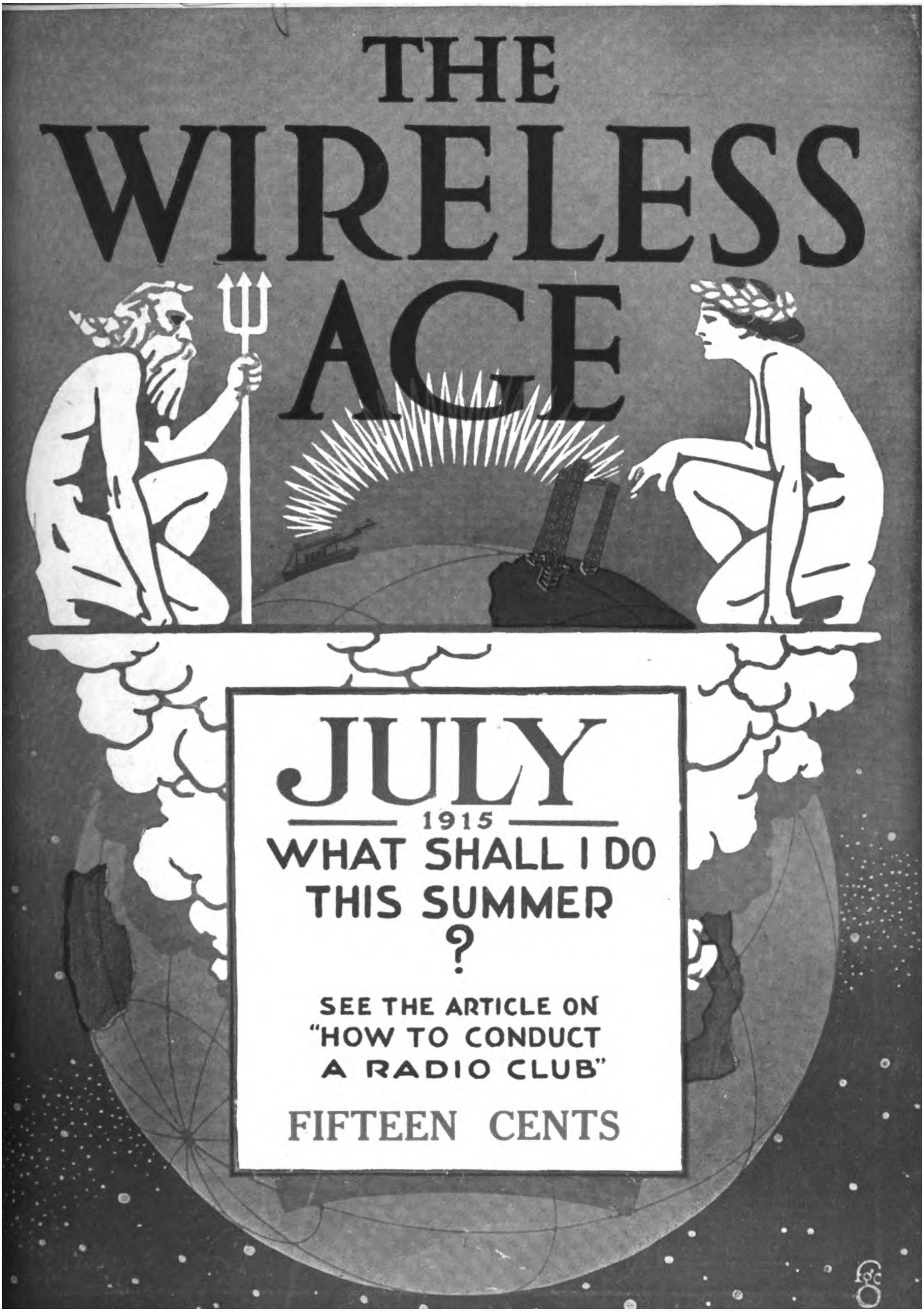
THE
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JULY
1915
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THE WIRELESS AGE

An Illustrated Monthly Magazine of RADIO COMMUNICATION

Incorporating the Marconigraph

J. ANDREW WHITE, Editor — WHEELER N. SOPER, Asst. Editor

Volume 2 (New Series) — **July, 1915** — **No. 10**

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THE WIRELESS AGE

Owing to the fact that certain statements and expressions of opinion from correspondents and others appearing in these columns from time to time may be found to be the subject of controversy in scientific circles and in the courts, either now or in the future, and to sometimes involve questions of priority of invention and the comparative merits of apparatus employed in wireless signaling, the owners and publishers of this magazine positively and emphatically disclaim any privity or responsibility for any statements of opinion or partisan expressions if such should at any time appear herein.

JULY, 1915

The Ownership of Wireless Equipment

Another Vindication of the Claims of This Magazine in Open Forum Discussion

SUPPLEMENTING the comments on the March number's article which were printed in last month's issue, an interesting contribution to the discussion on the proper ownership of wireless equipment has been received from a wireless man of long experience. This reader has requested that his identity be covered by the signature "Veritas." His address to the Open Forum is as follows:

"I cannot be charged with partiality to either side of the discussion, as I am not now engaged in the wireless service, but I have had personal experience therein in the past with different corporations, and under the varying circumstances referred to in the publication.

"It goes without repetition, or even assertion, that one general and responsible operating company, supplying all steamship lines with a standardized outfit and covering the apparatus with its own personally controlled force of operators and other auxiliary employees, such as repairmen, inspectors, etc., is, and should be, productive of more valuable service to the interest of the steamship companies and the public than the confused and mixed up state of affairs that exists at present, and which shows a tendency to become worse.

"While it is true, as your pamphlet asserts, that the Marconi idea of renting instead of selling outright the various types of apparatus as they came out, resulted in the present quite extensive growth of the use of wireless generally, still business men or steamship officials do not think of or care for that feature.

"They look at the situation as they find it now. It is 'to-day' with them, and dollars and cents saved is the goal in view.

"Two features or objects, as far as I can ascertain, actuate steamship company officials in preferring to purchase and own their wireless apparatus and engage the services of their own operators. They are cheapness and efficiency, in the order named.

"It should, however, be understood and remembered that the 'wireless service' as an income yielder to its originators and investers is not, and has not, been a superlatively attractive one. And it is owing chiefly, if not solely, to the beliefs of its inventors and friends and overwhelming confidence in its future convictions—supported by literally pouring money into its creation and development—that we have any wireless service at all to-day.

"Steamship companies, like individuals, are skeptical as to the real worth of a thing until it has been thoroughly tried out. And then they want the cost price cut down to the last dollar. Right there is where the growth and progress of wireless service has been delayed.

"Competition has been so profusely and often so recklessly pushed that apparatus has been installed on ships for next to nothing, and in some cases, absolutely free; months elapsed before any rentals were earned.

"The wireless companies incurred heavy expense in exploiting their systems, and upon closing of contracts providing a probable fair return therefor, the steamship companies threw up their hands in horror, thus clearly showing their ignorance of the primary cost of apparatus, and their unbelief that the service itself would or could be of any importance or benefit to them.

"In addition to this original cost, the wireless companies were bound to maintain all repairs, a rigid mechanical inspection in port and, by inference at least, were pledged to introduce all new inventions and improvements as they might be developed.

"Last but not least, the skilled operator to make the expensive and intricate apparatus available and serviceable, was to be furnished by the wireless company. In fact, all the risk and responsibility of every kind was put up to the wireless company.

"This low rate of income prevented the wireless company from paying its operators such salaries as would naturally attract older and more experienced men to the service, preferably, of course, those of years in the land telegraph service. The result was that in the early days of wireless a great many quite young and sometimes erratic and irresponsible persons were perforce accepted.

"A recent decision of the United States Court plainly asserts that the lately increased leased rates charged the steamship companies are still just, fair and reasonable, and when you stop to consider the importance of the wireless in an emergency—when no other form of assistance can take its place—then indeed its cost, whatever it may have been, instantly becomes insignificant.

"Another feature which is often entirely unthought of, or else belittled or even ignored, in the daily working of the wireless, especially while at sea, is that of community of interest, or in common every-day lingo, just 'comradeship,' and this sentiment obtains especially between ships, as distinguished from direct shore communication. How often have we said mentally, 'Why does not ZYX answer us? He has just answered a ship apparently in our range.' And again, 'It's no use calling ZXY, he won't answer us and handle our business, even to get the extra relay tolls, for he is a competing ship.' Then again we remember the bickering, struggling for circuit, and mutual recrimination about interfering, knowing or believing that 'reporting to headquarters,' will bring no result, as the steamship company to whom the offending ship belongs will either pigeonhole or ignore the complaint, or else say to its operator, in effect, 'You look out for our own business and get it off; never mind the other fellow.'

"Now one controlling operating company can stop all this, or at least greatly minimize its evil effects. All business would look alike to it, and its operators would make only such distinctions as the International Radio Laws and instructions authorize.

"A high steamship official once said to me as one reason why his company preferred engaging its own operators, 'I want steady and responsible men, and not a lot of kids who change around after one or two trips. I've had nineteen different operators in twenty-two sailings.' My suggested explanation that three things might have conduced to the transitory feature he complained of elicited a stony stare; for I named them as being, perhaps, poor sleeping and working accommodations for the operators, inferior food and inadequate salary. I record the fact that the first wages under his new personal regime were for the first and second operators ten dollars and five dollars more per month respectively than their predecessors had received. This showed his appreciation of the wireless service, though it is possible he made up the salary increase by the cheaper apparatus he had installed.

"If the latter worked as good as the equipment which it displaced, then he is the gainer thereby to a slight extent; but his company's wireless business, as well as that of the public emanating from his ships at sea, still suffers from the objectional features before mentioned.

"If looked at in the correct and fair light of visible facts the steamship companies are getting a very necessary service at a very reasonable cost. When they go abroad, or even along the coast, tourists and regular travelers invariably prefer ships carrying wireless to those not so guarded and protected, and its beneficent value is so apparent nowadays that national laws compel various steamship companies to provide this novel and useful invention. The marine insurance companies, it is said, recognize its value by conceding a reduction in premium on the insurance carried on the vessel and cargo.

"Administration is fully as important and necessary as good apparatus; and responsibility to be effective must be concentrated and not divided.

"The extra expense incurred by steamship companies which own their apparatus and engage their operators in maintaining the rigid inspection necessary to insure continuity of efficiency in the installation (looking after repairs, etc.) is no inconsiderable item. The Government standard must be maintained or penalizing may result; the ships held up till the delinquencies are remedied. A responsible operating company takes care of all these features, even to providing operators at the last hour before sailing in case sudden and unavoidable conditions prevent the regular man from reporting on duty. Its standard of efficiency is coincident literally with that of the Government, and hence no uneasiness of mind need ever trouble the steamship officials.

"Immense sums have been spent in recent years in litigation by the different wireless companies, and much is still being expended by them to obtain a permanent legal status for the different patentable features each respectively claims to control.

"Until these suits have been finally adjudicated by the highest legal tribunal in this country the wireless service will probably continue to be somewhat chaotic for the reasons already given. But indications are that the major company now controlling the far greater portion of the wireless service of the world will soon have its superior claims definitely passed upon, and for all time."

(Signed) "VERITAS."

From a Half Dozen Friends in as Many States

THE WIRELESS AGE is worth ten other so-called wireless magazines.—H. A. D., *New York*.

* * *

It is a "dandy" magazine, and strikes everybody right.—J. D. B., *Iowa*.

* * *

Kindly mail the November, 1913, issue to the address given below as soon as possible. With this issue, I will have every copy of THE WIRELESS AGE to date. I would not part with them for any amount, as I have received more benefit from them than from some of the very best wireless books. I always refer to the copies of THE WIRELESS AGE as my best wireless friends. They sure are great.—J. P. L., *Ohio*.

* * *

I have only received three issues of THE WIRELESS AGE, but I think it is the greatest magazine ever published.—G. S., *Alabama*.

* * *

Your magazine cannot be surpassed in any way. I am treasurer of the ——— Radio Club of this city, and I shall not fail to have the Secretary, as well as myself, recommend it to everyone in the club. Words cannot do justice to its good merits.—H. W. O., *Massachusetts*.

* * *

I received my first copy of your magazine and will never be without it now. It contains a fund of information and is worth twice the price.—R. C. A., *Pennsylvania*.

Court Restrains Infringer

National Electric Signaling Co. Secures Injunction Against Vaccaro Bros. in New Orleans

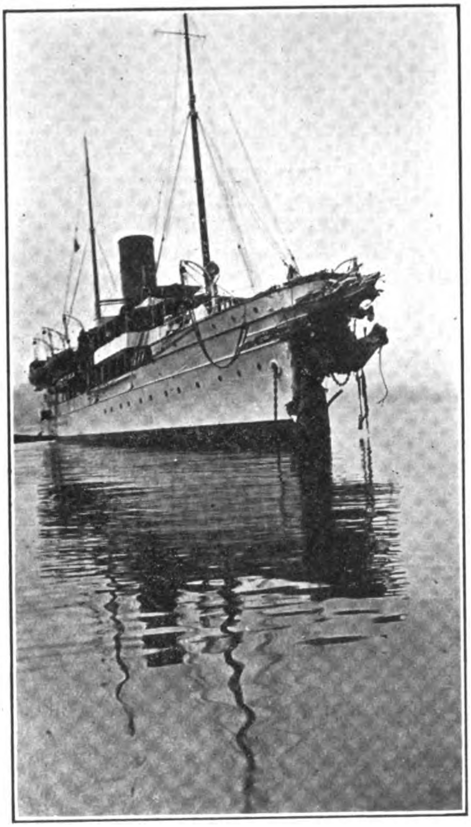
ON May 25 Judge Rufus E. Foster of the U. S. District Court in New Orleans issued an injunction in behalf of the receivers of the National Electric Signaling Company against Vaccaro Bros. and others, restraining them from further manufacturing, selling or using apparatus involving the inventions covered by the patents in suit. The injunction allowed thirty days for removal of the infringing apparatus.

The basis of the action lies in the Fessenden patents, Nos. 918, 306 and 918, 307, issued April 13, 1909 and transferred to the National Electric Signaling Company. Testimony was given for the plaintiff by Frederick M. Sammis, chief engineer of the Marconi Company, A. Mowat, and Samuel N. Kintner of the National Company. M. E. Hart and Howard Benedict Ayres filed affidavits on behalf of defendants. The injunction as issued reads in part:

"Said patents have been held to be valid and infringed by the Court of Appeals for the Third Circuit, and that said defendants, Vaccaro Brothers and Company, Vaccaro Brothers Steamship Company, Ltd., M. E. Hart, Enterprise Electrical Company and Gulf Radio Company, have infringed on the rights secured by the aforesaid Letters Patent by making, using and selling wireless telegraph apparatus embodying or containing in its construction and mode of operation the inventions set forth in said Letters Patent, Nos. 918, 306 and 918, 307, and each thereof, contrary to the form of the statute in such cases made and provided; and upon consideration thereof, it was ordered, adjudged and decreed, as follows:

"That a preliminary injunction be issued pursuant to the prayer of the bill of complaint herein, strictly commanding and enjoining the defendants, Vaccaro Brothers & Company, Vaccoro Brothers Steamship Company, Ltd., M. E. Hart, Enterprise Electrical Company and Gulf Radio Company, and each of them, their several clerks, agents, servants, workmen and attorneys, under the pains and penalties which may fall upon them, and each of them, in case of disobedience, that they forthwith and until the further order, judgment and decree of this Court, desist from directly or indirectly making or causing to be made, advertising or offering for sale, or causing to be advertised or offered for sale, agreeing or contracting to sell or causing to be agreed or contracted for sale, selling or causing to be sold, using or causing to be used, leasing or causing to be leased, supplying or causing to be supplied, installing or causing to be installed, or disposing of or causing to be disposed of in any manner, any device, structure, appliance or wireless telegraph apparatus embodying or containing in its construction and mode of operation the inventions as described and claimed in the said Letters Patent, or either thereof, or the essential or material parts of such apparatus to be used in a wireless telegraph system embodying the inventions of the said patents, or either thereof, provided that the defendants Vaccaro Brothers & Company are hereby granted thirty days from date hereof for installation or substitution of non-infringing apparatus, subject to further extension of time on proper showing of necessity therefor."

Wireless An Aid In Three Wrecks



How the Vanadis looked after she had been in collision with the Bunker Hill

Operator Moree's Account of the Collision between the Ryndam and the Joseph J. Cuneo. The Bunker Hill and the Vanadis in a Crash. The Stranding of the Minnesota.

There was another addition to the long list of rescues effected by the aid of Marconi wireless and wireless men on the morning of May 26 when the Holland-American liner Ryndam came into collision with the fruit steamer Joseph J. Cuneo south of the Nantucket Shoals. Following the crash, water poured in torrents into the hole which the Cuneo had torn in the side of the Ryndam. Nor did the fruit steamer escape undamaged, for her bows were stove in and she made water rapidly. On the Ryndam were B. Moree, first operator and A. T. A. LeClercq, his assistant. They sent the S O S broadcast while the passengers and some of the ship's company were being transferred to the Cuneo. A few hours after the appeal had been flashed several United States warships arrived, one of them receiving those who had been taken to the crippled Cuneo—230 in all. No lives were lost. The following story of the accident was written by Operator Moree:

THE Ryndam left New York on May 25, bound for Rotterdam, under the command of Captain P. Van den Heuvel, the voyage proceeding smoothly enough until the following morning. I had been on duty during the night, my assistant, Le Clercq, relieving me a short time before daybreak. When I fell asleep there was no thought of untoward happenings in my mind; you can well imagine my sensations, therefore, when I was awakened by a violent shock. At first I thought something had happened to our aerial, but even as I was speculating regarding the matter Le Clercq appeared and told me that we had been in collision with another vessel. I leaped out of my berth and, looking out of a port hole, saw that lifeboats were being lowered and that preparations were being made to take the passengers off the vessel.

The sight was real enough to convince me that I was not dreaming and, hurriedly dressing, I took my place at the wireless set. Soon afterwards the chief officer came with an order to send the S O S. We were then about twenty-six miles south of the Nantucket Shoals. While I flashed the signals my assistant busied himself carrying messages to and from the wireless room to the bridge. The wireless appeal was answered without delay by battleships of the Atlantic fleet manœuvering near Nantucket Shoals, the steamships North Star and Cretic also responding. The Wyoming of the Atlantic fleet said that several battleships were coming at top speed to our assistance. This information relieved the anxiety among us, due to the fact that our ship had a big hole in her port side amidships, extending nine feet under the water line. Through this opening the water rushed like a small river.

While the exchange of wireless messages was taking place the passengers were being transferred to the ship with which we had been in collision—the Joseph J. Cuneo—bound from Boston to Baracoa, Cuba. She had suffered considerably also, as a result of the accident, a large hole in her bow permitting the water to pour freely into her. The sight of the battleships South Carolina, Texas Louisiana and Michigan steaming toward us, therefore, was welcome indeed. The South Carolina at once lowered her boats and took aboard those from the Ryndam who had been transferred to the Cuneo. Then a wireless conference was held at which it was determined that the Texas should accompany the Ryndam to New York.

We arrived off Sandy Hook at half past eight o'clock and, complimentary marconigrams having been exchanged between the Ryndam and the Texas, the latter left us to join the other vessels of the Atlantic fleet. Thus we returned to the port from which we had started; our vessel was somewhat damaged, but we had escaped life loss and shown again that wireless telegraphy can be depended upon to bring help in time of need.

The collision between the Metropolitan Line steamship Bunker Hill, bound from New York to Boston, with 250 passengers aboard, and C. K. G. Billings' steam yacht Vanadis in a fog off Eaton's Neck, Long Island, on June 13 brought several offers by wireless of aid. Two men were killed and several persons were injured as a result of the accident. Marconi Operators Ingalls and Pitts were detailed on the Bunker Hill. When Captain Holmes, commander of the Bunker Hill, sent a marconigram to New York saying that the vessel was returning under her own steam, some of the vessels which picked up the message volunteered to come to the aid of the steamer. The latter, however, did not require assistance although she had been considerably damaged.

"I was on duty and Ingalls was at dinner," said Pitts in speaking of the accident. "When the collision occurred I looked to starboard, but could see nothing. When I looked over the port side, however, I saw the hull of the yacht. Then I heard the grinding and groaning of timbers and knew that we had been struck. We sent out the CQ and the Commonwealth, of the Fall River Line and several land stations answered. We also talked with the Vanadis. She was willing to stand by, but her assistance was unnecessary."

William V. Moore, Marconi operator on the steam yacht Alberta, anchored in Glen Cove, Long Island, had just received the time signal from Arlington when he picked up the following message from the Vanadis:

"If you have steam on please blow your whistle to guide us; we are coming slowly in. Have had smash."

Moore informed Captain Curtis of the Alberta of the message and that craft blew three blasts at intervals until the Vanadis felt her way to a safe anchorage at Glen Cove. The Vanadis was damaged in the collision, but did not take much water.

An officer of the Vanadis, according to an interview published in a newspaper, said that the fog was so thick that those on the yacht could not see where she was going. Suddenly the forward lookout shouted "Vessel dead ahead!" Efforts were made to avoid the collision, but the vessels came together, the bowsprit, head sails and forward rigging of the yacht being carried away.

Charles F. Trevatt, Marconi operator in charge on the steamship Minnesota, which ran on a reef at the entrance to the Inland Sea in Japan, has forwarded an interesting account of his experiences. It is in part as follows:

"We left Nagasaki, Japan, for Kobe in ideal weather at 4 A. M., on April 11, and passing into the Inland Sea in daylight everything went fine. On the same day at 8 P. M., when I came on deck it was pitch dark, there being no moon. I had just exchanged signals with the Oanfa (GTL) which we had passed earlier in the day, also bound for Kobe, when at 8:46 P. M., there was a terrific jolt; then came two smaller ones. I knew as soon as we stopped that something serious had happened.

"The captain immediately 'phoned from the bridge and said, 'Stand by,' and in a short time he again said, 'Can you get help?' I replied 'Yes,' and told him a Blue Funnel liner was about eleven miles behind.

"Both sets were working fine, but as soon as we struck I at once put on the ship's power to the emergency cells, while I was working, and called GTL. As every one knows around this coast, it is a job, what with jamming and static, to get through, but after giving a good BK and saying SOS slowly, I got GTL and he said he was coming right away.

"I heard the boats being hauled out and, as far as I could judge, everything was working smoothly; of course, I was too busy with the captain's orders to notice anything—whether we were taking water or not, or what damage we had sustained. However, I was informed that right on our starboard bow there was a fair-sized island.

"The Oanfa anchored within the hour about three miles from us, but in full view of our lights, and the captain told them they had better stand by till daybreak as there were rocks all around us; that if the situation became more serious we would tell them to come in closer. The next morning we found that our bow had been considerably damaged; we continued to take water and they decided to try and pull her off. They gave up the attempt, however, and decided to give the salvage company a contract to blast the reef.

"We were marooned on an island with no way of getting ashore. After a dozen attempts (eight divers had been at work blasting for nineteen days) we at last slid off into deep water, just where the steamship Nile sank on the 11th of January last. We came to Nagasaki under our own steam and put into drydock.

"The captain is very much pleased with our work. The trouble out here is the jamming. They stop for nothing. Soon after we struck a cruiser came and stood by, but it was more of a nuisance than it was worth. It kept on through the night working with other ships and, being so near, I leave it to you to guess what jamming a battleship can do. But after all we got through with our service which is the main thing."

HOW AFRICA KEEPS IN TOUCH WITH EVENTS OF THE WAR

An explorer and elephant hunter has written as follows from Bangui, French Equatorial Africa, to a newspaper:

"It will interest your readers to know that thanks to wireless linked up by land services, we—in the heart of Africa (over 6,000 miles from Europe)—receive daily reports of the progress of battles now raging in Europe a few hours after the events."

WIRELESS WAR NEWS IN THE ARCTIC

How the news of the outbreak of the European war reached the Russian naval officer, Vilkitsky, an Arctic explorer, in Bering Strait, is told in a newspaper dispatch from Petrograd. Vilkitsky, who has been heard of by wireless, left Vladivostok, planning to attempt the Arctic passage from east to west. He was not aware that hostilities between the Allies and Germany had begun and obtained the information from a wireless source somewhere in Bering Strait.

Wireless and War at Sea

"SINCE the last great naval war was waged in Europe, a century ago," says Archibald Hurd in an article on "Wireless and War at Sea," in "The Year Book of Wireless Telegraphy and Telephony" for 1915, "remarkable changes have occurred in the construction of ships, in their defensive and offensive qualities, and in their auxiliary equipment. The principles of naval war are static, but their application has changed and is still changing. The object of hostilities is to defeat the enemy, and in order to effect this purpose it is desirable to know what the enemy is doing in this or that theatre, and to possess means of communication which will enable superior power to be concentrated and exerted against him at the right time and in the right place. It is also essential that the power shall be of the right kind. Sometimes it may be necessary to employ battleships; on other occasions battle cruisers—that is, ships with the speed of cruisers and the gun-power of battleships—may be more suitable, while in other circumstances it may be necessary to use scout cruisers, destroyers or submarines. The more complete and exact the information obtained as to the movements of an enemy, the better will be the arrangements for defeating him, providing the higher command is exercised with competency and sureness of purpose. It may, indeed, be said that in war almost everything depends upon rapid and accurate intelligence."

