gaols and policemen, which is, of course, to get rid of the evil passions in the first instance; and that, I contend, is what we should expect a really *powerful* people to do. I suppose most persons would grant so obvious a commonplace.

Dominance of the Policeman.

Nothing is more curious in the political thought of our day than the dominance in it of the idea of the policeman. It would scarcely be an exaggeration to say that our ultimate category of political thought is the police. And not of our political thought alone, for the God whom many of us worship. . . . But let us keep to politics. The very ''pacifists'' whom the *Spectator* trounces for wanting to get rid of the police, have oddly enough a scheme of their own on hand for setting up an international police as a means of preventing war. There seems no getting rid of the police obsession—no persuading people, not even pacifists, to take the short cut of common sense instead of the roundabout way of police supervision.

I believe I am as sound a democrat as anybody who may chance to read this article and perhaps disagree with it. But the democracy I believe in is not a system of government. It is a method of learning, by very slow degrees, to do without government. In others words, it is a method of education, the final object of which is to develop the true power of the people by throwing them more and more on their own responsibility, by weaning them from the bad habit of trusting to external force thinly disguised under the name of law. I know the immense difficulty and danger of such an ideal and would agree with anybody who deemed it all but hopeless. The bad habit with which one has to contend is so widespread and of such long standing that vast multitudes have lost the power of acting on their own responsibility, so that if, for example, you want to make them sober the only way is by Act of Parliament. So with the other things—such as providing for old age. The reason why many, who could easily do it, fail to provide for their old age is simply that, under the system which has so long prevailed, they have fallen into the habit of waiting to do their duty until the law makes them—like the young in certain English villages before conscription who, when you told them they ought to join the army, answered: ''I shall not go till they fetch me.'' So conscription had to come, and its coming pointed to a weakness in the community—the weakness of those who would not go until they were fetched. At the same time there were hundreds of thousands of men who did their duty without being compelled; and this suggests to my mind that in regard to many other matters there are vast reserves of voluntary good behaviour in the people which a wise statesmanship should set itself to develop.

''State interference'' has not yet entirely killed out this greatest of all our national assets—the power of acting on our own responsibility; so that people like myself have really some ground for looking forward to a far distant time when democracy shall have got rid of ''conscription'' in countless other forms in which it now exists and flourishes—when we shall all be ''volunteers'' in regard to the general body of duty which it behoves a decent citizen to observe. Meanwhile, so long as men are such idiots that they will not come out of a public-house until they are fetched, we must pay the penalty for the system which has helped them onwards to that state of idiocy, and send a policeman to throw them out, thus making them sober by Act of Parliament—that is, unless they are drunk already.

Legislation is *physic,* and society can no more live on legislation than a man can live on Epsom salts and backache pills. Meanwhile, the vendors of this physic have the market-place to themselves. But many of those gentlemen are quacks.

NOTES AND NEWS

THE LATE M. GUILLAUX

Contradiction of rumours circulated regarding the famous French aviator M. Guillaux, who was in Australia when the war broke out, is contained in a letter received by the Acting Consul-General for France in Australia. These rumours had reflected upon M. Guillaux's loyalty, but it is now officially stated that he died as the result of a fall in May, 1917, and was buried at Neuilly-sur-Seine. M. Guillaux was the first man to fly from Melbourne to Sydney.

TRANSATLANTIC FLIGHT

The American Aero Club announces that it has negotiated with aircraft manufacturers for a transatlantic flight, which it is expected will soon be attempted.

MINES MENACE WHALES IN NORTH SEA

The recent experience of a fisherman on the coast of Norway shows that numerous mines floating in the North Sea and Skager-Rack are a menace to the creatures of the deep as well to ships. This man sighted a dead whale floating near the mouth of the Christiania Fjord and immediately made for it, well aware of its value because of the current high prices paid for all kinds of fats. With some difficulty he got a cable around the body and towed it to shore, where he found that half of the creature's head had been blown away, in all probability by accidental contact with a mine. Although the whale was rather small, being but 26 feet long, the lucky fisherman realised over £250 from the sale of his unusual prize, the blubber being among the most valuable materials obtained.