In articles dealing with the part wireless has played in the European war, published in previous issues of THE WIRELESS AGE, may be found illustrations of the truth of the foregoing. An interesting exemplification is brought out in the story of the destruction of the German raider Emden by the Australian ship Sydney. The incident is related as follows by Mr. Hurd:

"After a more successful career in the destruction of commerce than even the Alabama, of historical fame, achieved, she (the Emden) put into Cocos-Keeling Island and landed a party with the intention of isolating this small community. The wireless operator had time to send out a message for help. The signal was picked up by the senior officer in charge of the cruisers which were convoying transports from the Antipodes to Europe. The information was so full and accurate and was received so rapidly that no doubt existed either as to the identity of the enemy's ship or the possibility of catching her. The senior officer selected for the duty of destroying the Emden the Sydney, of the Royal Australian Navy, a vessel more powerfully armed and swifter than the Emden. Within a few minutes of the signal of distress being dispatched from Cocos-Keeling Island, this man-of-war, cruising many miles away, had changed her course and was bearing down upon the Emden for the purpose of destroying her; and destroy her she did. Wireless telegraphy was thus responsible for the complete destruction of this most famous of all commerce raiders; but for Signor Marconi's invention there is no saying when her career would have come to an end."

The important use to which wireless is put on British battleships of today has been pointed out in THE WIRELESS AGE. Each ship has its wireless installation adjusted so that it can send and receive signals and messages to other squadrons at sea or in harbor and to stations ashore. It is customary for one ship of a fleet to be always in direct touch by wireless with the Admiralty, the risk of interference from an enemy's craft being reduced to such an extent that it is hardly worth while taking into consideration.

"The invention of wireless telegraphy has radically altered the intelligence service of the British Fleet, as of other fleets," says Mr. Hurd in touching on this subject. "In former wars in which we have been engaged, communication between the Admiralty and the admirals at sea and between the admirals at sea and the officers commanding the individual ships was slow, uncertain, and often inefficient. The old system of intelligence may be illustrated by recalling the story of the errand of the brig Curieux. Nelson, acting on his unequalled intuition, had chased Villeneuve across the Atlantic, and on June 12th reached Antigua to learn that the enemy had apparently started back for Europe. The British admiral decided to send the Curieux to England with information of the enemy's movements and details of what he himself intended to do. Sailing at her swiftest, she did not reach Plymouth until July 7th. Commander Bettesworth posted at once to London, only to find that the First Lord of the Admiralty, Lord Barham, had gone to bed and that no one dared to arouse him.

How Lord Barham Met the Emergency

"'At an early hour,' Mr. Julian Corbett states in 'The Year of Trafalgar,' the old man awoke and fell into a fury when he knew what had been awaiting him. For it was not only Nelson's dispatches Bettesworth had to deliver, but having taken a more northerly course than the Admiral, who was making for the Straits, he had sighted Villeneuve and determined his course. It was on June 19th, as high as latitude 33° 12′ and in longitude 58°—that is, some 900 miles north-northeast of Antigua—that he had seen him, and the Combined Fleet was still standing to the Northward. Till there could be no doubt Bettlesworth had shadowed them, and then made all sail home with his all-important news. That Villeneuve had stood so far to the northward could only mean he was making for the Bay, and not, as both Barham and Nelson expected, for the Straits. What was to be done? In half an hour Barham had decided.'

"In three hours the orders of the Admiralty had been drafted and the commander of the Curieux was thundering down the Portsmouth road to rejoin his ship, which had in the meantime moved round from Plymouth to Portsmouth. In a short time the brig again put to sea, bearing with her dispatches to Cornwallis which had no little influence in changing the course of European history.

Slow Methods of the Past

"One can imagine how the admirals at sea and the members of the Board of Admiralty chafed under the delay which was imposed upon them, owing to the slow means of communication which then existed. The Curieux, from the time when Nelson decided on his course of action, until Plymouth was reached, was at sea twenty-four days. Then followed Captain Bettesworth's post to and from London, and further delay occurred before the vessel was able to complete the chain of intelligence by communicating with Cornwallis. In the past hundred years steam has replaced sail-power and movement by sea has thereby been rendered more rapid. On the other hand, except where cable communication exists, the Navy of today would still have to rely upon the same slow methods of communication as existed a century ago were it not for the invention of wireless telegraphy. The relation between the speed of the enemy and the speed of the intelligence ship of the opposing ship is now much what it was in Nelson's day. Under the altered conditions, however, a wireless signal 'in code' can accomplish in a few seconds all that the Curieux was able to do in many days.

"Lack of efficient intelligence was under other conditions the bane of the lives of our admirals, as their letters reveal. When Nelson was blockading Cadiz he had to maintain a chain of small vessels which stretched from the enemy's port to the main British fleet, fifty miles away, and the news that the enemy had sailed did not reach him for two and a half hours. Today a single scout cruiser, under steam, could cover that distance in an hour and a half, and no chain of repeating vessels would be necessary; and the enemy, instead of taking 24 hours to maneuver out of port, could complete the operation in one or two hours. Steam in the first place rendered possible a reduction in the number of links in the chain where great distances had to be covered, but it was not until Signor Marconi invented wireless telegraphy that it became unnecessary to have any chain in any circumstances.

A View of Wireless 16 Years Ago

"The marvels of yesterday are the commonplaces of to-day. We accept the triumphs of wireless telegraphy without surprise or wonderment. And yet how short is the time since this invention appeared and how surprising have all the early anticipations of its triumphs been more than fulfilled! In this connection it is not uninteresting to recall the leading article which appeared in the Times (of London) as recently as August 17, 1899, on the employment of Signor Marconi's system in the naval maneuvers of that summer. It was remarked that 'It has been demonstrated by repeated experiments, conducted under the conditions of actual service, that signals can be transmitted, received and interpreted from ship to ship up to a distance of at least thirty miles, and that their transmission is, so far as we know at present, unaffected by any ordinary meteorological conditions. . . . Thus at a single stroke all existing methods of signalling at sea would seem to be superseded and the effective range of signalling by night or day and in all meteorological conditions is enlarged some five or six fold at least. . . . An electrical contact, alternately made and broken at prescribed intervals, in any one ship will project the required signal, by means of the familiar telegrapic alphabet of dots and dashes, to any other ship within a circuit of thirty miles. Communication with the land can be maintained at the same distance, and the signal, being automatically recorded, will require no exceptional acuteness of vision and no trained habits of nautical observation in the operator who receives it. A button pressed in the flagship will initiate any and every tactical evolution in the fleet and ensure an almost automatic precision in the resulting movements of the ships. The flashing lantern will be superseded at night, flags and the semaphore by day, or employed for the most part only as auxiliaries for executive purposes and for the better discrimination of ships addressing and addressed. The hideous and often bewildering shrieks of the siren will no longer be heard in the fog and the cumbrous, dilatory and very uncertain system of gun signals will become entirely a thing of the past. As the range of transmission appears to depend on certain determinate factors—such as the height to which the transmitting and receiving wires are carried and the intensity of the vibrations excited in the former—it seems not impossible that the determination of these factors may lead hereafter to an accurate and expeditious measurement of the distance between transmitter and receiver, thus superseding the sextant in ascertaining and correcting the stations of ships in a fleet.'

"If a means of signalling over distances of about thirty miles was welcomed by the Times sixteen years ago in a leader of a column and a quarter in length, how great must be the indebtedness of the Navy to the new system when a squadron based on Malta can receive signals direct from the Admiralty by this new system and when the ordinary installation of a large ship of the fleet can send messages over a distance of 2,000 miles!

Progress in Naval Communication

"When the new means of communication was in its infancy installations were made only in battleships and large cruisers; the system was afterwards extended to small cruisers, later on to destroyers, and finally to submarines. The German under-water craft, which have played such a dramatic rôle in the present war, are provided with installations which enable them to communicate three or four times as far as could a battleship in the naval maneuvers of 1899. This contrast supplies evidence of the remarkable development which has taken place in the adaptation of wireless telegraphy to the uses of the Navy in the last sixteen years. Practically every ship in the British Navy today can dispatch and receive wireless signals, and consequently the intelligence work of the Navy has undergone a radical revolution. An admiral need never be out of touch with his vessels and he need practically never be out of touch with the Admiralty. The radius covered by his intelligence service is governed, not by the number of links in the chain of signal vessels, but by the character of the wireless installation. Admiral Sir John Jellicoe, in command of the Grand Fleet, can remain not only in hourly touch with the Admiralty, wherever he may be in European waters, but he can receive instant reports of any movements on the part of any section of the enemy's navy from patrolling squadrons.

Modern Admiral Better Served than Nelson

"In the matter of intelligence the modern admiral is infinitely better served than was Nelson, whose continual cry was 'more frigates, more frigates.' In the year before Trafalgar the Navy possessed 244 frigates to 175 ships of the line, while in 1814—just over a hundred years ago—there were 317 scouting vessels and 240 heavier ships. A British admiral was never satisfied that he had with him sufficient frigates to watch the enemy's movements, convey information to him, and act as dispatch carriers. In the opening year of the present century, with the advent of steam and iron ships, conditions had undergone a change, but still the admirals demanded 'more cruisers, more cruisers.' In the spring of 1900—fifteen years ago—the Navy embraced 45 battleships and 126 cruisers of various types and sizes, and there were 15 large armored or protected cruisers building. At that date the other six naval Powers had 52 cruisers in hand—France, 14, Russia, Germany and the United States 9 each, Japan 8 and Italy 3. The introduction of steam and the development of the steam engine had conferred advantages on Powers, great and small, and every country was intent on constructing cruisers. Of different types there were, built and building, 314 ships which could be used in scouting duties, though some officers held that many of the larger cruisers, carrying the 9.2 in. gun might also be employed in the line.

"Wireless telegraphy has since been devoted to a state of perfection as a means of communication which fifteen years ago would have been regarded as impossible. The whole world has become a whispering gallery; yet by 'tuning' and the use of codes secrecy can be maintained, so that A and B, British ships, can talk without C, a German ship, being able, except by luck in hitting on the 'tune,' or leakage of the code employed, knowing what is the subject matter of the conversation."

Mr. Hurd's remarks on the effect which wireless telegraphy has had on the construction of cruisers are especially interesting at this time to citizens of the United States in view of the discussion regarding our naval strength. He writes in part as follows:

"What has been the effect of wireless telegraphy on cruiser construction? How many cruisers are building? No armored or large cruisers—what in the past would have been known as first-class cruisers—are under construction in any shipyard for service under any flag. The only type of vessel in hand is the small scout, except in Russia, where, for an unexplained reason, six vessels of 7,600 tons displacement are on the slips. The vessels of the scouting type which are in hand are in British or other foreign yards range in displacement from 3,500 tons, in the case of Austria-Hungary, to 5,000 tons in that of Germany, the British scouts—known as light cruisers—being of 3,800 tons.

Cruiser Construction and the Art

"The attention which individual Powers are devoting to cruiser construction will repay analysis. When the present hostilities opened no fewer than 17 very fast and useful craft resembling the Arethusa, of fame, were in course of construction for the British Navy—they were described officially as 'destroyers of destroyers,' rather than intelligence vessels, and as such they have been mainly employed during the war. Germany had in hand 6 small cruisers, Italy, 4, Austria-Hungary 3, and France, the United States and Japan none. The duties which it is intended that the eight large Russian ships shall perform in war cannot be guessed; these ships stand alone and apart. If we omit Great Britain and Germany, which were involved in a keen rivalry which was to find its culmination in the present war—we are confronted with the fact that the other six naval

Powers had in various stages of construction only 7 cruisers.

"This neglect of cruiser building coincided with the development of wireless telegraphy and the increased size of destroyers carrying wireless installations.

Long Chain of Signal Vessels Superfluous

"In neither of the countries in which the building of cruisers has been almost if not entirely, abandoned, has any official explanation been made of the change of policy which has occurred. Even in the United States, where a very complete exposure of the springs of action of the naval authorities is made from year to year before Congressional Committees, no justification has been forthcoming of this abandonment of the cruiser. Throughout the world there is a general agreement that the day of the large, costly cruiser, with a protected deck or vertical armor, is over; there is no demand by officers in the American Navy for anything between the battleship and the seagoing destroyer, or if there is, it has failed to find expression. In other countries naval opinion runs strongly in the same direction, except where trade routes have to be defended.

"What is the explanation of this trend of policy? Wireless telegraphy does not render scout ships unnecessary, it is true, but it has made superfluous the long chain of signal vessels. An observation vessel—small cruiser or even destroyer—can remain on her station and pour into the flagship, 50, 100, 200, or more miles away, a continual stream of intelligence as she obtains it. Wireless telegraphy has not eliminated the scouting ship and has not increased her radius of steaming, but it supplies a method of quick, rapid and certain communication. It does not serve as eyes to the battle fleet, but performs the same duties in a fleet that the mind performs in the body, conducting the sensations from any part of the human form to the mind with the result that it is provided with material on which to act. For instance, the eye, nose or ears give warning to the mind of an imminent danger; a wise man, in the possession of his mental powers, takes suitable action to avoid it. Similarly with wireless telegraphy, the cruiser acts as the eye of the admiral and by means of its wireless installation, and without reliance on a chain of repeating vessels, communicates at once to the 'brain of the fleet'—the staff in the battleships.

"The introduction of wireless telegraphy has consequently contributed to an economy of time, which means greater strategic efficiency, and, in so far as it has been responsible for the decreased output of cruisers, to an economy of money. In some measure it has robbed the weaker naval Power of the advantage which steam conferred on him. Steam assured certainty of movement and facilitated evasion. Wireless telegraphy in greatly assisting in scouting operations, placed in the hands of the stronger navy the ability to effect concentrations in force. . . ."

It is related of the Emden that her commander depended largely upon wireless to aid him in determining the positions of British vessels. The raider steamed here and there in search of her prey, her operators from time to time picking up messages from prospective prize craft. If a British vessel answered the calls of the Emden the raider asked for her position and, having obtained it, steamed toward the ship. This is one of the ways in which wireless was employed by the Germans during the war. The advantage of wireless to the British Navy is called attention to by Mr. Hurd in an interesting manner.

Admiral Always in Touch with Ships

"Wireless telegraphy," he declares, "has completely revolutionized the intelligence services of the Navy. An admiral need never be out of touch with the ships under his command. Success in war depends in large measure upon unity in command, and wireless telegraphy, when it has been fully developed, will contribute powerfully to this end. The Lords of the Admiralty, seated in Whitehall, will be in a position to signal to ships of war on the outermost sea stations. This facility of communication will add incalculably to the strength of the British Fleet. It will enable concentrations of force to be made swiftly to the disadvantage of the weaker naval Power. Thus wireless telegraphy takes its place beside other scientific developments of the past few decades in assisting the supreme naval power and conferring upon it advantages altogether out of proportion to those enjoyed by the smaller nations. But for the aid which science has rendered, the British Empire today would consist of a series of isolated communities, each in danger of being surprised and isolated, as they were surprised and isolated in the past. In fact, however, the King's Dominions are being day by day brought into closer relations with each other and with the Mother Country. Wireless telegraphy is destined to become the nervous system of the British peoples; a signal of danger from any isolated community will at once result in appropriate aid being dispatched. In this way wireless telegraphy will enable the British Navy to utilize to the full the advantage of speed obtained by the use of steam.

Reinforcement to Naval Powers

"Great as are the advantages which wireless telegraphy has conferred upon the Navy, its development is not unaccompanied by some disadvantages. The distinguishing character of the Navy in the past was the initiative and resourcefulness of officers on distant stations acting on their own responsibility without reference to the Admiralty. The knowledge that, owing to the development of the new means of long-distance signalling, they possess instant means of communication with Whitehall may prove a source of weakness. Attention has already been directed to this peril both in and out of Parliament. It has been suggested that the Admiralty may be encouraged to interfere unduly with the freedom of action of officers in distant seas. On the other hand, there is a danger that officers in the outer stations, confronted with embarrassing conditions, may be tempted to evade responsibility and wait for instructions from home. Both dangers exist, but probably the latter is the greater. The Sea Lords in time of war have full reason to be conscious of the heavy responsibilities which rest upon them in the exercise of the higher command. They are hardly likely to add to those decisions and arrogate to themselves the right of decision on this or that minor point of policy. But a naval officer, realizing the consequences which will fall upon him if he commits an error, may well be tempted, if he be lacking in initiative and resourcefulness, to seek direction from home instead of acting according to his own judgment.

Wireless and An Imperial Fleet

"The Empire will not gain the full advantage of wireless telegraphy until further progress has been made in Imperial co-operation for naval defense. When the Empire obtains an Imperial Fleet, subject to the control of one authority, then the Imperial wireless service will powerfully contribute to the security of every Imperial interest, wherever it may be situated. It was suggested when wireless telegraphy was invented that it would rob the British peoples of the advantages which they had hitherto enjoyed from the possession of British owned cables. It was urged that the least wealthy naval Power would be able to take the fullest advantage of Signor Marconi's invention, and that, consequently, our sea power would be robbed to some extent of the benefits in war time which it had hitherto obtained from the control of most of the cable systems of the world. It is already apparent that this is a delusion; wireless telegraphy, owing to its length of reach and rapidity, will reinforce our sea power, because we are and must remain the supreme nation on the oceans of the world. When, by the co-operation of the Dominions, and, possibly, of India, a great Imperial naval force has been created, wireless telegraphy will confer upon the supreme authority in control the ability, independent of the cable, to concentrate the right force at the right place and at the right moment; and in this way the world-wide needs of the British Empire will be strengthened immeasurably. The wireless system is still in comparative infancy, and we cannot doubt that in the course of the next few years it will be greatly developed, and every stage of advance will mark a further strengthening of the naval chain which binds the Empire together and secures its safety under peace and war conditions."

Through the Mine Fields

A Few Observations on an Interesting but Not Exciting Trip

By S. Hopkins

ALTHOUGH my experiences must appear decidedly tame in comparison with those of other operators who have been drawn into the Western Ocean trade by the unfortunate conditions now prevailing in Europe, they were interesting to me, at least. I take it this is sufficient excuse, therefore, to outline the period in which the steamship Seguranca carried me on a cruise lasting two months.

We sailed from New York on March 15 for Rotterdam, carrying a general cargo. The trip across was uneventful, with the exception of one day when I picked up the SOS call from the Denver. We were over four hundred miles from her at the time and making very little headway against heavy seas, which precluded any possibility of our being able to render assistance.

Our first experience with war conditions occurred when we were approximately sixty miles from Bishop's Rock, one of the Scilly Islands. An English auxiliary cruiser came alongside, displaying the signal MN which, in the International Code, means "Stop immediately." This was followed with a blank shot from one of her guns and prudence decreed that we obey orders and await her further pleasure. A short conversation concerning our destination and cargo then took place; after which we were allowed to proceed on our way unmolested.

The only unusual feature of our trip through the English Channel was the entire absence of war vessels. In fact, the only battleship that we saw during the trip was an antiquated cruiser lying inside the breakwater at Dover. She assisted in maintaining a night patrol of Dover Strait. This is accomplished by eight powerful searchlights, which are kept playing over the surface of the water. Several torpedo boat destroyers, without lights, put out from Dover and inspected us, but we were allowed to continue our journey.

Our hopes had been raised by the apparent indifference of the British Admiralty to our steamer, and we were in high spirits as we passed around the bluffs at South Foreland. We had been informed, through the courtesy of the commanders of several Holland-America liners, that a pilot would be available at Deal and would conduct us as far as the Sunk lightship, in the North Sea.

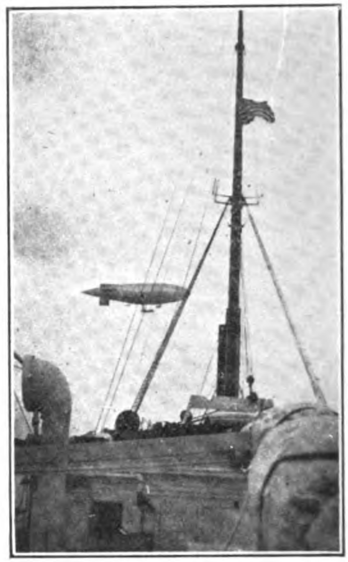
Imagine our astonishment, therefore,

A familiar scene in Holland, the customs officers of which country immediately sealed the wireless room when the "Seguranca" arrived on entering the Downs on March 31, when we beheld a perfect maze of lights surrounding us. At first they appeared to be stationary, and one could easily imagine oneself set down in the midst of New York. But presently our attention was attracted to a Morse light, and for the second time we were greeted with the signal MN, emphasized a moment later by the flash of a cannon from what we afterwards discovered to be a merchant vessel equipped with two four-inch cannon and one high-angle aeroplane gun. This was too pointed a request to be disregarded, and we accordingly slowed down. Shortly afterward, a tug came alongside and ordered us to anchor where we were and await daylight, when our papers would be examined. This cooled our ardor somewhat; but we anticipated nothing worse than the loss of a few hours.

It was nine o'clock before the boarding officer arrived. We had already identified four other American steamers among the sixty or seventy vessels whose anchor lights had created the impression of "The Great White Way." The official's first command was that the aerial should be lowered at once. Then, after a short pow-wow with the captain, he departed with our manifest which, he declared, would be sent to the Admiralty at London for examination.

About an hour later we were ordered to change our anchorage, and were assigned a position near the armed steamer which acted as a guard ship, preventing vessels from attempting to leave without the consent of the Admiralty.

I will not dwell on the monotony of our detention at Deal; for three weeks we remained at anchor and during that time only the captain was allowed ashore. I was appointed a committee of one to make known to the commander of the guard ship our immediate need of the services of a barber. Accordingly, I was rowed to H. M. S. Ceto and received the inspiriting assurance that he would be glad to do anything in his power to accommodate us, but was unable to countermand the orders of the Admiralty. However, the following day a barber appeared and lifted a great weight both from my mind and its domicile.



The monotony of a three weeks' detention at Deal was enlivened by the passage of a large British army dirigible

The tedium was enlivened by several incidents. At one time we witnessed the passage of a large British army dirigible, a snapshot of which is reproduced with this article. Again, one morning we all turned out to see a large French steamer come limping into port with the greater part of her poop deck blown off by a torpedo. She had managed to escape and was beached to allow cargo to be taken from her at low water.

The cannonading in northern France could be plainly heard at all times. We were not more than thirty-five miles from Dunkirk at the time the Germans besieged that city.

On April 16 a German aeroplane passed over the harbor, dropping a few bombs on the city. It was so foggy that we were unable to see the machine, but we followed the course from the hum of the propeller. The guard ship opened fire upon the German with a high-angle gun, but was unable to bring the machine down. The aviator dropped bombs on several cities about London, and succeeded in returning to Belgium safely. We read the next day that orders posted throughout the town required all lights to be extinguished at eight o'clock.

Hardly a day passed without a submarine alarm. An under-sea destroyer would be sighted in the vicinity and dozens of torpedo boat destroyers would suddenly appear and cruise about in circles. Then British submarines would appear and take part in these maneuvers.

It was April 20 when we were finally released, took a pilot and set out for Rotterdam. The pilot left us at the Sunk lightship; from there it is only ninety miles to the Maas River. We passed the North Hinder lightship (the Noord Hinder light is maintained by the Netherlands Government midway between the coasts of Holland and England) about seven in the evening, and saw there six British torpedo boats. We had previously sighted four submarines running with conning towers awash; but as they flew no flags we were unable to determine their nationality.

About eleven that night we reached the Hook of Holland; where, much to my disgust, the wireless room was sealed by the customs officer. I had to pack a suitcase hurriedly with a few necessities. After a run of fourteen miles up the Maas River, we reached Rotterdam. In all, we were thirty-seven days without touching shore.

The Seguranca lay in Rotterdam for ten days, which gave me an opportunity to visit The Hague. We made the journey in twenty-five minutes on the electric train, passing the quaint city of Delft, famous for its pottery. At The Hague we visited Carnegie's "Palace of Peace" and found it somewhat disappointing from the exterior, but wonderfully furnished inside. We also examined an old prison in which there is a collection of instruments of torture and execution used during the period when the Spanish Inquisition flourished.

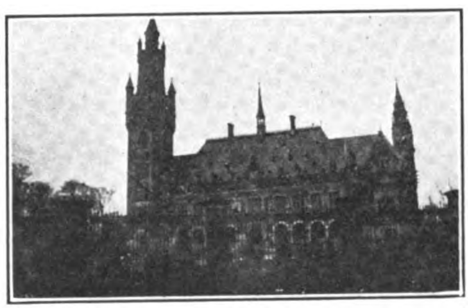
From The Hague, a run of ten minutes took us to Schevenningen, which is really made up of two separate towns; one in which the natives are composed entirely of fishermen and their families, the other of the ultra-modern type, an amusement resort somewhat like Atlantic City on a small scale. The fisher folk at Schevenningen all wear the same costume. A woman's standing in this little community is determined by the number of petticoats she wears. I have been informed that as many as twelve or thirteen of these articles are flaunted by the wealthier girls, giving them an appearance not unlike that attained by the wearers of the hoop skirt of colonial days.

It was at Rotterdam that I first saw the stork in his native haunts and was disappointed to observe that he carried no babies with him; the old legend connecting the baby with the stork, however, still flourishes in Holland.

Of the return trip there is very little to relate. We were not detained at England, although our papers were again examined by naval officers. We were not far from the Gulflight when she was torpedoed, but knew nothing of it until the next day.

The Lusitania passed us at seven o'clock on the morning of the day she was sunk.

Not an iceberg did we see, although our route took us well to the northward of the regular track. We were enveloped



Carnegie's "Palace of Peace" at The Hague was somewhat disappointing from the outside, but beautifully furnished within

in dense fog almost continuously while on the Banks and at one time we passed a berg which, though invisible, made known its proximity by echoing our whistle. Barring this and a disabled steering gear which nearly resulted in a collision with the steamer Colusa, the trip was devoid of excitement. Still, it was interesting. But, let me add in concluding, my idea of the way to enjoy your European trip is to stay at home until such time as vessels shall be permitted to go and come without interruption.

How to Conduct a Radio Club

Article XV

By E. E. Bucher

WHAT shall I do in the summer months? That is a question one often hears; and is, incidentally, one which may be answered in a most interesting way. That is, to the genuine wireless enthusiast.

The pursuit of knowledge in wireless telegraphy occupies a unique position among all the varied interests or hobbies of the young men who constitute our wireless amateurs.

The cycles of enthusiasm and dampened ardor through which many other forms of diversion regularly pass do not seem to exist; perhaps because of the variety of expression—mechanical, electrical and otherwise—to which the wireless art lends itself.

Yet in certain localities this is not strictly true. The approach of the summer season means in these communities a general exodus to the seashore or country districts, and on this account the enthusiasm of the few experimenters remaining at home wanes, and often, with local communication cut off, they conclude to temporarily abandon their experiments. Or perhaps this hasty conclusion is reached after having ascertained for themselves or learned from others that long distance work is difficult to perform during the summer months.

Then, too, the city dweller often finds it inconvenient to shift his equipment to the summer home or camp.

With due regard to the several adverse conditions, the writer knows and shall endeavor to show that this particular season is brim-full of possibilities which may result in profitable instruction and no little amusement.

Both the city dweller and the country migrator may conduct a number of interesting investigations which are impractical during the winter months, both are also afforded an excellent opportunity for correcting defects in their equipment which have become known through months of active service. That resolution, too, that the first available opportunity would be seized upon to construct a receiving or transmitting set of increased range and efficiency may now have full expression with the increased time at their disposal.

Overhauling the Station

Amateur equipments require occasional overhauling and renovation. Indeed, if the stay-at-home worker does not care to construct additional apparatus his attention might be profitably centered in this direction until every possible defect has been removed.

To properly overhaul a radio station inspection should be made of the aerial and its insulation. If the wire is badly corroded it should be replaced, and if the aerial insulators are carbonized to any extent they should be scraped and thoroughly cleaned or, if necessary, replaced.

The transmitting condenser may show signs of leakage—the lid supporting the condenser terminals may be partially burned. If this condition is found to exist, a new cover should be constructed at once. Careful examination of the tinfoil should be made and if blistering has taken place, immediate steps should be taken to correct it.

The insulation between the turns and about the support of the transmitting helix require careful survey; likewise, the "outgoing" insulators for the aerial. Correction of these defects is bound to increase the range of transmission as well as the purity of the emitted wave.

Attention should then be given to the receiving apparatus. It is well within the range of possibility that the windings of the "loose coupler" will need replacing, particularly if sliding contacts are used for variation of the inductance in place of the well-known multiple point switch. The constant friction of the sliding contacts sometimes will have almost cut the wire in two or, on closer examination, the metal will be found to have flattened out to the extent of a short circuit between the turns. Switch contacts also require cleaning or replacing.

The telephone diaphragms may be covered with rust or perhaps "jammed" tight against the magnet. They should be carefully cleaned with a very fine piece of sand or emery paper and then given a light coat of Japan varnish. If badly bent or buckled, new diaphragms will be required. If the magnets show abnormal weakness they should be taken to the manufacturers and remagnetized.

Careful attention to these details will often result in a decided increase in the general efficiency of a radio set, amply repaying the amateur for his labor.

Advice for the Amateur Away from Home

Consider now the amateur who contemplates summering at the seashore. If he neglects to stow away his receiving equipment in some compartment of the vacation trunk, he will have passed up the realization of many hours of enjoyment at times when the ordinary routine of events palls.

An elaborate receiving aerial is not required for seashore work. In fact, at the average resort a number of ready constructed substitutes are available in the form of elevated and wholly or partially insulated conductors or capacities which are entirely suitable for receiving work. With the sensitive receiving detectors of to-day, less pretentious aerials allow the reception of signals at distances before unattainable except with the very best of antennæ equipment.

Any building with a metal roof, whether connected to earth or not, makes an aerial of considerable efficiency. If the roof is supported by wooden beams the insulation is sufficient for all possible conditions of weather and the actions taking place are similar to those in any Marconi aerial; but if the building is connected to the earth through water pipes or other metallic conductors the complete system will act as a Marconi "looped" aerial and is suitable for the reception of the shorter wave-lengths only.

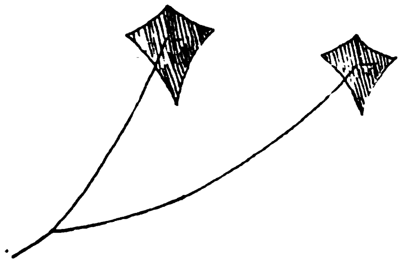
To be effective as an aerial, a wire connection should be extended from a corner of the roof to the aerial binding post of the receiving apparatus and the final earth connection made to steam, water or gas pipes.

The author has employed as a receiving aerial for a number of months the copper rain gutter of a building and secured very satisfactory results; comparable, in fact, to any amateur aerial. Signals were received at a distance of 2,800 miles with surprising clearness.

As a matter of investigation, the natural wave-length of the gutter was measured and found to be 500 meters and the capacity .0016 microfarads! This aerial system was, therefore, unsuitable for the reception of amateur signals at wave-lengths of 200 meters.

Many buildings, such as hotels or apartment houses, have metal cornices to which, if proper connection is made, signals may be received from 50 to 150 miles, and possibly further. Steel structures of any type, such as derricks, derrick tables and bridges act in a similar manner and will give satisfactory results.

Connection has even been made to the steel hand railing of a wooden bridge which was several hundred feet in length. Measurements of the natural wave-length were made and found to be 4,600 meters. Returning at a later date with a complete receiving equipment, messages were received in daylight from a high-power station 1,000 miles distant. These experiments were discontinued, however, in an abrupt manner. It seems that the gatekeeper had somewhere heard the term "electrolysis," together with mention of its destructive effects. After a few hours' deliberation, considerable apprehension arose in his mind as to the probable results of these tests; more plainly, he expected similar effects from the feeble radio telegraph current, remarking that a continuation of experiments might result in a collapse of the structure. Rather than spend the remainder of his vacation in attempting to explain the fundamentals of radio-telegraphy to the venerable gentleman and realizing the hopelessness of ultimate conviction anyhow, the writer discontinued the experiments. Some day



when this honorable post has changed hands, a return may be made and investigation pursued.

This incident merely serves to illustrate possibilities. The amateur experimenter should keep in mind, however, that the majority of the structures recommended as temporary receiving aerials generally have fundamental wavelengths too great for the reception of signals at the shorter wave-lengths.

Amateurs in the Country

The progressive amateur is overlooking valuable opportunities if he spends his days in the country without conducting experiments with receiving apparatus. The time signals may be received twice per day from Arlington or other naval stations at 12:00 M. and 10:00 P. M. eastern standard time. Perhaps the particulor location in which he has decided to abide is, somewhat distant from the news distributing center and he may occasionally long for first-hand information concerning the activities of the outer world. With the receiving equipment at his disposal and a temporary aerial, he may listen in at specific periods to receive the press news sent out by wireless from many stations. The news may then be distributed in bulletin form to those about him. But strict attention must be given to the question of whom these dispatches are addressed to, for unless a message is intended for general use it would be considered a violation of both the United States and the International Regulations to divulge the contents of these messages to his friends.

With a number of days at his disposal the amateur may carry on some interesting experiments with aerials supported by kites.

Aerials Supported by Kites

The value of kites for making meteorological observations has been recognized for a number of years. Their employment in aerial photography and general signaling is a matter of common knowledge, but outside of a few random investigations, little has been accomplished in the field of wireless telegraphy.

Successful experiments were carried out by Marconi on the steamship Principessa Mafalda, en route to Buenos Aires, during which trip a kite supported aerial permitted the reception of signals from Clifden, Ireland, at a distance of 6,000 miles.

Similar experiments may be carried out by the amateur in the open country fields and should prove particularly interesting. On account of their unusual length kite flown aerials are more suited for reception of the longer wave-lengths; suitable receiving apparatus will therefore be described in a later paragraph.

Kite flying is a scientific procedure from which the element of uncertainty has been largely removed. The experiments of many investigators have amply proven that they may be used to lift considerable weights. They are, therefore, entirely feasible for the support of amateur aerials.

In investigating the subject of kites, the amateur will first observe that there are two principal types, namely: the tailless, flat surface or Eddy kite, and the tailless box kite. For flying in heavy winds or gales the box kite should be employed, but for the lighter winds the Eddy type is preferable. In a medium wind both types may be flown simultaneously.

The Eddy kite has shown itself the premier for stability, ease of flying and lifting ability. In fact, in the majority of kite contests for those of the single surface type it has generally wrested the laurels from all others. It is likewise noted for its simplicity of construction. Another valuable feature is its intense leaning towards vertical flying, so much so that the writer has frequently observed a team of these kites to stand in an almost vertical position over his head, then overshoot the mark, dip forward and turn a complete somersault; a feat rarely attributable to the box kite.

A well constructed box kite will raise its supporting cord to an angle of 45 or some times 50 degrees from the earth, while the Eddy type may attain an angle of from 60 to 75 degrees. It will be left to the discretion of the reader which type he shall build, but he should be guided by the prevailing winds in his vicinity.

Before giving the constructional details of the two types, it is perhaps well to mention that the kite supported aerials should not be used during the approach or presence of thunder storms, or in regions where atmospheric electricity is especially severe. If this precaution is not observed the experimenter is apt to become an unexpected and not very comfortable participator in what might be termed Benjamin Franklin's original experiment on a considerably enlarged scale. Observe also that the experiments are carried out at a distance from trolley or high-tension lines for, should the kite line part by accident, it may drop across the wires, resulting in serious injury to the apparatus and attendants.

A suggestive sketch of a kite supported aerial has been supplied by the artist; close observation will reveal the following arrangements:

First, what is known as a team connection of kites is shown. (This is often erroneously termed a "tandem" arrangement.) Three Eddy kites, each having a vertical dimension of 9 feet, are spaced about equi-distant on the supporting cord. The rope for the first kite is payed out to that point where the kite ceases to rise vertically—it is sometimes difficult to observe when this point has been attained—but when a considerable sag is noted, a second kite of similar dimensions is raised on a piece of cord about 300 feet in length and attached to the main cord. The main cord is then payed out until a second decided sag is observed, whereupon a third kite is attached. From this point on a two-wire aerial composed of two strands of aluminum or steel wire is attached and payed out as the main cord. Attachment is then made to the wooden post in the foreground and electric connection finally made to the instrument.

The aerial wire may either have a length of from 1,000 to 2,000 feet at the least, or whatever is consistent with the lifting ability of the kite and prevailing winds, keeping in mind that this aerial is to be used for the reception of wavelengths from the high-power stations.

In the diagram, figure 3, a suggested arrangement of team kites is shown, the distance between fastenings having been indicated only after proper experiment. The cord of each individual kite is attached to the main cord by means of small iron rings. The details of a suitable knot for attaching the cord is shown in figure 4. The types of kite line indicated in the drawing, figure 3, are those furnished by the country's best known kite manufacturers, full particulars and price lists to be obtained by applying to the Marconi Publishing Corporation, New York. A sketch of a suitable reel for winding up the supporting cord is shown in figure 5, while an Eddy kite about to be raised from the earth is indicated in figure 6.

In presenting the design for the Eddy kite the writer has probably erred on the side of over dimensions, but it is obvious that the designer may carry out the experiment on a much smaller scale with satisfactory results.

A few general considerations are worthy of attention, first: The surfaces of the kites should be more or less baggy. The frame should present symmetrical construction around the principal axes. The wood for the frame is preferably of spruce, but bamboo, beech and ash are satisfactory. Even yellow pine, bass wood and white cedar are feasible, if these are the only ones obtainable.

Kite-flying cord may be purchased at

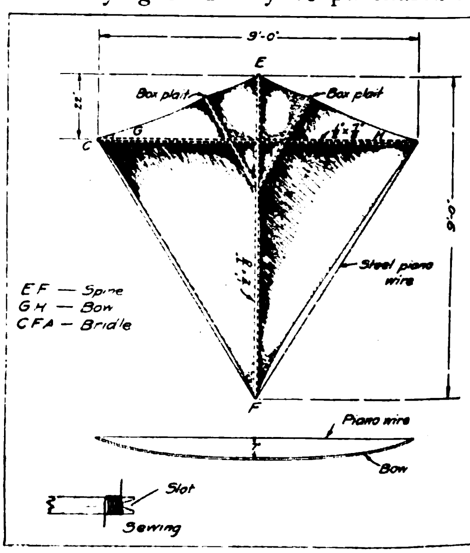
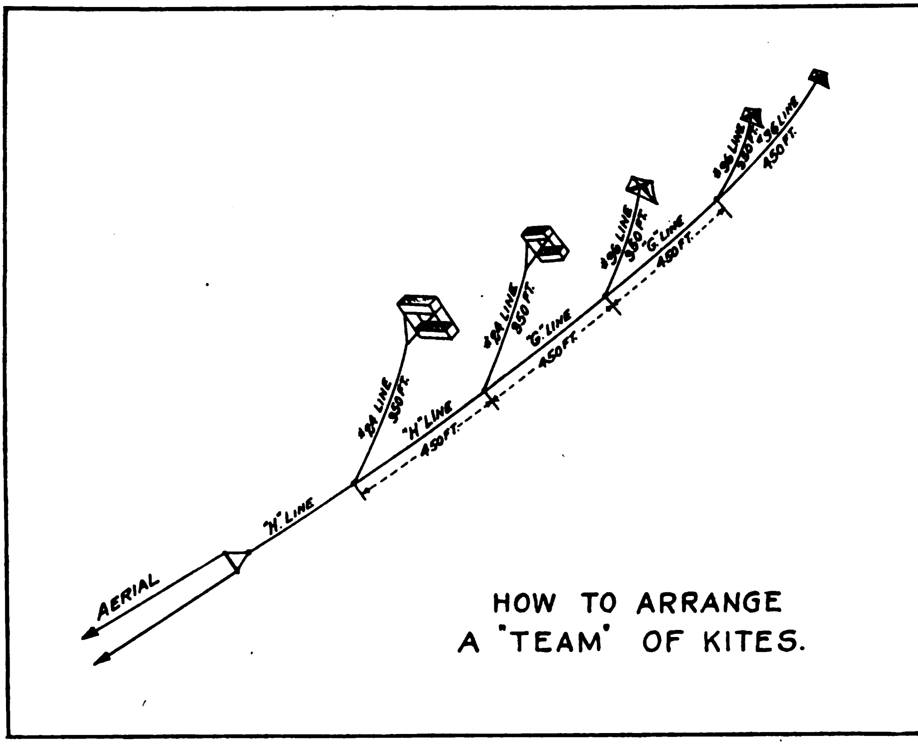


Fig. 2



HOW TO ARRANGE A "TEAM" OF KITES.

Fig. 3

many novelty stores, in fact, the entire equipment may be secured at a very nominal price. Investigation has revealed that steel piano wire is the most reliable and satisfactory of all kite supporting material. This is due to its unusual tensile strength and small wind resistance, but when several thousand feet of this wire are reeled out into space sufficient atmospheric electricity is apt to be collected to render the handling of the wire dangerous.

It should be taken into consideration that a single kite alone will rarely rise to a height of more than 2,000 feet. It may seem that greater heights are attained, but accurate measurements have proven that the appearance is deceptive, due to the kite really traveling in a horizontal position rather than in a vertical one.

Constructional Details

The simple details for construction of the Eddy tailless kite are given in the diagram, figure 2. The vertical stick EF, known as the spine, is 9 feet in length, having other dimensions of ½ inch x 1 inch. The horizontal stick, GH, known as the bow, has similar dimensions throughout. Particular care must be taken in selecting the point at which the bow is attached to the vertical spine EF. As shown at the bottom of figure 2, the horizontal stick is slightly bowed by means of a length of steel piano wire and then braced. When completed it should extend about 7 inches from a straight line, as shown.

In actual practice the horizontal stick is placed down one-fifth the distance from the top of the vertical stick, which in this case brings it 22 inches from the upper end.

The outer edge of the frame is then strung with steel piano wire, being fastened only at E. The sticks are slotted at the ends of H, F and G and then served with twine to prevent splitting, the wire being allowed to slide freely in the groove.

Before the assembling, the sticks should be accurately balanced as well as centered. The center should be measured with a rule and attempts made to balance the stick on a sharp edge. If a leaning to one end is observed, that end

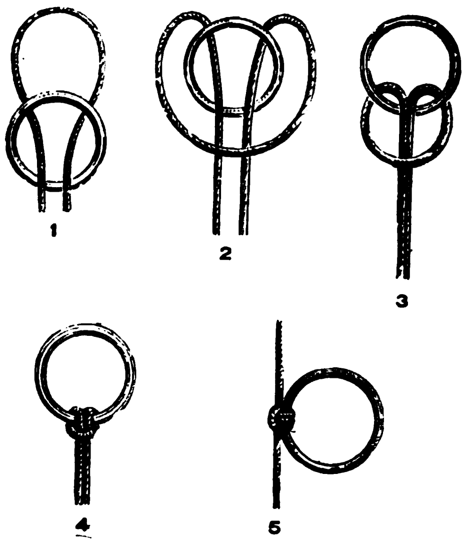


Fig. 4. How to put a ring on a kite line

should be shaved off with a knife until equilibrium is attained.

The keel for tailless kites of this type is intended to project to the front; the covering, therefore, should not be stretched tight, but put on loosely. If the covering is drawn tight the kite will dip and become erratic in action.

For the amateur who may desire to construct kites of smaller dimensions:—for a 5 foot kite the spine and bow may be ⅜ inch by ¾ inch; for a 4 foot kite ¼ inch by ½ inch, and for a 3 foot kite 5/16 inch by ⅜ inch.

Kite Coverings

Cambric is the most popular material for kite coverings. It is light in weight, may be obtained in a variety of colors and is cheap. Care should be taken not to use the goods on the bias as unequal stretching in that position will seriously disturb the stability of the kite.

An important feature of the Eddy kite is the pockets formed by the sag in the cloth as shown in the drawing, figure 2. These depressions should be of equal depth. Allowance may be made for them if the kite frame is laid on its face and the cloth cut all the way around about 1½ inches larger than necessary. Thus, when the edges are sewed in a sag may be allowed as desired. The effect is considerably enhanced if a box-plait is sewn at the top of the kite as shown in the detail, figure 2.

Kite Bridles

The bridle of a tailless kite must be accurately attached either at the bottom and top of the vertical spine, or at the point where the bow and spine cross and at the bottom, (see figure 2). In any event the bridle must be so arranged that when drawn over to one side of the kite it will be just long enough to reach the outer limit of the bow. More clearly, from the diagram: FG and FC are identical in length; AG is the same length as AC. Point C should just reach G or F.

To make the kite fly high the supporting line is attached above the normal point, but if lower levels are to be maintained the rope is attached slightly below this point. A few trials will enable the experimenter to locate the proper position.

The Construction of a Box Kite

The constructional details of a healthy box kite of the rectangular type, having over-all dimensions of 9 feet are given in figure 7. The corner pieces are of spruce or other suitable wood cut ¾ inch by ¾ inch by 9 feet.

The central sticks or spines have dimensions 1 inch by 1 inch by 9 feet.

The cross braces are also ¾ by ¾ inch by 9 feet and ¾ by ¾ inch by 4 feet.

The upper and lower cloth coverings are 2 feet 6 inches in width, the open or intervening space being about 4 feet.

The sticks are held together by special tin fasteners which may be purchased at any novelty store. They are further braced by steel piano wire which, if desired, may be fitted with miniature turn

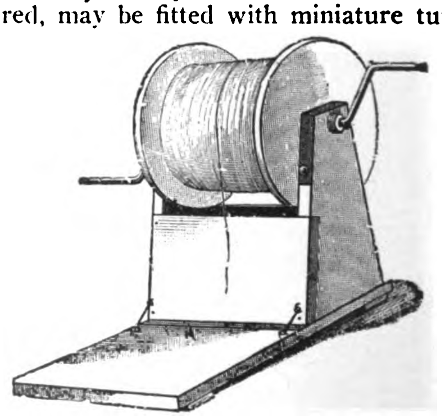


Fig. 5. Kite reel

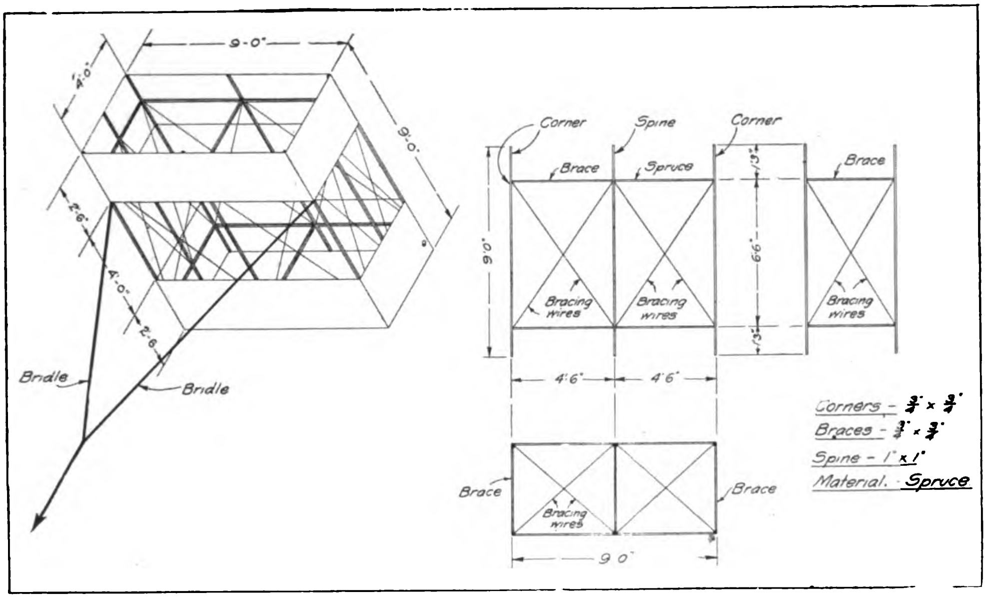


Fig. 7

buckles to take up the slack and warp.

The bridle for this kite is attached to the corner posts as shown in figure 7, but several trials must be made to locate the final position. The two sides of the bridle should join at a distance of about 9 feet from the corner pieces.

As in the construction of Eddy kites, the covering of this kite may be of cambric, carefully hemmed in at the edges to prevent tearing.

When to Fly Kites

To enable the experimenter to determine suitable winds for the two types of kites, E. I. Horstmann & Co. have prepared the interesting flag reference code shown in figure 8.

When the wind is so light that a flag flies, as shown in position 2, and every now and then drops down as shown in position 1, there is not enough wind to fly kites.

When the wind is strong enough to hold out a flag as in positions 3 and 4, the Eddy kite flies to perfection.

When the wind will hold flags out straight as in position 5, it is too strong for an Eddy kite, but is a perfect wind for a box kite; in such a wind a box kite

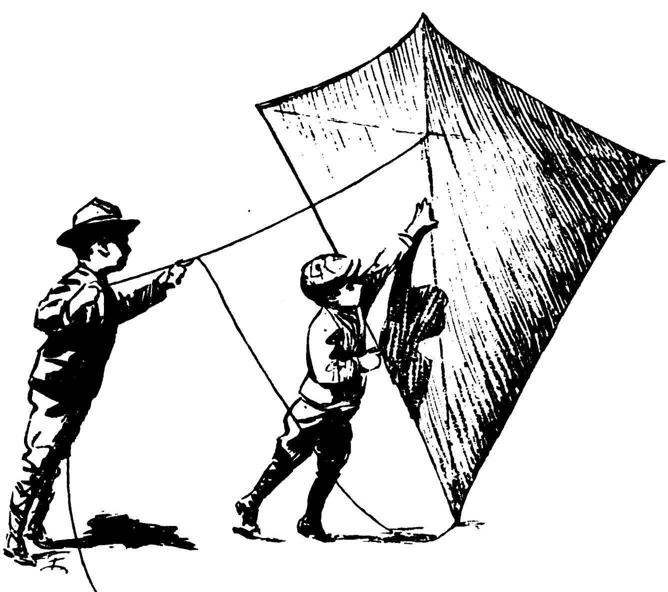


Fig. 6. Starting the flight of an Eddy kite

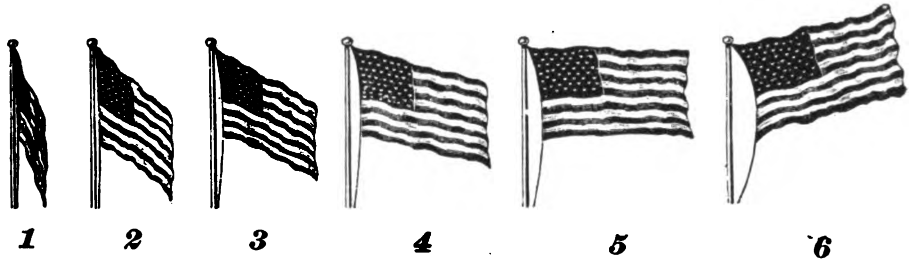


Fig. 8. Graphic chart showing various wind conditions

has great lifting power. A box kite may also be flown in a wind which will hold out a flag steady, as shown in position 4, or in such a wind both kites may be flown together in tandem.