BRIGHTER FUTURE FOR WEST MAITLAND

Mr. Harold Eaton Taplin, of Challis House, Sydney, has been appointed consulting engineer for West Maitland, N.S.W., and is now preparing a much-needed scheme for the better lighting of the town.

COMPULSORY FITTING OF NEW ZEALAND SHIPPING WITH WIRELESS.

In the *New Zealand Gazette Extraordinary*, published at Wellington, New Zealand, on August 1, appears an Order-in-Council to the effect that every British seagoing ship of 1,600 tons gross tonnage or upwards registered in New Zealand, in respect of which a license to instal wireless telegraph apparatus is or has been granted by the Minister of Telegraphs, shall be provided with a wireless telegraph installation and shall maintain a wireless telegraph service and shall be provided with two certified operators, together with suitable accommodation for the apparatus and operators.

Further, it is enacted that all masters or owners of vessels of over 1,600 tons gross register must apply for a wireless license before the twentieth day of August, 1918, and equip their vessels with wireless where and when required by the New Zealand authorities.

The effect of this Order-in-Council will be that a large number of well-known New Zealand traders will shortly be equipped with wireless installation which have not hitherto carried same and further there will be an increased demand for qualified wireless operators to man these vessels.

EVERYTHING ABOARD DUTCH SHIPS SEIZED

Formal orders for the taking over of all tackle, apparel, furniture and equipment, including bunker coal and stores, belonging to the Dutch vessels in American ports which have been seized by the United States, were issued on April 1 by President Wilson. Some of the masters of the vessels removed or attempted to remove navigating instruments, glasses and other equipment when they surrendered possession of their ships. The Navy was directed to take possession of the property and the Shipping Board was instructed to make full compensation to the owners in accordance with international law. The order applies to property already acquired as well as that still to be obtained from the officers of the vessels.

JACK'S DAY

During the last four years Australia has dived deep into its pocket and responded heartily to demands made upon its citizens on a large number of special collecting days.

We have had the Australia Day, A.I.F. Memorial Day, Anzac Day, Red Cross Day, Wattle Day, Violet Day, Belgian Day, French Day, Italy Day, Polish Day, Serbian Day and a host of others.

But, although the fourth anniversary of our entry into world warfare is already past, no official day has hitherto been organised for the benefit of our sailormen.

On July 24 a small body of energetic gentlemen foregathered at the Royal Naval House, Sydney, and decided that the people of Australia be given an opportunity to pay off a portion of our heavy debt to the Navy and Mercantile Marine.

A "Day" for Jack was then immediately organised and will be publicly celebrated on Friday, November 1, 1918, and already there are indications of wide support.

The organisers include Mr. Percy Hunter who has supplied *Sea, Land and Air* with particulars of the first meeting, and has promised to keep our readers informed as to subsequent progress.

Among the distinguished patrons of the movement are their Excellencies Sir Ronald Munro Ferguson, P.C., G.C.M.G., L.LD., Governor-General of Australia, and Sir Walter Davidson, K.C.M.B., State Governor of New South Wales. The presidency has been accepted by His Honour Judge Backhouse, while leading shipping and insurance companies and their staffs have guaranteed every possible assistance in the matter of attracive stret displays and the erection of stalls for th esale of goods. Several other groups have notified their intention of assisting in a similar manner.

The proprietors of Dalton House, Sydney, have placed, rent free, at the organisers' disposal a commodious suite of offices on the fifth floor of their building in Pitt Street; this is now the headquarters of the "Jack's Day" executive.

The proceeds will be allotted in the following proportions:—

Thirty per cent. to Lord Charles Beresford's Merchant Service Fund for the relief of sailors injured and rendered destitute—and for their dependents.

Thirty per cent. to the Royal Naval Fund for dependents and relatives of officers and men who have lost their lives or become disabled.

Twenty per cent. to the Royal Australian Navy Families' Fund.

Ten per cent. to the Mine-sweepers' Fund and the remaining ten per cent. as basis of a fund to be organised for the relief of Australian naval prisoners of war, this work having been undertaken hitherto by a small number of Australian ladies.