Position 6 shows how a flag flies in a gale, the wind blowing from 40 to 50 miles per hour. In such wind neither of the kites can be flown.

A Long Distance Receiving Set

Having progressed thus far with suggestions for various types of receiving aerials suitable for long distance radio communication, interest may next be engaged in the design of a receiving tuner which will permit the reception of longer wave-lengths.

The dimensions for an inductively coupled receiving transformer which would allow the reception of signals up to and including 8,500 meters follow. A diagram of connections is given in figure 10.

The secondary winding is made on a cardboard or hard rubber tube, 6½ inches in diameter by 7½ or 8 inches in length, and is wound closely with No. 30 S. S. C. wire; the complete turns being equally divided between the points of an 8-point multiple switch. The secondary variable condenser C-2 has a maximum capacity value of .001 mfds., while the fixed condenser C-3 has a value of .003 mfds. A potentiometer P, having a resistance value of 400 ohms, is connected in shunt to a 3-volt battery B. A fixed resistance of 1,800 ohms is included in series with the battery B, in order that the voltage may be sufficiently reduced in value for sensitive adjustment of the perikon and silicon detectors. The telephones PH should have a resistance value of from 2,000 to 2,500 ohms.

It is difficult to give the exact dimensions for the primary winding of this transformer, unless the wave-length, inductance and capacity of the receiving aerial is accurately known; but for a preliminary determination the following dimensions are suggested:

The tube for the primary winding should be of just the correct size to slide inside the secondary winding previously described, namely, about 6 inches in diameter. To have sufficient turns for the various lengths of antenna which might be employed, it may be 7½ or 8 inches in length and wound closely with No. 24 S. S. C. wire.

The inductance value of this coil may be varied either by means of a multiple point switch or by the well-known sliding contacts. It may be possible that certain kite-supported aerials will have a fundamental wave-length of such value that the condenser C-1 must be connected in series with the aerial system to estab-

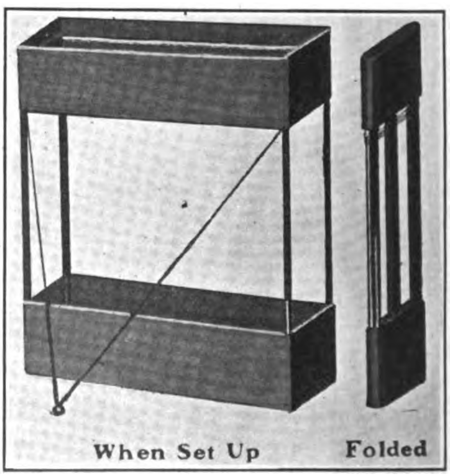


Fig. 9. Folding box kite

lish resonance.

For open field work a receiving set of this type may be constructed in a crude manner, for inasmuch as the experiments are to be of a temporary nature, expensive apparatus is unwarranted. For example: The primary and secondary windings may be made on a cardboard tube, while the inductance switches may be of the ordinary battery type, with wooden base.

Both the primary and secondary circuits must be accurately adjusted to resonance; the work would, of course, be facilitated if a thoroughly accurate wavemeter of suitable range is available. A wavemeter of this character is generally out of the reach of the average amateur.

A buzzer testing set should be included in this equipment, in order that a sensitive spot on the crystal may be readily located.

A Supersensitive Receiving Set

A contributor to THE WIRELESS AGE has supplied the diagram of connections given in figure 11, for a sensitive receiving set with which he states he has been enabled in daylight to copy signals from high power stations over a distance of 3,000 miles. He further states that it is equally suitable for the reception of damped or undamped oscillations. For this set an aerial of at least 800 feet in length is required.

Referring to the diagram, the receiving aerial A is connected to the earth through two tuning coils, T and T-1. A condenser C-1, which ordinarily is used at very small values of capacity, is connected in series with T-1. A connection is then extended from the slider S-3 through a small variable condenser C-2 to the grid of the oscillation valve G. The second lead from the condenser C-1 is extended to one leg of the filament F. B-1 is a battery of about 4 volts, while B-2 may include values up to 60 volts.

The variable condenser C-3 has capacity of .005 mfds. and is connected in shunt to the battery B-2 and the head telephones PH.

L-1 is an inductance coil, 5 inches in diameter by 26 inches in length, wound closely with No. 28 wire and furnished with a multiple point switch having 5

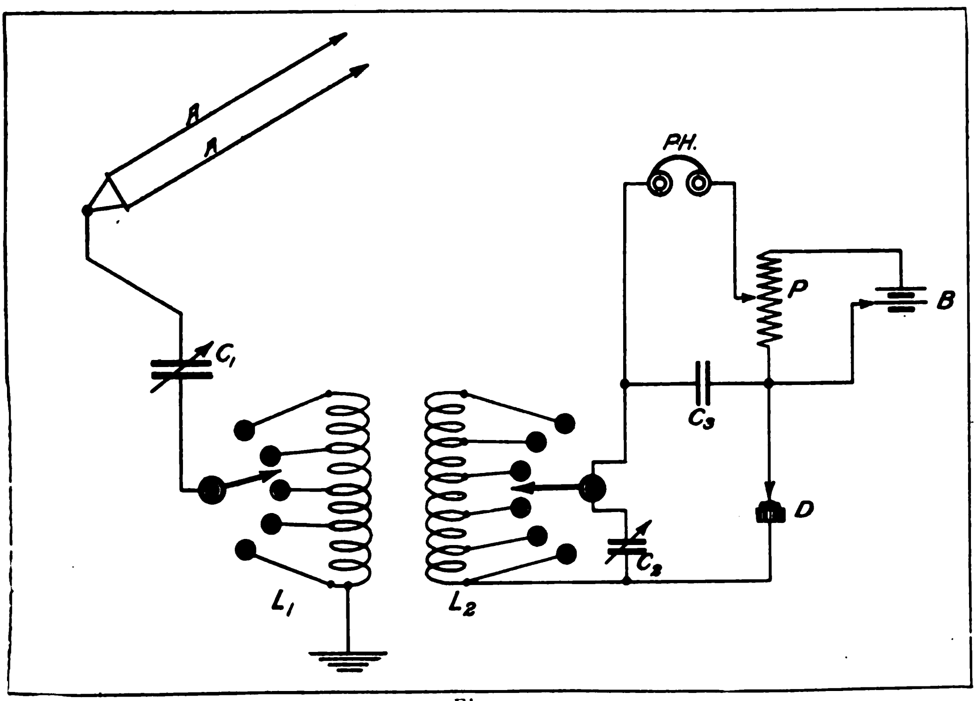


Fig. 10

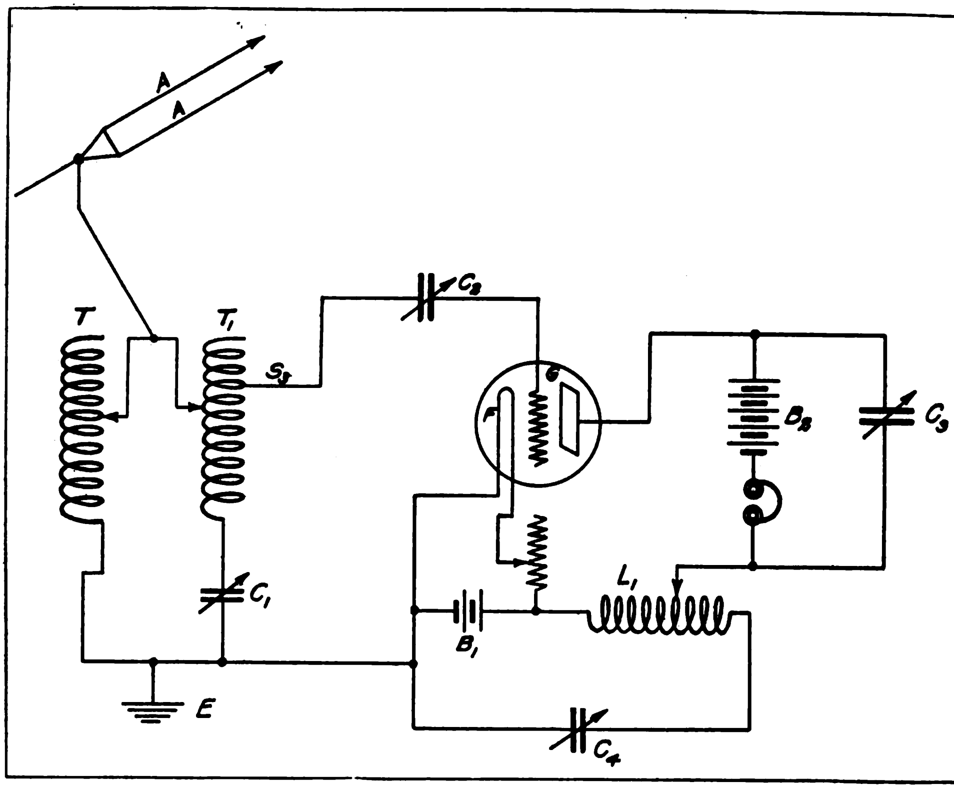


Fig. 11

taps. C-4 is a second variable condenser of .005 mfds. capacity.

The dimensions of the coils T and T-1 will naturally vary with the size of the aerial and therefore specific dimensions cannot be supplied, but for preliminary experiment they may be 12 inches in length by 4½ inches is diameter, wound closely with No. 24 S. S. C. wire.

For the maximum intensity of signals adjustments are first made at the coils T and T-1; corresponding variations being effected at the variable condenser C-1. Proper adjustment of the variable condenser C-3 and the inductance coil L-1 will result in an enormous amplification of the intercepted signals. Rough adjustments may be made at the condenser C-4. When undamped oscillations are received, variations of the values of L-1 and C-3 will give a corresponding change in the note produced in the head telephone, which of course, may remain at the particular audio frequency desired. The "blue glow" sometimes observed in the bulb is absent at the point of best adjustment. It should be understood that the set just described is more suitable for the reception of wave-lengths between 5,000 and 9,000 meters.

Aerials

Certain amateurs have put forth the suggestion that kite-supported aerials will not give the last degree of efficiency on account of the inclination of the wire and believe that better results will be obtained if the aerial wire is held in a strictly vertical position. This assumption is not correct, as the radiation from even a vertical aerial becomes more or less inclined in transit, depending upon the nature of the soil over which the "feet" of the wave pass. Thus, if radiation takes place over dry soil the top of the wave front will travel faster than the foot, and in consequence the wave is bent forward. Therefore, a receiving aerial having a certain portion in the form of a flat top will absorb more energy than a strictly vertical conductor.

(To be continued)

MEDICAL AID FROM TAMPA BY WIRELESS

The latest experiment in one of the modern uses of wireless at sea, proved a success when a Tampa doctor diagnosed the sickness of a sailor on board the tug Security.

The sailor complained of a pain in his left arm after the Security had cleared New Orleans for Wilmington, N. C., and the captain prescribed a dose of salts, the deep sea cure for all ailments.

A few days later the arm began to swell, and a high fever developed. The first-aid-to-the-injured book was brought into action, and its pages eagerly scanned to find the safe and certain cure for swelling arms and fever. Rules and regulations for treating fever were carefully followed, and were partly successful. But nothing was found that pertained to swellings of arms that had been neither cut nor bruised. Many were the applications applied to the injured limb, together with an occasional dose of salts to keep the circuit in good working condition. But, as the classics say, "there was nothing doing."

After transferring barges with the Astral at sea, off the coast of Florida, the Security headed for New Orleans, the captain doing his level best to relieve the pain of the sailor. On the fifth day at sea, the swelling increased and high fever developed. Recondite and plentiful was the medical advice given by different members of the crew, everything from "pow-wows" to making incisions being suggested; but the rules and regulations for making incisions could not be found in the first-aid book, and it was deemed unwise for one not experienced in the art of incisioning to attempt it.

As a last recort Wireless Operator George H. Reachard suggested sending a wireless message ashore for a diagnosis of the case, and a prescription from a doctor to relieve the pain until the Security reached New Orleans. Up to this time it was not known what kind of sickness the patient had contracted, therefore the only thing to do was to change the treatments from time to time, and see which had the desired effect.

Between the captain, chief engineer, and the Marconi operator the following message was composed and transmitted to the Tampa wireless station:

TO MANAGER,
TAMPA:

PLEASE CONSULT PHYSICIAN AS TO BEST COURSE TO PURSUE REGARDING SICK SAILOR, LEFT ARM STARTED SWELLING SIX DAYS AGO AT ELBOW BEGINNING WITH TWO LUMPS. SWELLING PROCEEDED FROM THERE TO HAND. IS NOW SWELLING TOWARD SHOULDER. HAD A HIGH FEVER AT BEGINNING, BUT FEVER HAS ABATED. AT TIMES HIS MIND WANDERS. COLOR OF ARM DARK RED. HAS NOT SLEPT FOR SIX DAYS. MEDICAL STORES LIMITED. ADVISE AS TO BEST HOME REMEDY.

In the meantime the patient was suffering terribly, and the case took on a grave aspect. The reply to the message was anxiously awaited.

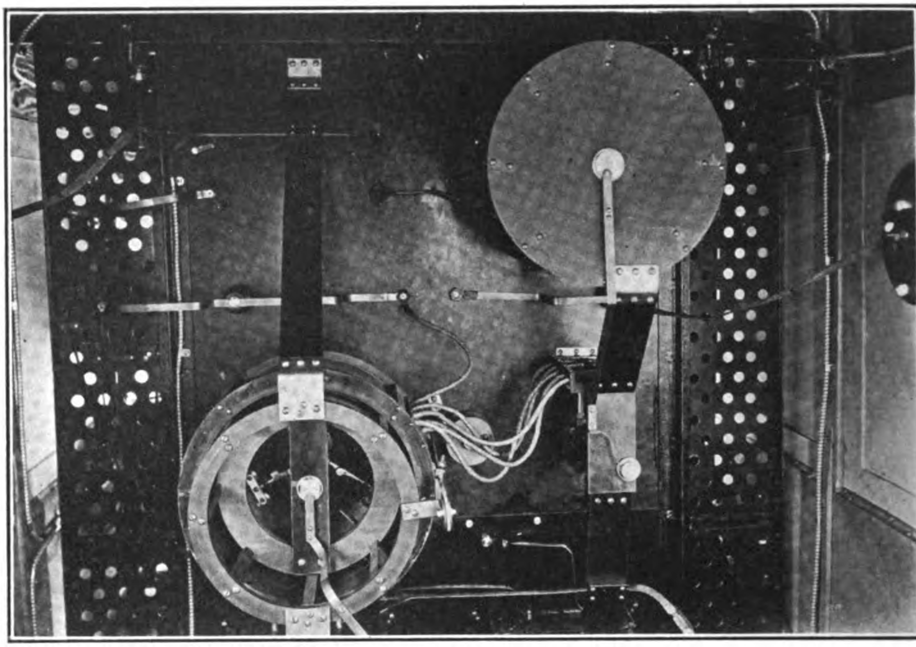
A few minutes later the following message was received:

DOCTOR SAYS: MAKE SATURATED SOLUTION BORIC ACID IN WATER. WRAP ARM FROM SHOULDER TO HAND. KEEP IT SOAKED IN HOT SOLUTION. KEEP BOWELS OPEN. GET MAN ASHORE QUICK AS POSSIBLE. IS BLOOD POISON. IF BORIC ACID NOT OBTAINABLE MAKE SOLUTION ONE TO FIVE THOUSANDTH BICHLORIDE MERCURY IN WATER.

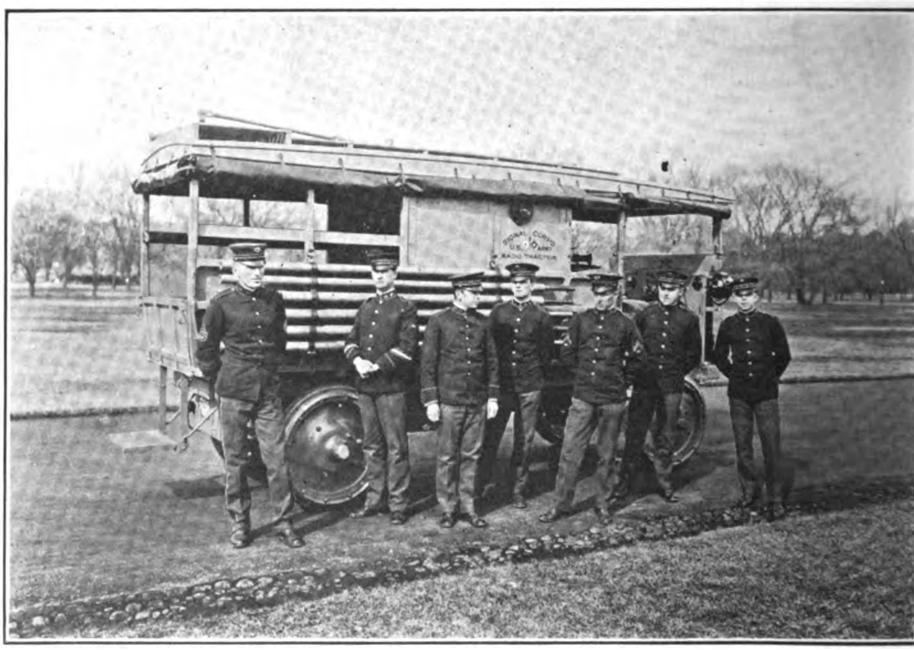
It was seen then that the sailor's life was in grave danger. The medicine chest was again explored to find the ingredients prescribed by the doctor; these were not available.

A course was immediately laid for Tampa, the nearest port, 180 miles nor'-east. Arrangements were made via wireless to have a tug boat meet the Security at Egmont Key and convey the patient to the hospital. Reports via Tampa wireless station kept the Security posted as to the condition of the sailor. The first report was "chances for recovery about even," and the last "patient slightly improved." Once ashore the patient received prompt attention and is now on the road to recovery.

The captain and entire crew of the Security extended their most sincere thanks to Manager Young, of the Tampa Marconi station for his efficient services in handling his end of the circuit.



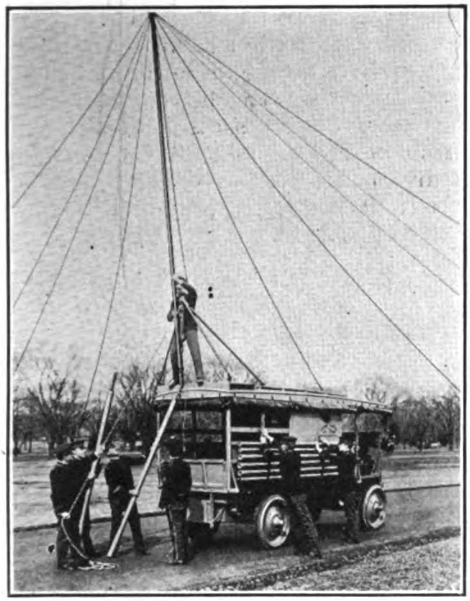
Interior view of "Radio Tractor No. 2," showing oscillation transformer and aerial tuning inductance. The complete set loaded weighs about 5,000 pounds



The army's new wireless equipped tractor which, driving by all four wheels, can be guided across country if necessary, carrying its crew of two chauffeurs, two operators, two messengers and one non-commissioned officer in charge

ARMY'S NEW SIGNALING TRACTOR

A PORTABLE wireless station, mounted on a three-quarter ton truck, has just undergone some successful experiments at Fort Myer under the direction of the Army Signal Corps. The new equipment has been called "Radio Tractor No. 2" and in many particulars is similar to "Radio Tractor No. 1," which was described in detail in the February issue of THE WIRELESS AGE.

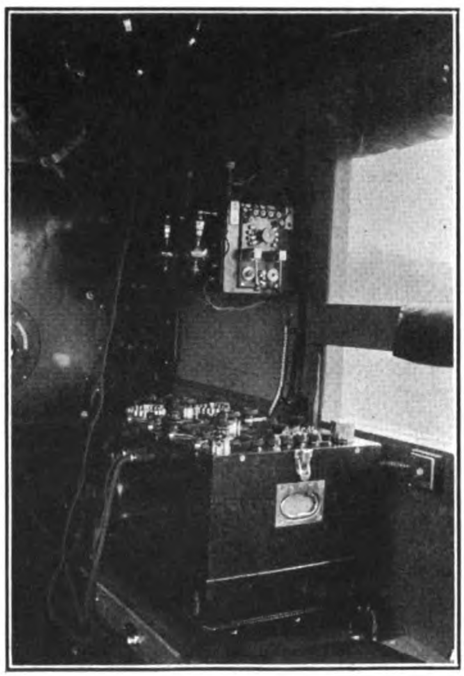


Erecting the 60-foot mast by means of mast hoisting shears which fold down close to the roof during transportation. With the crew shown the equipment can be put in working order in about five minutes

Unlike its predecessor, however, No. 2 can travel across country, if necessary, quite as well as on highways.

The chassis is of the Jeffery commercial type, but carries a specially designed body. Electrical equipment installed consists of a 1 k.w. alternating dynamo of the high frequency type, which by means of a special lever can be thrown into gear with the automobile engine. A portable switchboard is installed back of the driver's seat, on which are placed the various apparatus required in regulating and controlling the wireless operation. On the top of the body is a mast hoisting shears which fold down close to the roof during transportation. An electric signaling lamp is carried on top and is used as a searchlight or for auxiliary communication by the wigwag method.

The complete set loaded weighs about 5,000 pounds, or practically the same weight as that of a loaded escort wagon. It is light enough to follow the divisional headquarters under ordinary conditions and for that reason is designed to take its place in the signal corps divisional organization. The crew consists of two chauffeurs, two radio operators, two messengers, and one non-commissioned officer in charge. This crew is sufficient to put up the 60-foot mast supporting the antenna of the umbrella type in about five minutes.



The receiving tuner and one-step amplifier seen from the interior of the army's latest portable wireless station

It is stated that the guaranteed range of this equipment is 100 miles, although under favorable conditions the set is expected to operate a distance of more than 150 miles.

With the Amateurs

During the recent visit of the Atlantic Squadron in New York a temporary radio station was maintained at the Hotel Ansonia, the headquarters of Admiral Fletcher and many of his officers, for their use in communicating with the vessels of the fleet. The station was established in the United States Navy League rooms, the Radio Club of America making the installation and carrying on the operation.

The equipment was of composite non-synchronous 1 k.w. type, power being supplied from a special motor-driven alternator. The station was operated under a special temporary license and was tuned to an unusual degree of sharpness, the decrement being .05. Paul F. Godley, one of the Club directors, made the installation and two operators were in constant attendance, Mr. Godley and Messrs. Sadenwater, Lemmon, Grinan and Faraon handling most of the work. All communication was with the vessels of the fleet.

Regulating the clocks of the South Side High School in Newark, N. J., was the first activity which followed the recent organization of a radio club for students of that institution. On an aerial 145 feet in length and 100 feet high the weather reports and the noon time signals are now regularly caught and recorded under the direction of Instructor Hunkins, in charge of science instruction in the school. The most recent addition to the club's equipment is a buzzer practice set, built from the description given in a recent number of THE WIRELESS AGE.

The secretary of the Connecticut Valley Radio Club, George E. Beecher, Jr., of Springfield, Mass., announces that the club membership has reached thirty, a considerable gain over the membership of eight with which the club began. An invitation is extended to all amateurs to call IZL, the station of Dean A. Lewis, vice-president and holder of a special license.

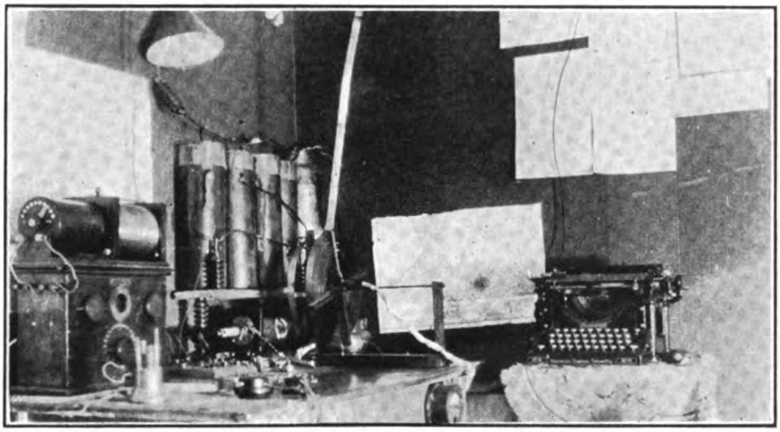
July 9 is the date set aside as the third anniversary of the organization of the Colorado Wireless Association, of Denver, Colo., which now has over eighty members and makes its headquarters in the Y. M. C. A. Building. During the summer season the sending of "time" each night at 10 o'clock by Chief Operator W. H. Smith will be discontinued, but will be resumed again in the fall and carried on throughout three seasons of the year. Special distinction, so the members believe, should be conferred upon this club for having one of the best aerials in the state, four-wire and 400 feet long, suspended at a height of 150 feet.

Organized for the purpose of co-operative instruction of members who wish to become commercial operators, the Los Angeles Radio Association reports a total of seventy members at the expiration of its seventh month of existence. Meetings are held one night each week in the Science Building of the Los Angeles High School.