The Premier, Mr. W. Holman, in giving his personal assurance of sympathetic co-operation and practical help, expressed the opinion that a greater proportion should be allotted to the Merchant Service, and in this view the Premier will probably find many supporters.

A committee was formed in Sydney on August 8 and immediately entered upon its respective duties.

NORTH SEA FLEET

Men Returning to Australia on Furlough

The Navy Department expects that a further draft of 100 men from the Australian ships in the North Sea will arrive about the end of December or early in January next.

These men have been in the North Sea continuously since the war started.

A draft of 130 men will also be leaving Australia for the North Sea ships, probably about the end of this month. These men have been serving on Australian ships or temporarly on shore. This draft will not include the men who recently returned from the North Sea, except those who apply to be returned, of which a number are anticipated.

UNIQUE TESTS REVEAL PHYSICAL DEFECTS IN WOULD-BE AVIATORS

That a startling percentage of men now being accepted for air service have hidden physical weaknesses that may prove their undoing, is indicated by new scientific tests that have been made on a large number of newly-enlisted airmen. These tests, which reveal so much of vital import for our armies, have been made by a Chicago specialist, Capt. Charles Moore Robertson, of the Medical Reserve Corps, who has fitted up for the purpose a cabinet in which each flier-to-be was placed and subjected to atmospheric conditions identical, so far as pressure is concerned, with those obtaining in flying, the air being rarefied by means of a powerful pump.

According to our contemporary, *Popular Mechanics*, the cabinet used is of steel and, when locked, is air-tight. A heavy glass window permits observation of the subject within. The rapidity of the "ascent" and the altitude simulated is shown on a properly graduated mercury tube. Each of the hundred and more men tested was subjected to the equivalent of an altitude of 6,000 feet. After this had been maintained for a time, the density of the air was alternately increased and decreased as would be the case in actual manœuvring. By rapidly letting the air into the cabinet through a cock the subjects underwent the equivalent of a swift nose-dive of a mile—a feat that is a severe strain on many men.

Each man was examined both before and after being confined in the cabinet, each examination consisting in taking the blood pressure, ascertaining the muscle tone by measuring the duration of one nerve impulse with a dynamometer and stop watch, and in revolving the subject in a pivoted chair.

The records show that the first examinations gave an indication of the condition that would exist after the "flight," over 25 per cent. of the men proving unfit, according to these tests. For this reason, it is strongly contended that a most serious mistake is being made in accepting men for air service merely on the basis of a physical examination made without taking into account the effect of sudden changes of air pressure.

Limited investigations with the aid of a vacuum chamber have been made in a certain Allied flying camp to show the degeneration resulting in experienced airmen due to lack of oxygen while flying at great altitude. There is every reason to believe that the experienced men who have been found unfit by these tests would have been detected in advance had an examination of this nature been made at the time they were accepted for service.

Some men who appeared the best physical types showed the most signs of shock and ear disturbances after emerging from the specialist's air-tight chamber. In many cases the ear sense seemed almost obliterated—a condition often involving the gravest consequences for a flier and those dependent on him. In other cases candidates who looked a poorer type seemed to improve from the experience, the ear, for example, being more acute in its sense of equilibrium after the "flight."

CONCRETE STRUCTURES IN SEA WATER

The U.S. Bureau of Standards has been collecting data from harbours in various parts of the world concerning the effects of sea water on concrete. The Bureau finds that practically all reinforced concrete structures in sea water are failing, because of improper design, which leads to the corrosion of the reinforcement, and the designs advocated in current engineering practice will not ensure permanent or durable structures.

SHIPBUILDING IN CANADA

The Canadian Vickers Company has launched at Montreal the largest ocean-going ship ever built in Canada. The vessel has been named *Porsanger* and is owned by a Norwegian Company.

Editorial Announcement

The Next Issue of

"Sea, Land and Air"

(due Sept. 15)

will include clearly written and fully illustrated Articles dealing with

THE FUTURE OF AERIAL TRANSPORT IN AUSTRALIA.

AUSTRALIA'S RAW MATERIALS FOR AUSTRALIA'S NEW SHIPS.