The Cape May County Radio Association, of Wildwood, N. J., is a newcomer in the amateur field. Lawrence Chalmers is president and Edward Schlichting, secretary.

Clifford P. Morrison, of Yonkers, N. Y., is the owner of station 2LN, a familiar call to amateurs in the neighborhood. His equipment comprises an aerial composed of five wires, seven strand phosphor bronze, each wire insulated with high tension electrose ball insulators, and two 10 inch insulators in series on each rope; and is about 60 feet high.

For transmission 1 k.w. Clapp Eastham, type E, transformer is used, secondary voltage 12,000. This transformer is immersed in tank of oil and is seen between the two tables. The leyden jars



The efficient amateur station of Clifford P. Morrison

are copper plated, gallon size, and stand on frame, which is mounted on long electrose insulators, connections of heavy copper cable braid.

Oscillation transformer is made of one inch brass ribbon wound 8 turns in secondary and 1 turn in primary, with about four inch coupling. Large muffled spark gap is seen in the photograph directly under the leyden jars.

At a recent meeting of the Fulton Carlyle Radio Club of Cleveland, Ohio, R. P. Irvine was elected president; Myron R. Pesek, vice-president; Stanley Charek, secretary, and Stanley Green, treasurer. The club is constructing a one kilowatt station for working with distant amateur organizations.

At a meeting held April 20 in Binghamton, N. Y., "The Binghamton Progressive Radio Association" was formed. Officers elected for the first term were: President, Kenneth Kingsbury; vice-president, Wallace Dunmore; secretary, Ray H. Holmes; treasurer, Mr. Bovee. An experimental department is to be established and instructive discussions will be held.

Norfolk (Va.) has two squads of juvenile wireless operators who have acquired a degree of proficiency that is very encouraging. Four of the youths are licensed and five are not. Most of them have their own sending and receiving sets. Edward Sampson, one of the licensed operators has received messages from Pensacola, Fla., and Arlington.

The licensed operators are: George Boughman, Albert Le Faucheur, and Jack Walthall, York street.

A new organization, the Radio Club, has been formed at the Boys' Branch of the Bedford Y. M. C. A., 420 Gates avenue, Brooklyn, N. Y., by John H. Diemer, boys' dicertor.

"The purpose of the club," said Mr. Diemer, "is to get the boys of the Bedford district interested in wireless telegraphy. There are many youngsters who would like to study wireless, but have not the appliances. We have installed a complete set of instruments."

The officers of the Radio Club are: Harold E. Perry, president; Samuel Hammond, vice-president, and J. Kenneth Mitchell, secretary. The charter members include E. Carlson, Samuel T. Hammond, Clifford H. Bowie, Harold Perry, John Wilson, George J. Knight, J. K. Mitchell, E. Perry, Harold Hamlin, Charles Rupprecht, Lewis Dorsch, Robert Dorsch, Earle Morris and Kenneth Lane.

Thirteen new members were initiated at a meeting of the Connecticut Valley Radio Club held in Springfield, Mass., recently. The club is conducting a membership campaign, under the direction of George W. Beecher, its secretary.

The Year Book for 1915

DOES an article on "The Influence of Wireless Telegraphy on Modern Strategy" written by an expert appeal to you? Are you interested in the progress of wireless telephony? Do you feel that you ought to have a thorough knowledge of the International Radio Telegraphic Convention? Would lists of the wireless telegraph stations of the world with their call letters be of value to you? Are you interested in the proceeding of the London International Conference on Safety of Life at Sea? These subjects and a host of others are exhaustively treated in "The Year Book of Wireless Telegraphy and Telephony" for 1915, published by the Marconi Publishing Corporation, 450 Fourth avenue, New York.

This volume should have a place on the book shelf of every person interested in wireless. The information which it contains has been carefully selected with the aim of placing within reach of the reader all that is essential pertaining to the subject. A glance over the pages of the book will show that the ambitions of its editor have been realized, for it fairly bristles with facts and figures pertinent to the art.

"The Record of the Development of Wireless Telegraphy," which fills eighteen pages, covers a period extending from 1831, when Michael Faraday made his discovery of electro-magnetic induction between two entirely separate circuits, to the present time.

"The record of progress and development in wireless telegraphy and telephony for 1914 stops abruptly with the outbreak of the European conflict," says the concluding paragraph of this feature. "This was only to be expected, for in both neutral and belligerent countries research work on a large scale has been postponed and international cooperation in scientific investigation is almost at a standstill. The war service work now engages the whole of the attention of those who in peace time would be engaged in progressive work, both scientific and commercial. It is common knowledge that extensive use is being made of wireless telegraphy in the present struggle and no doubt such wide practical application of the new science under the most varied conditions will result in the collection of a great volume of data leading up to important progress after the close of the mighty conflict, when opportunities will again be afforded for peaceful pursuits and scientific research."

The experiments in wireless telephony made by Mr. Marconi in March, 1914, when he joined one of the Italian war vessels attached to the squadron commanded by the Duke of the Abruzzi are referred to as follows:

"Experiments in wireless telephony were carried out between several vessels lying at anchor one kilometer apart, ordinary receivers being used with great success. At night wireless telegraphic signals were received from Glace Bay, Canada, over a distance of 6,500 km. (4,062 miles).

"The wireless telephone experiments were continued between two warships on the high seas, and the reception was consistently perfect over a distance of 30 km. On the fourth and last days successful wireless telephone experiments were carried out, communications being effected using only very limited energy between vessels on the high seas 70 km. (45 miles) apart. These experiments were repeated between two vessels situated at a distance of about 20 km. (16 miles), where land interfered between the communicating vessels, and in this case again excellent results were obtained. On this day radio-telephonic communication was constantly maintained for twelve hours, and the continuous working of the apparatus did not cause the slightest inconvenience."

The laws and regulating of wireless are fully set forth in the articles of the International Radiotelegraphic Convention. An appendix containing abbreviations follows them.

In connection with the list of wireless stations published it is announced that, "The tables of land and ship stations should be consulted in connection with the map of wireless telegraph stations of the world inserted at the end of this book. The stations have been grouped together under the names of the countries in which they are established, and these countries have been arranged in alphabetical order, therefore no difficulty is likely to be experienced in locating any particular station.

"The call letters of every station are given. Recently, however, the International Bureau has alloted a revised list of combinations and call letters to signatories of the Convention, and on page 517 is published a list showing the call letters which have been reserved for the exclusive use of the respective countries.

"An alphabetical list appears on pages 518 to 559 which contains call letters for all stations (land and ship) together with the number of the page whereon particulars of each station are to be obtained.

"Stations which are of a private or experimental character do not figure in the lists, except where the information available has been such as to justify their inclusion."

Trans-oceanic communication in connection with the European war is touched upon in an article entitled, "Long Distance Services."

"To those of us who can realize the fact that radiotelegraphy is yet in its infancy the present situation is full of significance," declares the article. "The Austro-German Allies, but for the fact that they possess certain high power long distance wireless stations, would be entirely cut off from the rest of the world. This means that the two central European Powers would be unable to send out orders or give or receive intelligence of any kind whatever, except through neutral countries whose cable communication is almost entirely under British control. Germany has always been conscious of her disability in this respect and for many years past has spent her money lavishly in laying German cables—only to see them cut by the British within forty-eight hours of the declaration of war.

"After the cutting of the cables the German long distance wireless stations abroad were able to maintain service which was found particularly useful by their rulers in the Fatherland. The next move in the British assault upon German communications consisted in the destruction, one by one, of many of their high power wireless stations. The detrimental effect upon Germany of the British successes in this respect cannot be better demonstrated than by the following extract from an official communiqué issued at the beginning of 1915 by the German Colonial Office. It reads as follows:

" 'Soon after the outbreak of war all communication by the Colonies by sea was broken, and all German submarine cables were cut by the British, so that even telegraphic communication with the whole of our colonies was rendered impossible. The only remaining means of communication was wireless telegraphy, but the first warlike measures of the British were directed to depriving us of this means also. On August 12th fell the wireless station Yap, and soon afterward the station Naru (both in the Pacific Ocean). Tasigata (Samoa) fell on August 29th, and Bitapaka, in New Pomerania, on September 12th. During the night of August 24th the great station at Kamina, in Togoland, had to be destroyed by us in order to prevent its capture.

" 'So vanished all possibility of further direct communication with the African protectorates, which hitherto had been able to communicate via Kamina. As a matter of fact, there had been from the very beginning a disturbance of the system, which prevented us from receiving any reports from the governor of East Africa after the outbreak of war. And so the material which we have collected and which in the main reached Berlin by circuitous routes and very late, is mostly derived from private letters or from enemy newspapers and must necessarily remain fragmentary and some of it must be regarded as untrustworthy.'

"At present the high power stations in Germany cannot be got by the Allied forces, and these now form the sole direct link between the Austro-German authorities and the world outside their immediate neighborhood. . . .

"So much for the lesson of the utility of Government wireless stations in the hour of national need as exemplified. . . . Is it too much to hope that, now long-distance wireless is daily proving its powers in warfare, the re-establishment of peace will bring once more to the fore the final consummation of the Imperial wireless chain which was occupying so much attention before the war started?"

"The Function of the Earth in Radiotelegraphy," by Dr. J. A. Fleming; "International Radiotelegraphic Research During 1914," by Dr. W. H. Eccles; "Wireless and War at Sea," by Archibald Hurd; "The Influence of Wireless Telegraphy on Modern Strategy," by Colonel F. N. Maude; "Some Applications of Radiotelegraphy," by A. H. Morse; "The Application of Wireless Telegraphy to Meteorology," by R. G. K. Lempfert, and "Wireless Telegraphy in Survey," by A. R. Hinks, F. R. S., are other attractive features of the book. Thirty-two illustrations add variety to the pages. The book, handsomely bound in buckram, contains about forty pages more than the volume issued for 1914. The price is $1.50.

BOOK REVIEWS

HOW TO MAKE A TRANSFORMER FOR LOW PRESSURES.

DIRECTIONS FOR DESIGNING, MAKING AND OPERATING HIGH-PRESSURE TRANSFORMERS.

These two pamphlets have been written in easily understandable English by Prof. F. E. Austin, of the Thayer School of Engineering, Dartmouth College. The first deals with the construction and operation of a small "step-down" transformer for experimental purposes which may be connected with any house circuit witn 110 volt current or less, and 60 cycle frequency. The transformer described is rated as one of 100 watts, but actual testing of a transformer made by students under the directions proved that it would transform considerably more power without heating. The directions are unusually explicit and should be perfectly clear to the novice. Price 25 cents, from the Book Department, The Wireless Age.

The second pamphlet deals in the same comprehensive manner with a "step-up" transformer for house mains, to step-up pressure to 5,000 or 10,000 volts, or more. There are numerous illustrations of the actual apparatus used in the construction and considerable technical information of value to both novice and advanced experimenter. Price, 50 cents, from the Book Department, The Wireless Age.

THE CENTRAL RADIO ASSOCIATION BLUE BOOK. *Published by the Central Radio Association.*

The cover of the book states that it is a station call directory and ready reference book of wanted facts. The volume contains a list of stations of all of the members of the Association which cover nearly thirty states. The call letters, sending power, make of transformer or coil used, transmitting distance and other interesting data of every station are given.

In addition to the list of members, the call letters of several hundred amateurs who hold government licenses and have not yet become members of the association are given. Other information includes a full explanation of the government time signals and weather forecast code, an illustrated article on the construction and operation of the audion detector and audion amplifier, a list of all of the principal government land and naval stations and their call letters, the abbreviations authorized by the International Radiotelegraphic Convention, as well as a list of the abbreviations in general use. One page has been devoted to a key to the station calls of the world, enabling operators to locate the origin of any official call.

The book will be mailed to any one upon receipt of the price, 50 cents.

The Rescue of The Lusitania's Operators

Details of the Manner in which Leith and McCormick Escaped Death. Other War Incidents

ADDITIONAL details of the destruction of the Lusitania by a German submarine show that Robert Leith, the senior operator on the vessel, had gone to luncheon in the saloon when the ship was torpedoed, his assistant, David C. McCormick, being in the wireless cabin. When Leith sat down at the table a woman on his left remarked that he was late and would not get any luncheon. She had hardly spoken when the Lusitania was struck by the torpedo. Leith hurried to the wireless room where he found that McCormick had made preparations to send the S O S. The appeal was flashed immediately, the Marconi men remaining in the cabin to operate the set till they could be of no further aid in summoning assistance.

Leith and McCormick did not see each other from the time they left the ship till they had reached Queenstown. Leith jumped into a life-boat which had been launched, but was partly submerged. He made his way with others into another boat which was fastened to the derricks of the Lusitiana by ropes. These, Leith said were severed by a pocket knife in the hands of Collis, an American passenger, the action of the latter preventing the boat and its occupants from being dragged down with the steamship. Leith was picked up by the fishing smack Wanderer and taken ashore.

A dull heavy thud gave warning to McCormick that the Lusitania had been torpedoed. Following the explosion, he said, several articles about the wireless cabin came clattering to the floor. Beyond the period when the Lusitania had listed so that members of the ship's company were able to walk down her starboard side into the water, McCormick's recollections of what occurred are not clear. He recalls, however, clinging to a collapsible boat after he had successfully fought against being carried under the waters by the suction due to the sinking of the Lusitania. He was rescued by a torpedo boat.

Leith is about thirty years old. He has been detailed on various vessels, including the Aquitania, Oceanic, Celtic, Caronia, Franconia, Adriatic and Baltic. He was at one time employed as a telegrapher on the London and Northwestern Railway.

McCormick's home is in Glasgow. Before he entered the Marconi service he was employed in an attorney's office. He is twenty years old and has been detailed on the Ionian, Colonian, Landon Hall and Warwickshire.

According to London correspondents, Mrs. Inez Milholland Boissevain on June 2 gave an interview to the press in which she said the American liner St. Paul was chased as far as the Mersey River by a German submarine. She said the chase ended on the night of May 29, only when British torpedo boats came to the rescue. Mrs. Bossevain stated that the captain of the St. Paul told her and Guglielmo Marconi about the chase when they got off the St. Paul at Liverpool.

The statement disclosed that Mr. Marconi received a warning from the Italian Consul before he left New York that an attempt might be made by the Germans to stop the St. Paul and take him off. For this reason his name was kept off the passenger list and every endeavor was made to prevent the inventor's presence on the vessel from becoming known.

"Mr. Marconi removed all the labels from his luggage, gave his private papers into my care and got into clothes suitable for slipping into a hiding place somewhere down in the bowels of the ship," said Mrs. Boissevain, describing the adventure.

"That night we had a concert at which Mr. Marconi was to preside and the programmes were inadvertently printed with his name as chairman. The captain ordered all programmes destroyed, and when the concert began it was announced that Mr. Marconi was to have presided, but that he was unfortunately not aboard the vessel. And Mr. Marconi was right there at the time and every one knew it.

"We had quite a lot of children aboard—the sons and daughters of Canadian officers going over with their mothers to join the army quartered in England. We saw two trawlers and the children tried very hard to persuade Mr. Marconi to hide.

"Late in the day, before we reached the war zone, we heard of the Nebraskan's experience, and then the captain sent this wireless to Queenstown: 'In view of recent events, don't you think you had better keep your eye on us?'

"This answer came back to us: 'Full speed ahead. Alter your course as much as possible. Submarines watching bar.'"

Officials of the American line in New York stated they had received no word from their London agents regarding the reported chasing of their ship, the St. Paul, by a submarine up the Mersey River. They refused to comment on the report until they receive definite information as to the facts.

A dispatch from London says that the American cargo ship Nebraskan, owned by the American-Hawaiian Line, bound for the United States in ballast and flying the American flag, was torpedoed, in all likelihood, about fifty miles west of Fastnet on the southwest coast of Ireland on May 25. Her captain, J. S. Green, of San Francisco, in wireless reports states that he may have struck a floating mine, but naval authorities question the probability of a ship encountering a mine fifty miles from land and remote from any mine fields. The Nebraskan was not sunk.

As soon as the vessel was struck all hands were ordered to abandon the ship. Officers and crew took to the boats and pulled away, expecting that the vessel would go to the bottom in a few minutes.

When it became apparent that the Nebraskan's bulkheads were holding the crew went aboard again. An examination showed that only the lower holds had admitted water.

The Nebraskan is an oil burning steamer and her fuel supply was intact. Captain Green managed to head her around and started for the English Channel, sending out S O S signals, which brought aid.

A report issued by Admiral Thaon di Revel, chief of the Italian naval staff, shows that Austrian wireless messages are intercepted regularly by the Italians, says a special dispatch from Rome. The Italians have been enabled to obtain this information which is of immense military value, by the use of a new device invented by Guglielmo Marconi.

In a dispatch from Paris it is related that the president and members of the Russian Duma recently sent a wireless message to the French Chamber of Deputies from the new station erected in Russia expressing confidence in the victory of the Allies. President Deschanel of the Chamber of Deputies responded with a message of thanks.

Windmill-Driven Generator for Aero Sets

Photograph showing the device in operation

THE novel windmill driven generator for aeroplane wireless service developed by L. J. Lesh promises to solve some of the problems in the equipment of aeroplanes with power sets. The simple expedient of belting the generator direct to the gasoline engine has long since been found impracticable for the wireless set becomes inoperative when the motive power gives out. Engine trouble or exhaustion of gasoline while the aviator is over the ocean would present a very definite need for a call for help just when the set could not be worked. Thus far storage batteries have been found too heavy for satisfaction to the fliers so the windmill generator should prove extremely useful.

Taking into account that the aviator must always maintain considerable forward velocity, Mr. Lesh turned naturally to securing power from the speed of the aeroplane and made his first windmill experiments with an automobile. The fan was belted to the generator, a 500-cycle machine with direct connected exciter. At a speed of 50 miles per hour the fan rotated at 1,000 r. p. m., and the generator at 4,000 r. p. m. Ammeter, voltmeter and tachometer were arranged so as to give complete data on the tests. Readings were taken at speeds from 30 to 65 miles per hour and the results were very interesting.

It was learned that power developed increased with the speed but reached a maximum limit at about 60 miles an hour. Just what happens then has been a question, but it was definitely established that between the speeds of 55 and 65 miles per hour there is a comparatively small variation of power developed. A like phenomenon was observed in experiments with propellers at high speeds. The blades get in each other's way and fail to take a proper grip on the air.

The generator developed a full ¾ kilowatt at 60 miles per hour, although designed for but ¼ kilowatt. Excellent cooling made it possible to work with considerable overload. The aerofan is similar in construction to a bicycle wheel, a steel rim being used with steel spokes in tension and aluminum blades annealed and creased around the spokes and ball bearings in the hub.

A wireless key was interposed in the electrical circuit and experiments were made in taking a load on and off the generator. Resistance in the form of a bank of lamps was cut in and out, as in transmitting messages, with no apparent effect on the speed of the generator These trials having proven automatic speed regulation to be inherent in the fan and that ample power was developed for wireless, the apparatus was transported from New York City to Hammondsport and installed in a regular Curtiss hydroaeroplane.

The Lesh aerofan was clamped to the frame of the machine in such a way that it could be raised and lowered to adjust the belt passing through aluminum tubes to the generator situated beneath the seats. The object of the tubes was to prevent the belt from being blown off the rim of the fan. A tachometer gives a direct indication of its speed of rotation. The transmitting set, consisting of ¼ kilowatt, quenched gap, transformer, helix and condensers was placed aft. The adjustment of the wireless apparatus was calculated beforehand and the only wave regulation used was obtained by raising and lowering the antennæ. The latter was manipulated by means of the hand reel shown in the photograph and was adjusted until the maximum radiation was indicated by an ammeter placed in the antennæ circuit.

The key, which was strapped to the operator's knee, had two contacts, one of which put the generator in series with the transmitting set, while the other connected it to an artificial resistance of the same value as the set. As one or the other of these was always in circuit, the load on the generator was fairly constant and the fan did not "race."

No attempt was made to break long distance transmission records, the object of the experiments being primarily to determine the efficiency of the aerofan. It is stated that the results obtained were entirely satisfactory, messages being transmitted to the land station from the aeroplane at a considerable height and on volplane as well as on straight away flight.

MARCONI MESSENGER IN UNIFORM

Dressed in a suit of gray with crimson trimmings and brass buttons, the first uniformed messenger of the Marconi Wireless Telegraph Company of America has made his appearance in New York City. On his collar are gold-plated emblems representing electric waves and the name "Marconi," the latter being lettered in red. He carries a red leather pouch in which to safeguard messages.

NEW STATION AT PORT OF SPAIN

The new five k.w. Marconi station at Port of Spain has a guaranteed daylight range of 350 nautical miles and communication has frequently taken place at night as far as 1,500 miles. It is always possible to communicate during the day with the Curacao station, which is about 500 miles away. A station has been built at Toco, near Point Galera, which facilitates the means of sending information of shipping to Port of Spain.

IN THE SERVICE

Charles J. Ross, auditor of the Marconi Wireless Telegraph Company of America, has been familiar with short cuts—one of the watch words in efficiency methods—since he was a school boy. Even then he showed a tendency to conquer problems in arithmetic by means of a process of mental gymnastics which enabled him to obtain accurate results without useless expenditure of time or effort. Today finds him solving problems in business in much the same manner in which he overcame difficulties in school.

Born in Brighton, Ohio, Ross was educated in the public schools of Cleveland. Then, like others in the Marconi service, he chose a telegraph office in which to gain his initial experience as a wage earner. He was sixteen years old when he entered the employ of the Postal Telegraph-Cable Company in Cleveland as a messenger, afterwards becoming in turn checker, delivery clerk, receiving clerk and operator.

The Cleveland Telephone Company offered excellent opportunities in its service to young men of Ross' caliber about this time and he left the Postal company to join the telephone company as a line inspector. Promotion eventually placed him in the chair of the manager of the main exchange. Many vexed questions confronted him in discharging the duties of this office, one of his problems having to do with the delay of operators in answering calls. In order to determine the cause of the trouble he was compelled to reckon the average time consumed by each operator in responding to signals and compare these figures with averages obtained in a similar manner in other exchanges. The figuring involved fractions of seconds, but when it was completed Ross knew exactly where the defects in the system were and how to remedy them.

He came to New York in 1901 to become auditor and accountant in a large department store. The next five years he spent in department store work, being employed by Simpson-Crawford Company, O'Neill Adams Company and Chapman & Co. During this period he was engaged not only in figuring statistics and striking averages, but in studying men and methods of fitting them to their work.

Public accounting attracted him as a vocation in 1907 and he became connected with the Audit Company of New York. He remained in the employ of this company for several years, acting as auditor, supervisor of business systems and bank examiner. He was afterwards employed by Arthur Young & Co., of New York, accountants and auditors, becoming chief accountant and supervisor of business systems. He left this firm on June 1 to enter the service of the Marconi Company.

As a public accountant he has audited and systematized more than 100 corporations. These include the International Agricultural Corporation, the Indian Refining Company, the Newport News & Old Point Comfort Street Railway Company and subsidiary companies, the American Cement Company, the Granby Consolidated Mining, Milling and Smelting Company, the Western Savings Fund Society of Philadelphia, the First National Bank of Baltimore, Gimbel Brothers of Philadelphia, Simpson-Crawford Co., Moore & Schley, Dick Brothers & Co., Finley, Barrell & Co., brokers, of New York; the National Light, Heat and Power Company, and the United Textile Corporation. The extent of this work can be better realized when it is understood that each corporation requires a different auditing system and separate systematizing methods.

Whistles to his friends in the Continental code

The Evolution of an Operator

By H. A. Eveleth

IT was in an embryonic state of mind and a number of years ago that I visited a friend and first viewed a toy electric train. Then and there I caught the fever. On my way home I determined to experiment on my own hook.

The first experiment consisted of ringing an electric door bell. I had the bell but lacked the current with which to ring it. The construction of a suitable cell was attempted and this was accomplished after considerable labor and many references to the intricacies of the regular door bell battery. But in setting the cell down on the floor, gravity got the better of my hand and the jar was cracked and the cell made useless; incidentally, too, the plaster on the parlor ceiling below was partially tinted.

But that bell had to ring, so another method of procedure was followed. The house was wired for electric lights, and in the room where the experiment was being conducted was located the cut-out box and main switch. Certainly, here was enough current to ring the bell!

One of its terminals was carefully connected to one arm of the switch. Another wire was connected to the other terminal of the bell, and, holding the free end of this wire in my hand, I cautiously touched it to the second arm of the switch. The bell rang—for a second—then it jumped into the air amidst a cloud of smoke.

That evening I studied by the light of an oil lamp; the next day an electrician came around and replaced a blown fuse. Thereafter the electric light mains were treated with due respect.

During the next year much apparatus was constructed. Junk would be a better name for it. Everything from a magnet to a cent-in-the-slot shocking-machine had its place. A telegraph system was rigged up with the next door neighbor's son, and communication carried on at a three-word-per-minute rate. Until the operators at both ends of the line became more or less proficient in their work, about eighty per cent. of the communication was accomplished by means of the vocal chords.

The construction of an electric furnace

to be operated by the "110" was next attempted. Resistance was somewhat scarce around the "laboratory" in those days, and before a satisfactory arc was obtained seventeen fuses were brought to grief.

Then came the wireless fever. It was a severe case, followed by long convalescence. That first receiving set was a wonder! It consisted of two carbon blocks, across which rested a knitting needle, a telephone receiver and a battery, and an aerial consisting of a few wires strung up in the attic. Ten minutes after it was completed the "110" was accidentally grounded through the receiver. The remains were laid away the next day.

The second set was a great improvement. It included instruments by means of which incoming signals could be tuned in or out. The back lawn was adorned with aerial wires, and a ground switch was installed to take care of Old Jove. After two weeks of failure the set actually worked, and the thrill of joy which the first signal caused will never be forgotten!

The apparatus was complete but it lacked an operator. During the following months many nights were spent endeavoring to master the code; this accomplished, the practical side of the art was partly learned.

A transmitter was then added to the equipment; it consisted of a spark coil connected to aerial "direct." Imagine the decrement, you radio inspectors, who since have spoiled the happy days when interference was at a maximum.

By this time I had acquired the aspects of a full-fledged "ham," which, as everyone knows, is the most dangerous stage of the fever. It is the period during which the amateur sees aerials hanging from every tree, whistles to his friends in Continental code, dreams of wireless and fails in his lessons. Every amateur passes through this stage . . . and thereafter treats the subject in a more practical and scientific manner.

When I had passed safely, the construction of more up-to-date and more powerful apparatus was attempted. A transformer was installed, operated by the "110." Trouble now came in plenty! The induction from the aerial affected the telephones round about. Every time the set was operated most of the telephones in the neighborhood were put out of commission. After a searching investigation the telephone company remedied the trouble.

Whenever the transformer was operated the electric lights "blinked" all over the neighborhood. Thus a pleasant conference with the electric light company was afforded. The neighbors, of course, held me in high esteem by this time!

As time went on improvements were constantly made, additional knowledge gained and—well, the trials and tribulations in the evolution of one self-created operator have ended with experience's knowledge.

ARGENTINE REGULATIONS

The regulations prepared by the Argentine Ministry of Marine for the wireless telegraph service, have been published by the Boletin Official (Buenos Aires). Merchant vessels carrying fifty or more persons on board must, unless they are specifically exempted, be provided from the time they are put into commission with wireless telegraph installations. A similar rule applies to all craft leaving or entering ports of the country. The equipment must have at all times a minimum transmitting power of 200 kilometers (124 miles) in the case of river vessels, and 500 kilometers (310 miles) in the case of seagoing vessels.

For administration purposes in connection with the wireless service the republic has been divided into two zones, maritime and land. The maritime zone comprises all stations working territorial waters and on navigable rivers, as well as those on land installed within 100 kilometers of the coast and the River Plate and fifty kilometers of the banks of the other navigable rivers; the land zone includes all other stations.

The Japanese Telegraph Administration has announced that the coast stations at Choshi, Fukkikaku and Dairenwan will send messages to ships at sea regarding typhoons reported by the Central Meteorological Office at Tokio.

From and For those who help themselves

Experimenters' Experiences.

The editor of this department will give preferential attention to contributions from amateurs covering the design of transmitting sets, wave-meters, etc. There is an over-supply of material on receiving tuners, particularly "loose-couplers," the designs for the majority of which present nothing new or original.

FIRST PRIZE, TEN DOLLARS
Design for a Receiving Tuner of the Panel Board Type

Receiving apparatus of the panel board type of construction is rapidly displacing the usual design where the complete apparatus represents several isolated and individual units. Believing that many of your readers will be interested in the construction of a set of this type I herewith present the details of a suggested design. All adjustments connected with the variable features of this apparatus are made from the outside of the box by conveniently placed handles or knobs. The panel board itself is made of polished hard rubber, while the entire apparatus is contained in a case of hard wood.

The component parts of the complete set are placed as follows: Referring to the drawing of the front elevation, the primary tuning condenser is placed in the upper left hand corner, while directly underneath it is placed the tap-off switch for variation of inductance in the primary winding. The variable condenser for the secondary winding is placed in the upper right hand corner and directly underneath it the variable switch for the inductance values of the secondary winding. The former switch has 20 points and was especially designed to minimize troubles due to poor contact.

At No. 1 in the drawing a brass sector is indicated which is used to make connection with the contact lever. The contact lever is made of phosphor bronze, one end being bent at right angles to the contact point so as to make a knife edge contact which, as is well known, does not allow dust to collect on the contact point. The knob and lever which control the coupling between the primary and secondary winding are also shown mounted at the lower right hand corner of the drawing. Here No. 3 is the lever which moves the secondary coil in and out, while No. 2 is a brass sector. No. 4 is an arm which connects the primary coil with the lever. No. 5 is a coupling control handle; No. 6 is the secondary tuning switch handle, while No. 7 is a brass bracket for holding shaft. No. 8 and 8′ are brackets that hold the rod upon which the primary and secondary tuning inductance is mounted. The secondary coil also moves on this knob.

The primary winding of the tuning inductance is 4 inches in diameter wound closely with No. 24 D. C. C. wire. The diameter of the secondary winding is slightly less. It is 4 inches in length and is wound with No. 32 D. C. C. wire. There are 20 values of inductance taken from the primary coil and 6 from the secondary coil.

The detector is placed in the center of the panel board, the design being much similar to that which appeared in my article in the March, 1914, issue of THE WIRELESS AGE. The mineral cup can be rotated so as to enable the operator to adjust the detector.

The stopping condenser was purchased from a dealer in wireless telegraph apparatus.

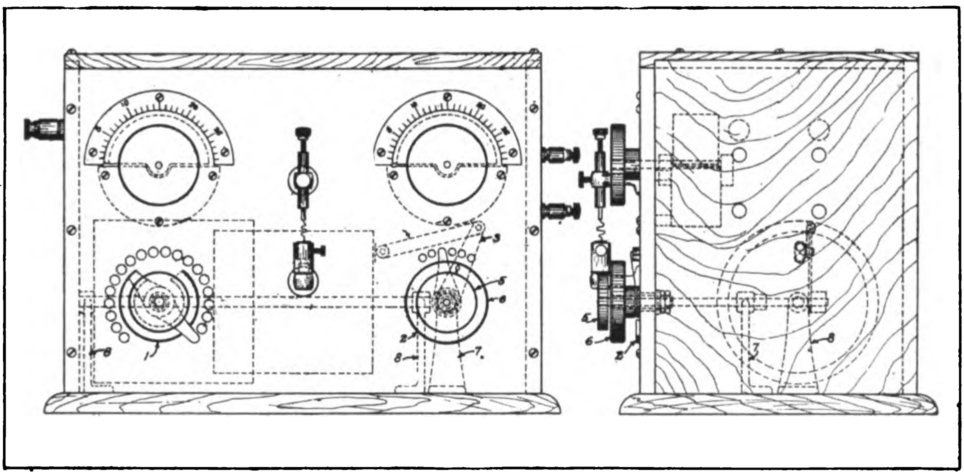
The binding posts for the earth and the aerial connections are placed on the right hand end of the cabinet. On the left hand end are the terminals for the telephone receiver.

The receiver is designed to work on wave-lengths up to 2,500 meters which are easily obtained by using the two variable condensers which, as stated before, are shunted across the primary and secondary windings.

No attempt has been made to give dimensions in connection with this set, but it is suggested that the scale notation given at the foot of the drawing be used, if possible.

If the builder desires this equipment to present an extremely neat appearance he should construct the box of mahogany. I have designed a set similar to this and have been commended several times for the high degree of efficiency obtained.

RALPH HOAGLAND, *Massachusetts.*



Drawing, First Prize Article

SECOND PRIZE, FIVE DOLLARS

Ajax Rotary Spark Gap

I recently designed a small rotary spark gap for use with an Ajax battery motor which I thought would be of interest to your amateur readers. A top view of the complete outfit is shown in Fig. 5, a side elevation in Fig. 4, and a front elevation in Fig. 6. The constructional details are given in Figs. 1, 2 and 3 which should be sufficiently clear to require no detailed explanation. It will be observed that the disc for the gap is 3¼ inches in diameter and has 12 discharge points. It is made of aluminum which is an important consideration when used in connection with a small motor. The disc is ⅜ of an inch in diameter. The stationary electrodes for the disc are mounted in a specially designed binding post with a 1-16 of an inch slot, as shown in Fig. 3. The disc is mounted on the shaft by means of an insulating collar turned from a circular piece of hard rubber. The remaining details will be quite clear from the drawing.

Instead of operating the motor by means of dry cells, I constructed a special step-down transformer which gave about 12 volts in the secondary winding from a 110-volt source of supply. I connected in series with the 12-volt circuit a resistance coil to regulate the speed. This coil of resistance was

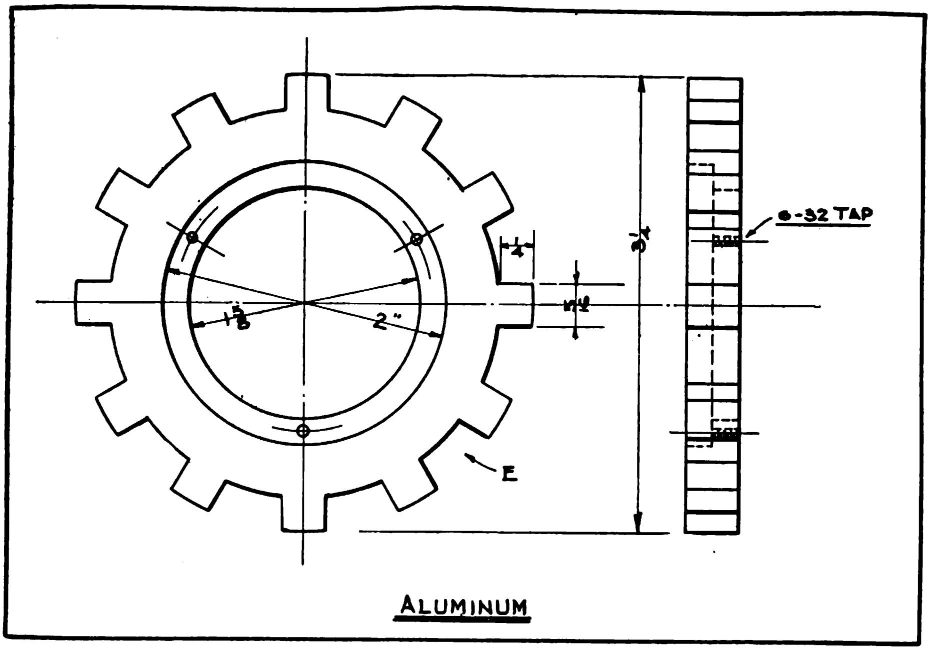


Fig. 1, Second Prize Article

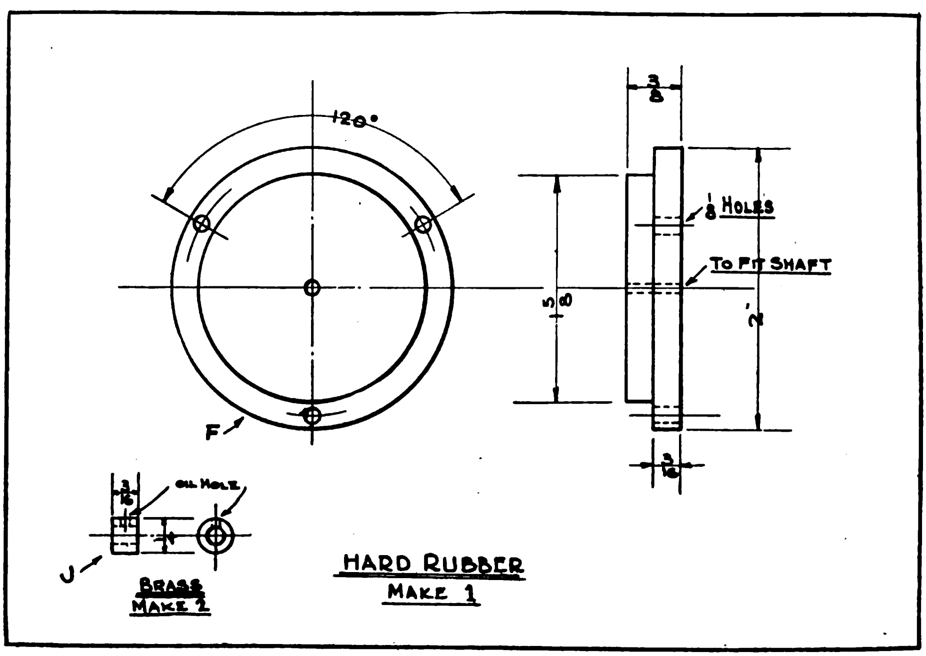


Fig. 2, Second Prize Article

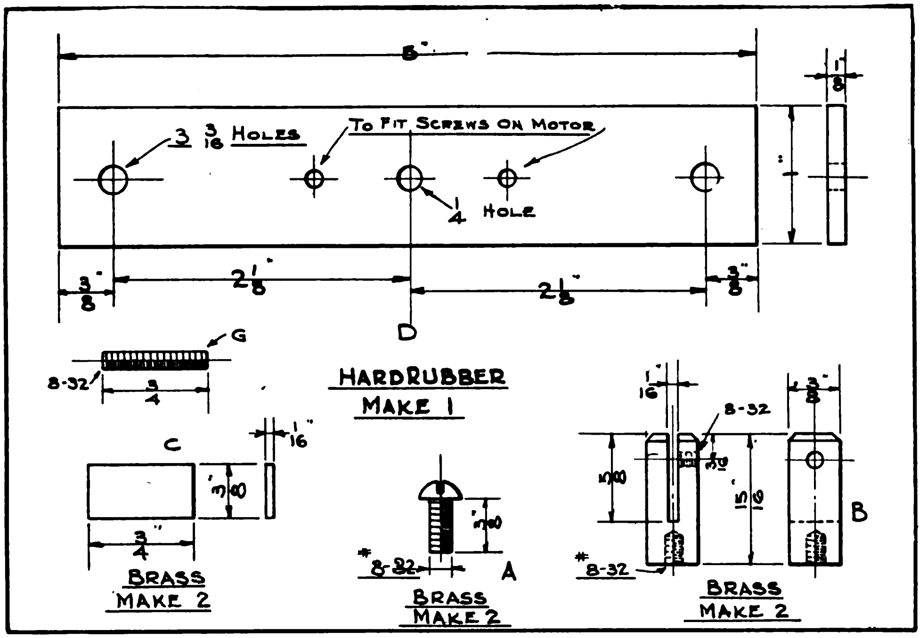


Fig. 3, Second Prize Article

wound on a tube ½ inch in diameter by 9 inches in length and comprised two layers of No. 18 magnet wire. Inside the tube I placed an iron core which was so constructed that it could be drawn in or out, thereby regulating the current flow. In this manner the speed of the motor is definitely controlled.

I find from my experience that the motor can be run continuously for half an hour before heating appreciably, so that for the average amateur's work it will be found entirely satisfactory. The one I constructed has been in use continuously for six months and is still giving satisfactory service. I use this rotary gap in connection with a ½ k.w. transformer.

O. Cote, *Rhode Island.*

THIRD PRIZE, THREE DOLLARS
A Box Kite for Portable Wireless Telegraph Sets

An interesting diversion from the general run of amateur experiments is to suspend an aerial at a considerable height by means of box kites. By proper design a kite may be constructed that will hold into space an aerial of aluminum wire having a length of from 600 to 1,000 feet. The approved plan is to send the kite to a height of from 2,000 to 3,000 feet, the kite being held into space the first 2,000 feet by the regular kite flying cord, the remaining 1,000 feet consisting of aluminum, copper or finely stranded steel wire.

For the readers of The Wireless Age

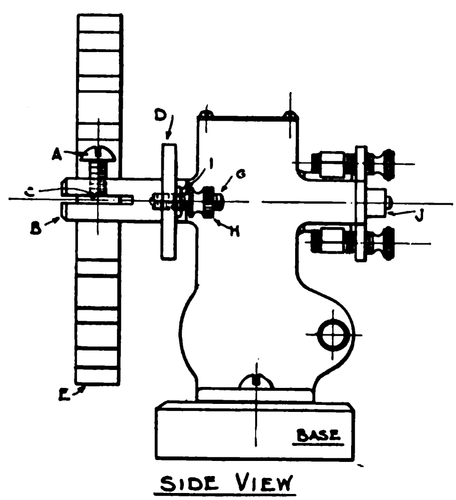


Fig. 4, Second Prize Article

who wish to engage in this form of experiment I have drawn a design of a box kite which has been thoroughly tested. Referring to the drawing: The sticks for the frame should be made of

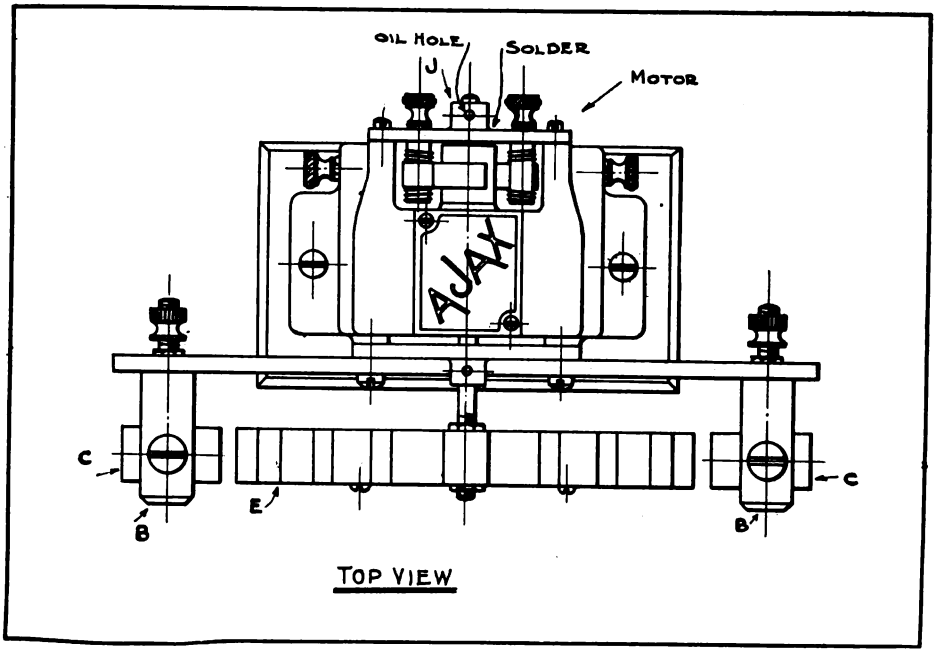


Fig. 5, Second Prize Article

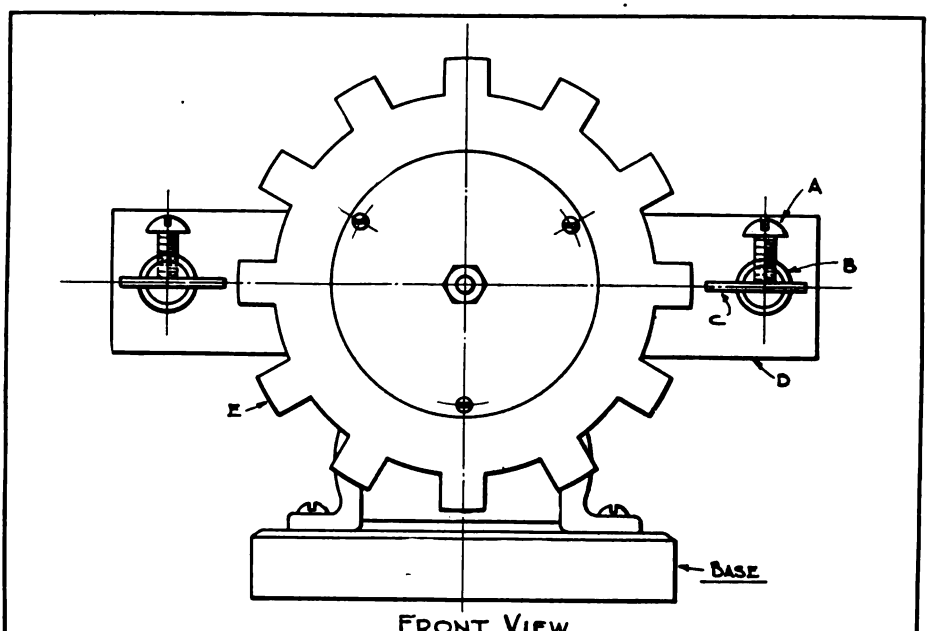


Fig. 6, Second Prize Article

LIST OF PARTS—SECOND PRIZE ARTICLE

Make 2 as shown at A in Fig. 3 Brass.
Make 2 as shown at B in Fig. 3 Brass.
Make 2 as shown at C in Fig. 3 Brass.
Make 1 as shown at D in Fig. 3 Hard Rubber.
Make 1 as shown at E in Fig. 1 Aluminum.
Make 1 as shown at F in Fig. 2 Hard Rubber.
Make 2 as shown at G in Fig. 3 Brass.
Make 2 as shown at H in Fig. 4 Brass.
Make 2 as shown at I in Fig. 4 Brass.
Make 1 Base to suit.
2 6-32 Rd. Hd. Br. Mach. Scs.
2 6-32 Hex. Br. Nuts and 2 Washers.
Make 2 as shown at J in Figs. 2 and 4.
Make 1 New Shaft 3 inches long.

straight grained wood which may be of spruce, basswood, maple wood or pine. The longitudinal corner spines, A, A, should be 3/8 of an inch square and 72 inches in length. The 4 struts should be 3/8 of an inch by 1/2 inch and about 41 inches in length.

Two cloth bands should be made to exact dimensions. The ends of the bands should be lapped at least 1 inch and served double to give extra strength. There are several kinds of kite cloth which may be used for this purpose, among which may be mentioned lonsdale, nainsook, cambric, or light percaline.

The four struts (b) should be cut a little over dimensions so that they will be slightly bowed when in position. This will hold the cloth taut and flat. They should be tied together at the points of intersection and the ends should be tied with coarse, waxed thread shown at (c) to prevent splitting.

The small guards (k) are glued to the longitudinal sticks to prevent the struts from slipping out of place. The ends of the struts, if desired, may be fastened to the longitudinal strips, but if made as described the kite may be readily disassembled and rolled up. The bridle for the kite is represented at e, f and g.

A box kite of this construction is particularly suited for flying in heavy wind and by using several kites in tandem an aerial of any dimensions desired may be raised into space. For receiving signals from the very high power stations the antenna should be from 1,000 to 1,500 feet in length, but for ordinary receiving work from commercial stations the aerial need not be more than 400 to 500 feet in length.

ROY THACKER, *California.*

FOURTH PRIZE, SUBSCRIPTION TO THE WIRELESS AGE

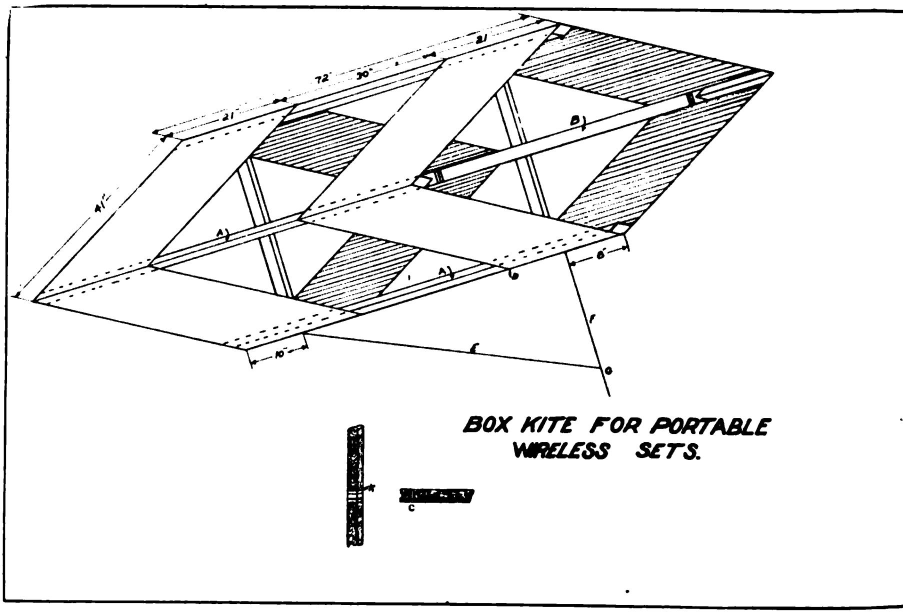
An Oscillation Transformer

After considerable experimenting with various types of oscillation transformers, I have finally designed one which I find gives a marked degree of efficiency. I consider my design particularly suited to amateur workers as it is not very complicated and easy of construction.

To comply with the government regulations the sending set must emit a feebly damped wave. To produce a wave of the desired characteristic an oscillation transformer of the inductively coupled type is preferable. With my design a wave of the desired sharpness may be readily obtained on account of the fact that the secondary winding can be drawn in or out of the primary winding to any distance desired.

The primary and secondary windings are wound parallel to each other, the primary winding being made of No. 10 spring brass wire and the secondary winding of No. 8 spring brass wire.

The details of construction are as fol-



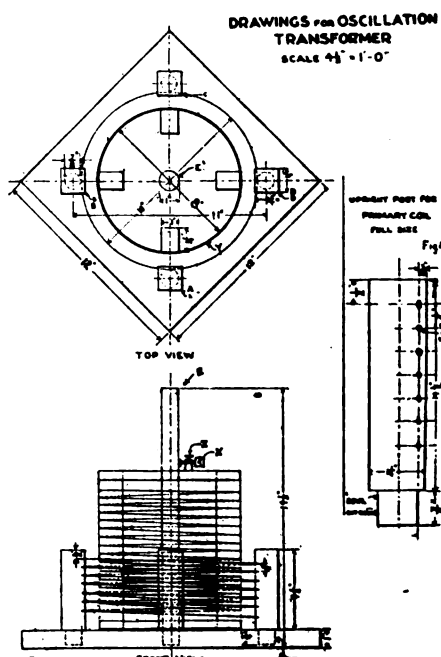
Drawing, Third Prize Article

lows: The primary winding is mounted on a piece of wood 1 inch in thickness and 12 inches square. Five holes are drilled to a depth of ¾ of an inch, as shown in Fig. 1 at points a, b, c, d, e.