A MARVELLOUS WIRELESS RECEIVER.

THE PHYSICAL PHENOMENA OF LIGHT.

Described in simple terms by

MRS. D. M. SELWYN LEWIS, B.Sc., (University of Sydney)

and a Special Contribution from the pen of

The Hon. Alexander J. Poynton, M.H.R.,

Minister for Navy.

In addition the September issue will contain numerous features relating to the Sea, the Land and the Air.

To ensure prompt and regular receipt of your monthly copy, order a Yearly Subscription (**9s. post free**) from

The Wireless Press

97 Clarence Street, Sydney

THE RADIO-TELEGRAPHIST

BY EUGENE DYNNER

I am a radio-telegraphist—which is synonymous with optimist.

We radio-men form a distinct division of the *genus humanum.*

We are perhaps the most light-hearted, care-free aggregation of good fellows that inhabit the earth.

We go to sea in ocean greyhounds which are the result of years of scientific study and represent the combined labour of thousands of men for years; and in old sailing ships which excite our vivid imaginations with the romance of Father Neptune's domains.

We are free: for those who are fettered to desks in offices or benches in workshops are virtually prisoners—voluntarily so.

We see the world—Mexico, Peru, Japan, India, are all familiar to us.

We number among our acquaintances the Venezuelan, the polite Chinaman, the turbaned Turk and the learned Englishman. Prince and peon; rich man and poor man; yachtsman and fisherman; banker and beggar; priest and heathen—we know them all.

We are cosmopolitan, if anything.

The book of adventure is an open one to us. Wars and the terrors of the sea are nothing in our young lives—for most of us are young. Earthquakes and revolutions; submarines and hurricanes are nonentities in our existence.

Who does not wish to go to some out-of-the way corner of the world where romance still holds sway? Where the air is filled with the voluptuous fragrance of multi-coloured flowers and the enthralling songs of brightly plumed birds: lands of unstained primæval beauty and loveliness. An island in the South Pacific or the Caribbean, darkest Africa and brightest France: all are within our reach.

And who, but those who travel, know the joy of homecoming after a long voyage? Distance enhances the love our friends bear for us. As a result our stays at home are full of happiness and pleasure.

The world is our field: the seas our camp.

I am a radio-telegraphist—and glad of it.

—*Marconi Service News.*

MARCONI SCHOOL SUCCESSES

Students of the Marconi School of Wireless have been highly successful in two examinations held during the last month at 97 Clarence Street, Sydney.

The following, who have now been appointed as operators on the undermentioned ships, are to be congratulated upon obtaining first class certificates of proficiency in radio-telegraphy: Messrs. R. A. A. Macfarlane, F. C. Kirkpatrick and W. P. Renshaw (both of whom have joined up with the Wireless Squadron at Moore Park), A. L. B. Nairn to s.s. *Rupara,* W. G. J. Lawry to R.M.S. *Niagara,* H. Stubbs to R.M.S. *Makura,* D. N. Mansfield to s.s. *Cooma,* J. Elmore to s.s. *Australfield,* H. W. Devlin to s.s. *Port Lyttleton.*

The following also obtain first-class certificates and will shortly apply for appointments:—

Messrs. S. R. Dixon, H. F. Giles, V. E. Stanley, J. H. Baker, C. R. Stanfield, A. Stuart, C. C. Ullman, L. Hales.

Another Marconi School student—Mr. Norman Leeder—last week obtained his certificate at Collins House, Melbourne, and will be appointed to the Naval Transport Service.

NEW SWEDISH RADIO STATION

At Karlsborg, Sweden, a wireless station has been completed which is capable of sending messages over a distance of 3,150 miles. The masts, weighing only 25 tons each, are 684 feet high. They are insulated at four different places from the base to top and are erected with the bases embedded in black granite blocks impregnated with paraffin. The aerials, continues *Schweizerische Bauzeitung,* are 1,476 feet long and composed of 60 phosphor-bronze wires hung from steel tubes. The capacity of the station is increased by covering the territory between the masts with a phosphor-bronze wire netting.