Next obtain four pieces of wood 1¼ inches square by 4½ inches by ¾ of an inch in thickness. Holes are drilled in this piece to receive the wire, as shown in Fig. 2. Care should be taken to drill the holes one or two sizes larger than the wire in order to let the wire slip through freely. The ends of these pieces are then cut into a dowel ⅞ of an inch in diameter and ¾ of an inch in length; they are now ready to be fastened to the base. A small amount of cabinet maker's glue is secured and put into the holes in the base and the dowelled parts of the uprights are placed in the holes and held tight by bench clamps until the glue becomes hard. The primary winding which, by the way, consists of 6 turns of No. 8 spring brass wire, is next put into place.

The secondary winding is of the ordinary helix type, 8 inches in diameter and 9 inches in height, comprising 16 turns of No. 10 spring brass wire. The secondary winding is slid in and out of the primary winding on the rod, e, and is held in place by a binding post, as at z. This post is tapped with a 8/32 thread to receive the rod, X, which is also threaded in the same manner.

When the proper value of coupling is obtained the knob at the end of the rod.



Drawings, Fourth Prize Article

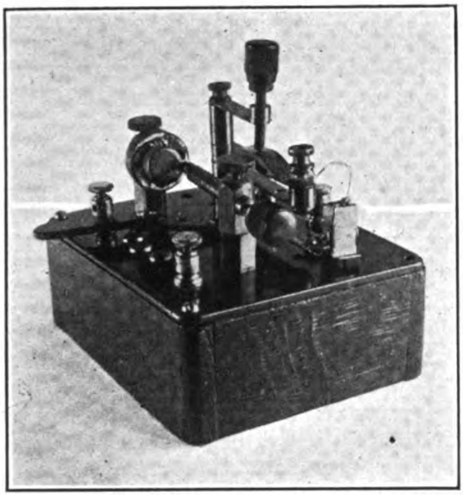


Fig. 1, Honorary Mention Article, Manson C. Wood

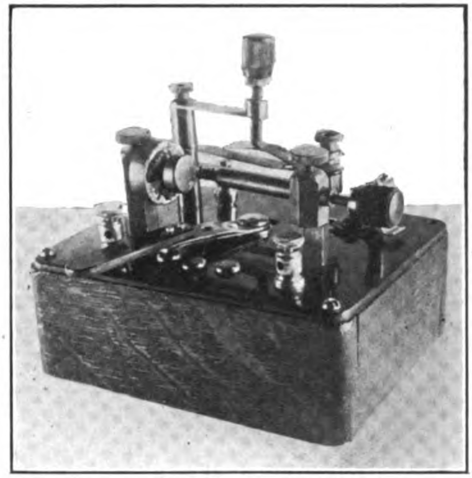


Fig. 2, Honorary Mention Article, Manson C. Wood

x, is turned until the secondary winding is held tight in place.

The woodwork should be treated to match the remaining apparatus in the complete set. Contact clips are used for making connection with the turns.

EMIL J. MEYER, JR., *Pennsylvania.*

HONORARY MENTION

A Detector Mounting of Merit

The tendency among the more advanced amateurs of to-day is to produce, if possible, a neat, compact and well-working receiving set. It is generally preferred to use two receiving detectors of the rectifying type having different degrees of sensitiveness; that is to say, one should be of a rugged nature—not easily "knocked" out by atmospheric electricity or nearby transmitting sets—while the other may be extremely sensitive and used for long distance work only.

In order to make a compact unit of two sets of detectors I mounted them on the top of a small case having a hard rubber top, as per Figs. 1 and 2. The case is 4¾ inches in length by 3¾ inches in width by 1½ inches in height, made

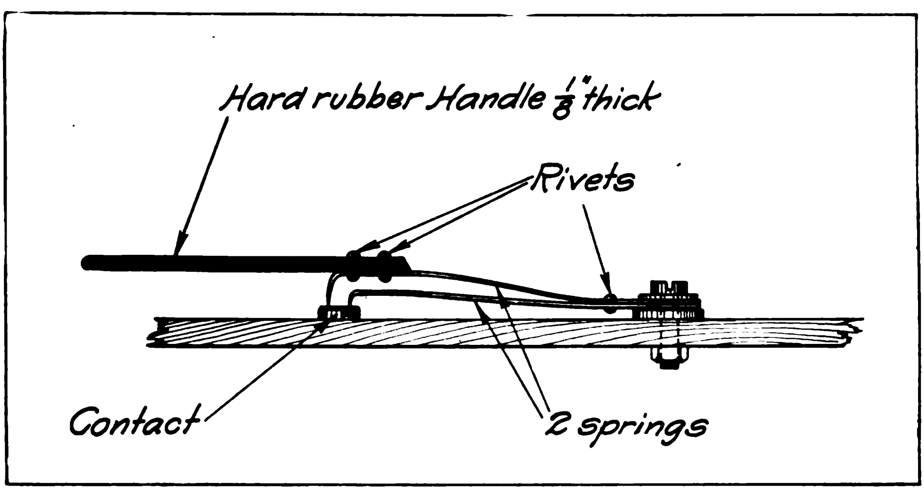


Fig. 3, Honorary Mention Article, Manson C. Wood of any suitable stock 1/4 or 3/8 of an inch in thickness. The hard rubber top is 1/8 of an inch in thickness. A perikon and galena detector are mounted, as shown in the drawing, in connection with a 3-point switch. This switch should, by all means, be of the knife edge type, making a positive and self-cleaning contact. The switch I constructed is made of two spring brass blades operated by a hard rubber handle. Invariably when looking between the contacts of this

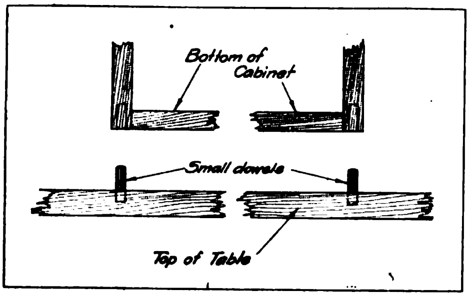


Fig. 4, Honorary Mention Article, Manson C. Wood

switch, I find that there are a number of brass filings, which is a positive indication that the switch is making a good contact. The instrument is held firm to the table by means of small pegs which are placed into holes drilled on the under side of the case (Fig. 3).

I find from the general run of experiments that perikon and galena are the two best detectors for amateurs' work, but I also find that only about one piece in fifty of galena crystals is satisfactory or sensitive; but when that piece is discovered and contact is made with it by means of a strand of steel picture cord wire, the combination is about as sensitive as can possibly be desired. Whenever the crystal seems to become less sensitive I find that it may be restored by simply cutting the tip off the wire, thereby presenting a fresh, clean surface.

I employ the following method in locating a sensitive galena crystal: I usually buy a quantity of galena, break it into small pieces, place these small pieces on a piece of tin-foil which is connected to one terminal of the detector circuit of the receiving set and adjust it for receiving. I connect the opposite terminal of the detector circuit to a small wire and test consecutively the various pieces. In this way a sensitive crystal is easily located.

Manson C. Wood, *Mass.*

HONORARY MENTION
The Construction of Quenched Spark Plates

The construction of the plates for a quenched gap is often a puzzling matter to the amateur experimenter. The designs shown in Figs. 1, 2 and 3 are therefore recommended. By reference to Fig. 1 and Fig. 2 it will be observed that one complete plate for the gap comprises three copper discs. Two of these discs are 4 inches in diameter by 1/8 of an inch in thickness, while the other is 5 inches in diameter by 1/16 of an inch in thickness. A groove is made on one side of the two thick plates, as shown in the diagram, Fig. 1. The three copper discs are then fastened together by means of 8/32 machine screws, as shown in Fig. 2. The disc of the larger diameter acts as a cooling flange, while the two discs of smaller diameter constitute the spark discharge surface. The spark takes place on the inside of the groove and the surface should therefore be very carefully and evenly ground.

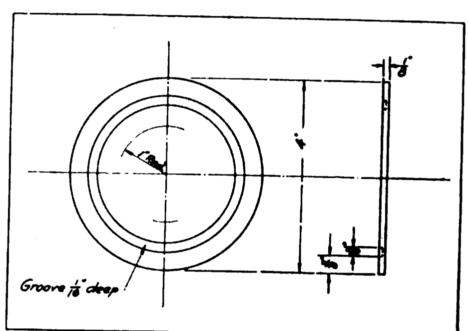
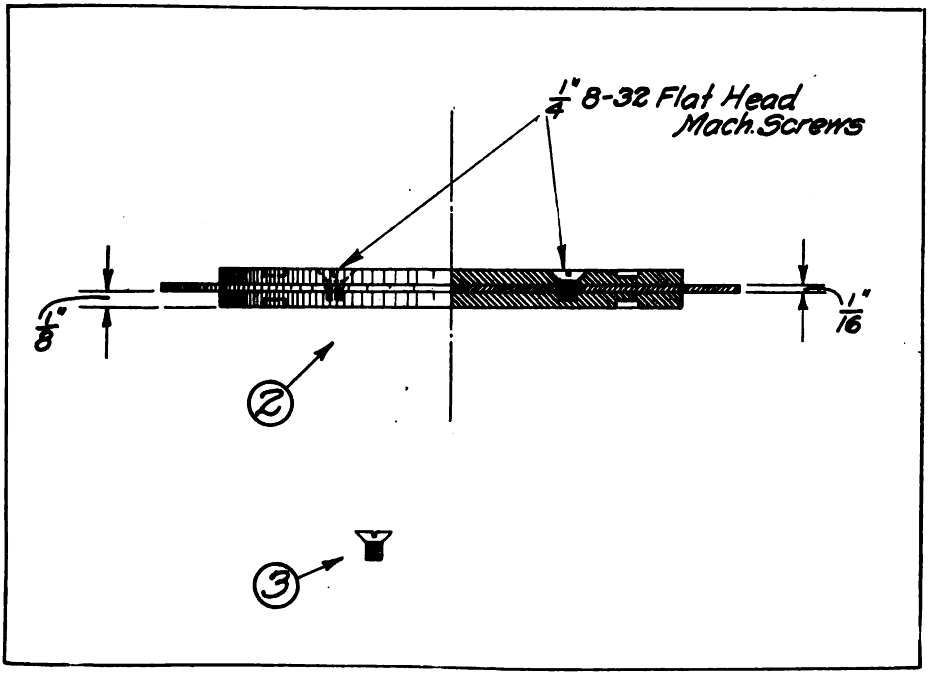


Fig. 1, Honorary Mention Article, Justice Stephen

Of course, the complete gap will comprise several of these plates, the number to be used depending upon the size of the outfit. For the average amateur 1/4 k. w. set there should be from 7 to 9 plates, while for the smallest spark coil set the gap need not comprise more than



Figs. 2 and 3, Honorary Mention Article, Justice Stephen

HONORARY MENTION ARTICLE, JUSTICE STEPHEN

No.	List of Parts	No. Parts Required	Material
1.	Copper Disc 4" Diam. 1/8" Thick..	2	Copper.
2.	Brass F. H. Machine Screw......	2	Brass.
3.	Copper Disc 5" Diam. 1/16" Thick..	1	Copper.

3 or 4 plates. In assembly the plates are stacked over one another, being insulated by micanite washers. This material may be purchased from electrical supply houses in square sheets and then may be cut to the desired shape by a pair of sharp pointed dividers. The inside diameter of the mica rings should be such that the mica washer will extend to just the center of the groove. Care should be taken that this washer does not extend beyond the inside edge of the groove, because if so it will be burned and cause a short circuit between the plates. The plates when completed should be mounted in racks so that they can be pressed closely together with considerable pressure, in fact, if possible, the gap between the plates should be made air-tight, otherwise the quenched gap will soon become inoperative.

JUSTICE STEPHEN, *New Jersey.*

NOTE.—While a quenched gap plate of this construction is suitable for ordinary amateur work, the cooling flange will not be as effective in cooling the spark as could be expected from that design where the cooling flange is cast solidly with the plate.—TECHNICAL EDITOR.

HONORARY MENTION
HOW TO REMOVE TARNISH

I have found that tarnish may be removed from copper and brass by simply rubbing the metal with a common ink eraser. The "grit" in the eraser removes the tarnish without scratching the metal.

I thought this advice might be of assistance to the readers of THE WIRELESS AGE.

WILLIAM A. CAWLEY,

Chapter XIII

THE service regulations of the International Radiotelegraphic Convention declare that "all stations are bound to carry on the service with the minimum of energy necessary to insure safe communication." The stated conditions practically imply that the transmitting set must be fitted with appliances that will enable the emitted energy to be progressively reduced from a maximum to a zero value.

The radiation from an aerial set into excitation by the ordinary spark type of transmitter may be reduced by any one of the following methods:

1. The open and closed circuits may be thrown into dissonance (out of resonance).
2. A reactance coil may be connected in series with the primary winding for reduction of energy flowing to the transformer, or a high tension reactance may be connected in series with the secondary winding.
3. The voltage of the alternating current generator (source of energy) may be reduced to any desired value by means of a field rheostat.
4. The degree of coupling between the primary and secondary windings of the oscillation transformer may be reduced from a maximum to a zero value.

In the case of the plain or rotary spark discharger, the fourth method is by all means to be preferred because no readjustment need be made of the generator voltage or the length of the spark gap. The tone or note and regulation of the spark gap thus remain practically normal and constant throughout the entire range of antenna currents. If, however, methods Nos. 1, 2 and 3 were employed, total readjustments of the variable elements of the circuits would be required in order to produce a clear note and efficient working. Again, when the open and closed circuits are detuned a complex wave is emitted which might be more detrimental to interference than a single wave of increased strength.

If a reactance coil is inserted in series with the primary winding, a complete readjustment must be made at the spark gap in order to secure a reasonable degree of working qualities. In the case of the plain spark discharger under these conditions, the length of the spark gap must be decreased. It is invariably found that when a reactance coil is inserted in series with the primary winding that the note of the spark becomes rough and disagreeable to the ear. In the case of the rotary spark gap discharger, as reactance is inserted in series with the primary winding of the transformer, the movable electrodes must be shifted in order to obtain resonance and produce a

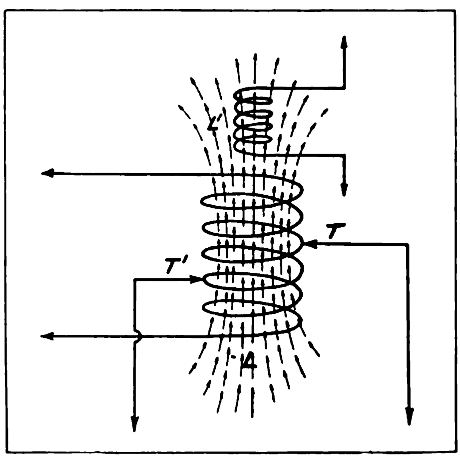


Fig. 1

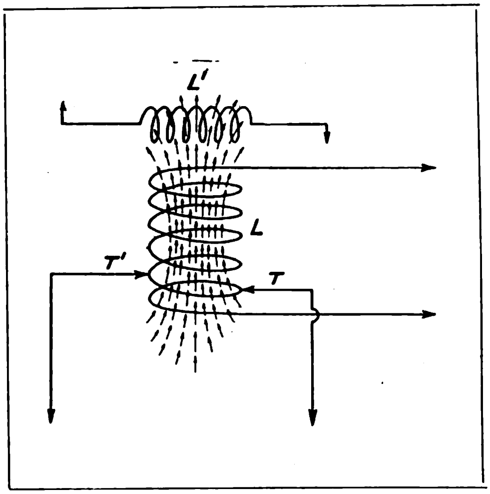


Fig. 2

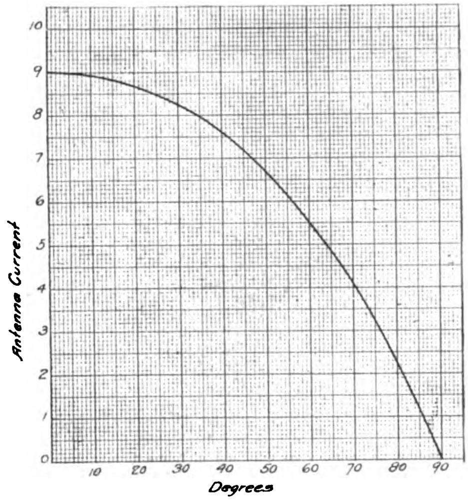


Fig. 3

clear note. The foregoing statements in respect to readjustment, practically apply to method No. 3, in which the generator voltage is reduced. As intimated before, by the use of method No. 4, the adjustments of the set, as a whole, are in no wise disturbed.

Method No. 4 will become clear by inspecting Figs. 1 and 2, in which the usual oscillation transformer is represented by the primary winding, L'. The winding L, has two variable tap-offs, T and T', which enable the wave-length of the condenser circuit to be altered as desired. The winding, L', is generally of a fixed value of inductance and as formerly used was so constructed that it may be drawn up and down from the winding, L, or if necessary, telescoped completely inside of L.

Fig. 4

It is found by experiment that if the antenna current is reduced by drawing the winding, L', vertically from the winding, L, that the distance between these two helices for a zero value of current in the antenna circuit is so great, as to be inconvenient for installation in the average ship wireless cabin. It has, therefore, been decided to decrease the degree of coupling by turning the secondary winding L', progressively at right angles to the winding L.

When L' is in the position shown in Fig. 1 the lines of force emanating from the primary winding take the path shown, alternating, of course, with the reversals of current in the primary windings. In this position, L' receives the maximum energy from the primary windings, but if L' is placed in the position shown in Fig. 2, it is at once evident that the lines of force from L do not cut the turns of L′ at right angles, but move parallel to them. Therefore, very little or no energy will flow in L′. It is likewise plain that if the winding, L′, is placed in any intermediate position between that indicated in Figs. 1 and 2, it will be partly cut by the lines of force from L and the energy flowing will depend upon the angle which the winding, L′, makes with L. Hence we have an efficient method by which the current flowing in the antenna circuit may be reduced to a zero value and the radiation or effective range of the set accordingly.

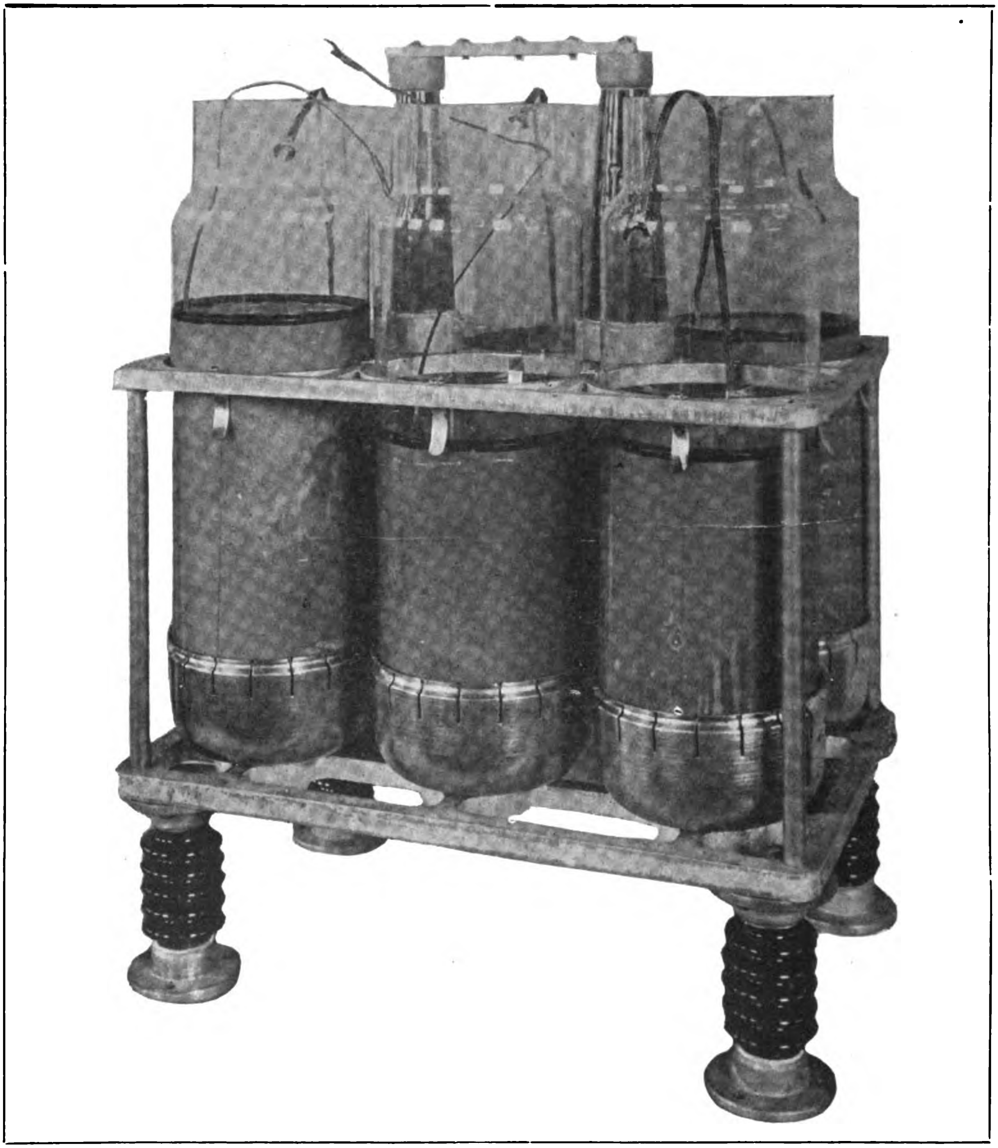


Fig. 5

Furthermore, the effective range of the transmitting set is decreased not only on account of the reduction of antenna current, but also because of the fact that the damping decrement of the antenna circuit is decreased and the emitted wave, therefore, has a lower decrement.

The Quenched Spark Set

In the case of the quenched spark transmitting set, the method described for reduction of power is not feasible. Hence the effective radiation is decreased in the following manner: The design of the set is such that the power increases as the square of the number of gaps in use; that is to say, if ten gaps represent full power, the power would be 10 squared = 100. Therefore, the effective antenna current is decreased by a reduction of the number of gaps in use and the note is then cleared by a reduction of the alternator voltage.

Adjustments by a reactance coil in the primary or secondary circuits of the power transformer or by coupling alone are not feasible with this type of apparatus, because such alterations result in an impure note or tone, which is detrimental to the general working qualities of the set. A typical curve showing how the antenna current may be decreased by variation of coupling in the case of the rotary spark discharger type of transmitter is shown in Fig. 3, where the abscissa represents the angle of difference between the axes of the primary and secondary windings, and the ordinates the corresponding current in amperes. It will be observed that a 90° change is required to give zero current in the antenna circuit.

Operators in the Marconi service should take particular care to make full use of this variable coupling feature; when within a few miles of a receiving station they should reduce the antenna current to that value which will insure communication. A photograph of the Type "A" oscillation transformer as constructed by the Marconi Company with the variable coupling feature as described is indicated in the photograph (Fig. 4). The secondary winding is partly tilted in relation to the primary winding. Ninety degrees on the scale represent the loosest coupling, while at the zero position the axis of the secondary winding is exactly in line with that of the primary winding.

The Leyden Jar Condenser

While the general over-all efficiency of the oil flat plate glass type of transmitting condenser cannot be denied, it is inconvenient for overhauling in case of puncture of a plate at sea. A condenser of the Leyden jar type is far more feasible because in case of puncture it is not necessary to disassemble the entire condenser unit and the punctured jar may be replaced without disturbing the remainder of the unit.

The marine equipment of a Marconi set at present comprises the condenser unit shown in Fig. 5, where an aluminum rack supported by corrugated insulators contains six standard Marconi round bottom jars, each having a capacity value of .003 microfarads; the total unit is, therefore, of .018 microfarads capacity. These jars are electrically coated with copper, making a condenser of greater durability than the ordinary tinfoil covered Leyden jar.

When the potential of the power transformer is between 20,000 and 25,000 volts, two of the units are generally connected in series, but for potentials between 10,000 and 15,000 volts a single parallel connection is employed. Flexible copper leads are directly soldered to the inside coating which in turn are connected to a metal bar at the center of the rack which is insulated from the frame proper by porcelain pillars. Contact to the outside coating is made by means of the retaining cups as indicated on the floor of the rack.

OPERATOR IN LUSITANIA ROMANCE

A dispatch from Manchester, England, says that John Welsh, who was at one time employed as a wireless operator at the Marconi station in Honolulu, and Miss Gerta Neilson were married on May 13, as the result of a romance which began on the ill-fated voyage of the Lusitania. Welsh and his bride became engaged on the voyage and were rescued together when the vessed was torpedoed. Both lost all of their savings in the wreck.

Infatuation

O mystic fascination,
  O fate idealized,
I'm but a mass of molecules,
  Reversely polarized.
I'm vanquished by a sorcery
  No amulet can cure,
For, Love, you are the magnet,
  And I the armature.

The more I circle round you,
  Love's current stronger grows,
Till leaping forth from heart to heart.
  Love's arc electric glows.
Against the ardor of that flame
  Insurance won't insure,
For, Love, you are the magnet,
  And I the armature.

The messages unnumbered,
  Of fond endearment fly,
At once, in all directions,
  The wireless they out-vie.
A throbbing heart is at the key,
  Its dots and dashes sure,
For, Love, you are the magnet,
  And I the armature.

I dwell within your field of force,
  In that blest region where
Your strength is to the distance,
  Inversely as the square,
No influence external,
  Can me from you allure,
For, Love, you are the magnet,
  And I the armature.

At last we'll cling together,
  Apart no more to roam,
With hearts attuned harmonic,
  We'll sing of Ohm, sweet Ohm.
One circuit never broken,
  While life and love endure,
Forever you the magnet,
  And I the armature.

—Park Benjamin.

Marconi Men

The Gossip of the Divisions

Eastern Division

Harold Sanders, a graduate of the Marconi School, has been assigned as junior to the El Sol.

H. F. Ward was assigned as junior on the El Dia upon his return from Barbados.

Peter Podell, who made a trip to northern Europe on the Santiago, was assigned to the Millinocket after enjoying a short vacation.

C. R. Underhill, a bright young Marconi School graduate, has been placed on the El Cid as junior.

William Travers is now on the Santiago, a one-man ship.

R. Volker, a member of the recent graduating class of the Marconi School, is now attached to the El Rio as junior man.

A. A. Borch has been re-engaged and is now on the City of St. Louis as second man.

K. H. See has succeeded H. E. Ingalls as senior on the Concho. Ingalls is now senior on the Old Colony, running from Boston to New York. The Old Colony is, we understand, temporarily taking the place of the Bunker Hill, which was damaged in a collision in Long Island Sound. Junior Operator Pitts, now on the Old Colony with Ingalls, narrowly escaped being injured on that occasion.

John Rowland has resigned from the service. John Flagg relieved him on the Wico. Flagg was formerly attached to the Miami of the Gulf Division.

J. R. Lange and E. L. Petit have been assigned as senior and junior, respectively, to the Siberia, a newly-equipped vessel.

J. K. Noble has been re-engaged and is now on the Seguranca.

E. N. Pickerill and H. E. Orben have resumed duty on the Kroonland. This vessel is now on a New York-San Francisco run via the Panama Canal.

J. J. O'Brien has been transferred from the Charlton Hall to the San Marcos.

George Abbott has achieved an ambition he has been nursing for a long time and is now senior operator of the Sabine.

R. D. Giles is now second on the City of Memphis. Joseph Callon succeeds him on the Zulia. Callon is from the Baltimore Division.

C. F. Schafer succeeds A. Jaquette on the Platuria.

Sidney Hopkins is now on the Comus as junior.

R. Myers, of the Baltimore Division, is now on the Astral, succeeding R. F. Gleason, who is no longer in the service.

B. T. Elkins has been transferred to the Navájo of the Pacific Coast Division. Louis Michael succeeds him on the Northland.

William Lillis has been transferred to the Portuguese Prince, an English vessel. G. Oliver, a tyro, takes Lillis' place on the Matura.

M. W. Grinnell and A. W. Mayer have been assigned as senior and junior, respectively, to the Massachusetts.

I. T. Barnes is now attached to the Bay State.

The Santa Catalina, Santa Cecilia, Santa Cruz, Santa Clara, Florence Luckenbach, Lewis Luckenbach, Hattie Luckenbach and Pleiades, of the Pacific Coast Division, have been transferred to this division. The operators attached to these ships, who will now come under the jurisdiction of this division, are as follows, their positions on the list corresponding with their ships in the order named: R. Ticknor, I. L. Church, George Gerson, J. E. Dickerson, P. S. Lewis, J. W. Russell, P. Harrison and F. Mousley.

C. E. Stevens is no longer on the Jamestown, having been replaced by J. Maresca. Stevens takes Maresca's place as junior on the Sarnia.

A. H. Lynch has relieved Sam Schneider as senior on the Brazos. R. Raggie fills the vacancy left on the Howick Hall.

J. P. Eckhardt has returned from a six months' cruise on the S. Y. Cassandra. The itinerary of the yacht included the Mediterranean, West Indies and Norway.

L. M. Burt has resigned from the service. J. M. Harrison takes his place as senior on the Parima.

R. Balzano replaces F. W. Rosenquist as senior on the El Rio.

F. L. Velten, a graduate of the Marconi School, is attached to the Cherokee as junior.

D. J. Surrency, who recently returned from a long trip on the Commewijne, has been assigned as senior operator on the City of St. Louis.

C. D. Riley has returned from a trip to Europe on the Antilla. The Antilla was captured by a British cruiser on her way to Copenhagen and escorted to an English port, where she was interned for more than two months.

H. B. West is now attached to the Antilla.

C. D. Riley is now senior on the Commewijne.

I. T. Carpenter is now on the J. L. Luckenbach, a one-man ship.

F. A. Klingenschmidt has returned to New York. The owner of the steam yacht Owera, to which Klingenschmidt had been attached, had expected to take a trip to the San Francisco Exposition, going through the Panama Canal. When the yacht reached the Canal, however, the plans were changed, much to Klingenschmidt's disappointment, and, after spending several months cruising about the West Indian islands the yacht returned north. Klingenschmidt has been assigned to the Algonquin as senior.

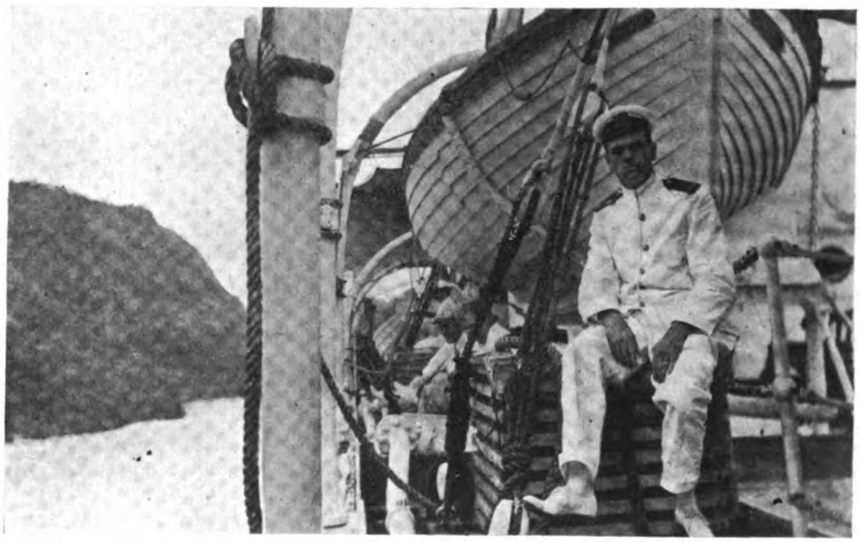
S. Tonner has resigned from the service. W. C. Thompson takes his place on the Radiant.

The details of A. Voightlander and W. E. Florence have been exchanged. Voightlander becoming senior on the North Star and Florence junior on the Morro Castle.

A. G. Berg is senior on the El Cid. The Esperanza, to which Berg had been attached for a year, has been laid up.

H. Bernhard succeeds K. McAlpine on the Kentra.

C. C. Langevin has returned from a trip around the world. Langevin left New York in December last on the City of Corinth. The itinerary of the vessel took her through the Panama Canal, across the Pacific to the Straits Settlements, to India, Egypt, and through the Suez Canal. Langevin says the Turks were shelling the Suez Canal when his ship was trying to get through. To protect the officers of the ship, the bridge was banked on all sides with bags of sand and earth. The members of the crew were ordered to keep below decks and in



E. N. Pickerill viewing the Panama Canal as the Kroonland steamed through the water-way. Pickerill is senior Marconi operator on the Kroonland this way they managed to get through the Canal in safety. Langevin was transferred to the City of Delhi at Port Said, and made the remainder of the voyage on that vessel.

R. A. Merry is now junior on the Sabine.

R. J. Green has relieved H. V. Griffing on the W. B. Keene. Griffing is taking a vacation.

R. Wright, who made a voyage to Copenhagen on the City of Macon, has returned to the Great Lakes Division.

J. P. Callan was assigned to the Gulfstream at Baltimore, relieving F. G. Evans.

Sam Schneider and C. C. Langevin have been assigned to the Northland as senior and junior, respectively.

W. R. Schultz has resigned from the service. H. D. Copland takes his place on the Calvin Austin.

Nine graduates of the Marconi School have recently been assigned to steamers sailing out of New York.

Southern Division

A. Doehler has been temporarily assigned to the Powhatan as junior operator, vice operator Dudley, who has been detailed to the Cretan as senior operator.

R. Myers was recently transferred from the Suwanee to the tug Astral at Baltimore. His vacanacy on the Suwanee was filled by J. F. Larrimore.

H. McKiernan has been transferred from the Essex to the Parisian at Newport News, Va., as senior operator. H. Simons was assigned as junior.

O. E. Curtis has been assigned to the Dorchester as senior in place of J. B. Brannan. Curtis recently returned to the Marconi service after spending several months in the United States Coast Guard Service.

Sidney Giffin was recently assigned to the Caloria, of the Standard Oil Company, at Baltimore.

J. H. McCauley has been assigned to the Ontario as junior operator, vice J. F. Larrimore.

L. H. Gilpin was recently transferred from the Cretan to the Essex as junior operator, F. H. Crone having been promoted to senior on the latter vessel. The Cretan is now running between Philadelphia and Jacksonville via Savannah and the Suwanee has returned to Baltimore to take up her regular sailing between Baltimore and Jacksonville. Crone made several trips to Providence on the Parthian while the Essex was being repaired.

H. G. Hooper has been transferred from the Gloucester to the Essex as senior operator for one trip. The Gloucester is being overhauled at Baltimore.

Operator H. G. Helgeson was recently transferred from the Gloucester to the Atlantic, at Baltimore, relieving Operator L. C. Smith. The Atlantic steamed for Buenos Ayres, South America, thence to ports in Europe.

J. L. Brannan was recently transferred from the Dorchester to the Parthian as senior operator, D. D. Moore, a new man, being assigned as junior.

J. Greeley was recently assigned to the Cretan as senior operator.

Walter Osterloh, formerly junior operator on the Merrimack, has been reassigned to that ship after making several trips on the Dorchester to Boston and Providence.

Sewall P. Smith, formerly of the Francis Hanify, has been assigned to the Dorchester as junior operator.

Inspector E. M. Murray sailed from Baltimore on the Suwannee on June 15th to inspect the Savannah and Jacksonville stations.

R. B. Dailey, of the Cape Hatteras station, and Mrs. Dailey are on their vacation. Mr. and Mrs. Dailey visited the Baltimore and New York offices on their trip north. W. J. Phillips is working as relief operator at the Cape Hatteras station during the absence of Operator Dailey.

Inspector M. C. Morris is installing a set on the U. S. S. Melville at Philadelphia, which soon goes out on her official trial. The Melville is a naval floating machine shop.

Great Lakes Division

G. Mackwiz and F. Marshall, senior and junior, respectively, cleared Detroit for Buffalo, May 3rd, on the initial trip of the season made by the Eastern States.

Car Ferry M. & B. No. 1 recently dry-docked at Cleveland for a week. R. C. Hough took advantage of the prolonged stay to visit his home.

R. Garrie has replaced G. Keefe on the Georgia. Garrie comes from the Carolina.

E. Piersal has been assigned to the Alabama, vice H. M. Junker, who was placed in charge of the Virginia May 1st.

E. M. Tellefson is now on the Arizona.

S. R. Henry is now in charge on the Puritan, having replaced S. Hansen.

H. C. Rodd was temporarily assigned as manager at Ashtabula when that station opened for the season April 3rd.

C. D. Heinlen, who was employed as night operator at Duluth last season, has been assigned as second operator at the Cleveland station.

W. H. Jones, who was on night duty in Detroit last season, opened the Detroit station April 26th as manager, having as night man A. J. Main, who was on the Northland.

G. Commerford has been assigned to the City of Buffalo, vice F. Stehmeyer, who took the Lakeland on. May 29th The Lakeland is in dry dock at Detroit.

F. G. Siegel, who was manager at Detroit last season, is now first at Cleveland, vice E. A. Nicholas, who has left the service to enter the awning business in the latter city.

E. I. Deighan, who recently returned from a winter voyage on the briny deep, is full of reminiscences. Attempts to persuade him to write an article dealing with his voyages have not been successful, however.

A. J. Therriault, who performed such excellent service at Mackinac Island last season, again opened up the station May 28th.

The new steam yacht Nokomis, owned by H. E. Dodge, of Detroit, was placed in commission May 16th, with Charles W. Beals on board.

H. M. Junker has been placed in charge of the Virginia.

E. W. Schulthise of the Lakeland has been detailed to the Duluth on the second trick.

The City of Erie cleared Cleveland for Buffalo on her initial trip of the season, with G. Covey in charge. Covey sailed out of New Orleans during the winter months.

Pacific Coast Division

The Mongolia, with B. McLean in charge and E. S. Howard as assistant, topped the trans-Pacific newspaper sales record on March 16 last. We expected this mark would be shattered by the later arrivals carrying some of our old reliables, but it remained until McLean and his new assistant, P. S. Finnell, of Chow Dorg fame, succeeded in raising the Mongolia's record by several hundred copies. Congratulations!

The following transfers and assignments have been made:

C. Trostle on the Aztec; C. M. Jackson, assistant on the Aroline; E. R. Fairley on Barge 91; L. C. Rayment on Barge 92; T. C. Eastman on the Beaver, as operator in charge; M. W. Michael on the Carlos; E. Diamond on the Centralia; J. F. Woods, assistant on the Congress; F. W. Brown on the Coronado; D. W. Kennedy on the Grace Dollar; I. W. Hubbard on the Governor, as assistant; A. P. Stone transferred to first on the George W. Elder, at Portland; J. J. Michelson transferred to assistant on the George W. Elder, at Portland; C. H. Rogatsky transferred to assistant on the Klamath; H. Bodin transferred to first on the F. A. Kilburn.

T. J. Welch relieved J. W. Russell as operator of the Lewis Luckenbach on June 4th. Russell has been granted a short leave of absence.

The Leelanaw, with Operator S. J. Morgan in charge, has been transferred to the New York Division.

G. S. Bennett has been transferred to the Manchuria as assistant.

H. C. Hax has been transferred to the Matsonia, as assistant.

B. T. Elkins relieved J. E. Dickerson, as operator in charge of the Navajo at New York, May 24th.

H. Long has been transferred to the Newport, as assistant.

M. A. Mears has been transferred to the Newport as assistant.

L. O. Marsteller has been transferred to the Pennsylvania as assistant.

F. Mousley has been transferred to the Pleiades.

J. H. Southard has been transferred to the President as first.

H. Dickow has been assigned as first operator on the San Juan.

J. W. Miller is now first on the Santa Clara.

J. E. Dickerson has been placed in charge of the Grace liner Santa Clara, bound from New York to San Francisco.

R. H. Brower and F. A. Lafferty are acting first and assistant on the Rose City.

H. Oxsen was assigned as operator in charge on the Yucatan for her voyage to Australia via Honolulu. On June 3 at eight o'clock in the evening her position was reported as 300 miles west of Honolulu.

B. H. Linden has been assigned to the San Juan as assistant.

G. F. Roberts, who for nearly two years has been wireless operator in charge and purser on the F. A. Kilburn, has joined the Francis Hanify, bound for Honolulu, via San Pedro.

Seattle Staff Changes

H. J. Scott has been detailed to the tug Oneonta.

E. J. Edmonds has been transferred from the Windber to the Admiral Watson as first operator. H. F. Wiehr took his place on the Windber.

C. A. Hohlbein, assistant on the Windber, has been transferred to the Admiral Evans.

J. E. Johnson has been transferred as first operator from the Queen to the President, with W. R. Rathbun as assistant.

O. Treadway has been transferred as first on the Admiral Watson to the Queen.

B. C. Springer, second operator on the Queen, is now on the Spokane.

H. W. Kelley, of the Seattle school, has been appointed second on the Queen.

F. M. Roy, of the President, and A. C. Berntswiller are first and second, respectively, on the Senator, the first boat to sail for Nome this season.

C. E. Williams, of the school, is second on the Spokane.

C. Thomas, second on the Governor, has resigned to take a position in the British military force in Canada.

C. E. Bence, station manager at Juneau, has started north on the Admiral Evans, after spending a vacation in San Francisco. He will relieve Gus Lang, who has been temporarily filling in at Juneau.

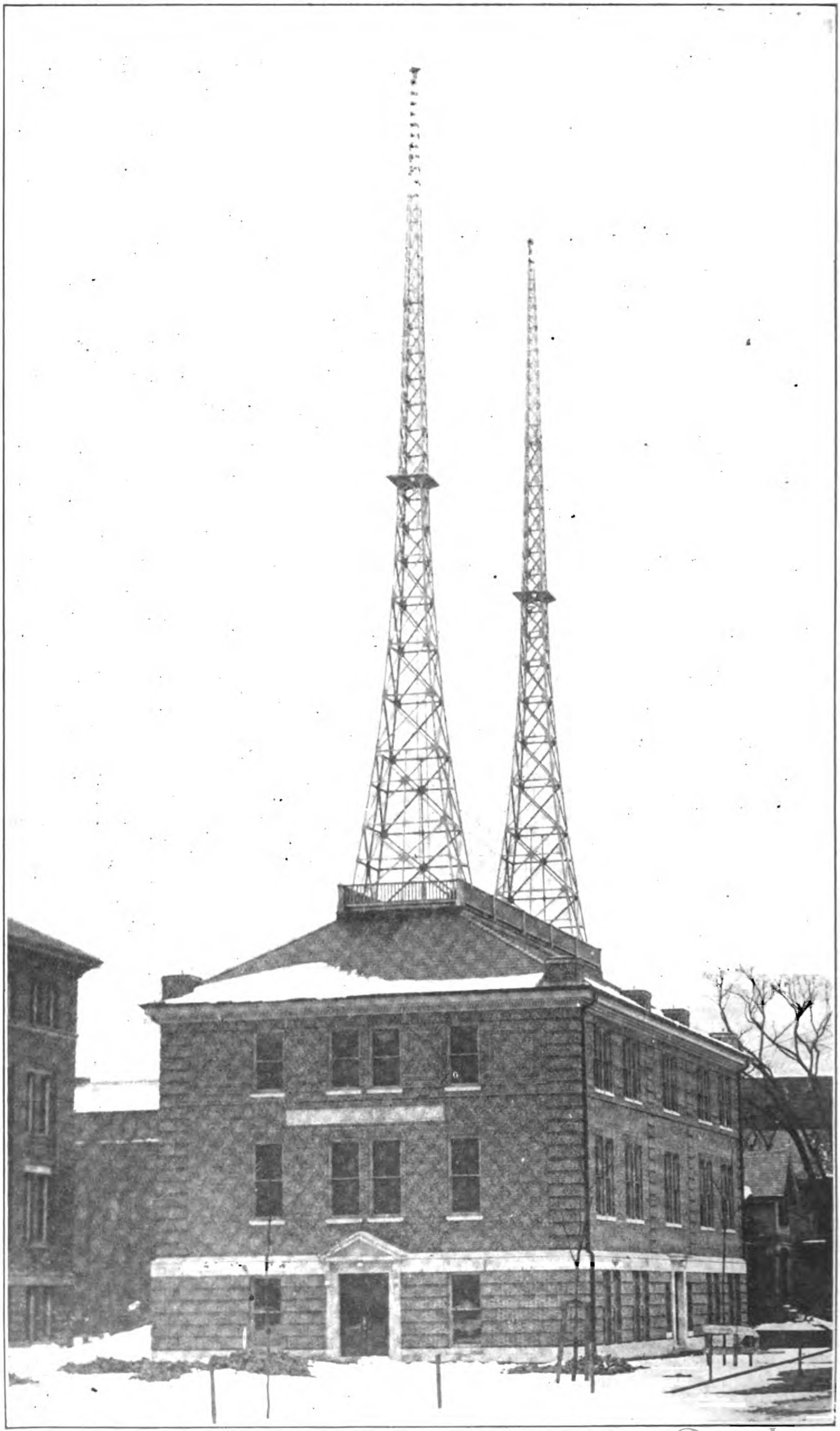
Friday Harbor station, one of the best-known Marconi stations on the Pacific Coast, has been permanently closed. Since the new Seattle station was established in the forty-two story L. C. Smith Building, the use of Friday Harbor as a relay station was no longer necessary. W. B. Wilson, station manager, is now taking a well deserved vacation, pending an appointment to another station.

R. S. Powell, of the Seattle construction force, is the father of a daughter, who was born in the latter part of May.

ITALY'S MESSAGE RULES

The Western Union Telegraph Company announces that the Italian Government, acting under Article 8 of the International Telegraph Convention and Article 17 of the Radio Telegraphic Convention, will accept on Italian lines and in Italian colonies only messages exclusively in plain language, (English or French); that they will not handle messages without texts; that service instructions, such as "reply paid," must be mentioned in full in the French language and not in abbreviations admitted by the convention.

Inquiries concerning messages sent or received are not admitted. All messages are subject to censorship, and therefore at sender's risk. All Italian radio coast stations and colonial stations are closed for private service.



The new radio laboratory at Harvard University

Queries Answered

Answers will be given in this department to questions of subscribers, covering the full range of wireless subjects, but only those which relate to the technical phases of the art and which are of general interest to readers will be published here. The subscriber's name and address must be given in all letters and only one side of the paper written on; where diagrams are necessary they must be on a separate sheet and drawn with India ink. Not more than five questions of an individual can be answered. To receive attention these rules must be rigidly observed.

Positively no Questions Answered by Mail

H. V. R., Jamaica, N. Y., writes:

Ques.—(1) I have an aerial composed of five No. 14 wires, 40 feet in length, spaced 1½ feet apart. If I space the wires 3 feet apart, will it increase the intensity of the signals?

Ans.—(1) If you refer to signals received, there will be little if any increase in strength.

Ques.—(2) Can a 4,000-meter loading coil be employed in connection with a 3,000-meter receiving tuner?

Ans.—(2) Yes, if another loading coil is inserted in series with the secondary winding to maintain conditions of resonance.

Ques.—(3) Is the New York Herald wireless station in operation, and if so, at what time?

Ans.—(3) This station is in communication with vessels at irregular intervals. Press matter is sent regularly at 10:15 P. M. and at 3:15 A. M.

Ques.—(4) Has the size of the earth wire leading to a water pipe any effect on the intensity of signals received?

Ans.—(4) It will have no effect whatsoever provided the wire is at least a No. 18 B. & S. gauge. For transmission purposes the earth connection should be as large as possible.

Ques.—(5) Please give my receiving range with the following instruments: Aerial as described, 3,000-meter loose coupler, silicon detector, small condenser and Brandes head telephones of 2,800 ohms resistance.

Ans.—(5) Your daylight receiving range is about 100 miles; night range about 500 miles.

* * *

R. J. F., Southampton, N. Y., writes:

Ques.—Please tell me how far I can transmit with a ½ k.w. transformer, rotary spark gap revolving at a speed of 2,400 R.P.M., a condenser comprising 8 plates 6 x 8. I use 12 battery cells as a source of energy. My aerial is 60 feet in height by 130 feet in length, composed of 6 copper wires hung on 12-foot spreaders. I have a friend who has a wireless station, but I cannot get in communication with him. In fact, he advises that he does not hear me at all, and I fail to hear him; however, I can receive from other stations. Please tell me what the trouble is.

Ans.—If you had given the distance from your station to your friend's house, and also enclosed a diagram of the connections employed we might answer the query more definitely. Your aerial has a natural wave-length of about 350 meters, which, of course, does not comply with the government law. In fact, this aerial is too long to be operated on a wave-length of 200 meters, and you should therefore erect one of smaller dimensions for transmission purposes. The capacity of your sending condenser is about .004 mfd., which requires several turns at the primary winding of your oscillation transformer to attain a wave-length of 200 meters. We do not understand how you operate a ½ k.w. transformer with batteries. Do you mean that you have an induction coil, or do you actually manipulate the transformer in connection with an interrupter?

* * *

K. B., Gastonia, N. C., inquires:

Ques.—(1) At my receiving station I have experienced at times a peculiar, sharp, buzzing noise, which resembles a 60-cycle current, and, in fact, is much similar to the noise heard in the ordinary telephone receiver when central accidentally rings in your ear. The noise is more or less intermittent, sometimes lasting a day and two nights continuously, and again only occurring at intervals during one night. It is seldom very loud during the daytime. The energy is slightly tunable, being received with the greatest strength at about 2,500 meters. When at its worst I can place my receiver at arm's length on the table and still hear the diaphragms buzzing. No matter what changes I make in the connections of the apparatus they do not have any effect upon the noise without also reducing the wireless telegraph signals. By disconnecting the ground wire the volume of the noise is diminished about one-half. If, however, the ground is reconnected the noise immediately occurs; or, if the ground is connected and the aerial disconnected, the noise is again considerably reduced. I hear a noise of similar note or tone in the ordinary speaking telephone between the time I take down my receiver until central answers. The superintendent of lighting for this city has attempted to find an explanation of the matter but without success. Any advice or suggestions will be greatly appreciated.

Ans.—(1) This noise is undoubtedly caused by induction from arc lights or alternating current circuits in your vicinity. If the tone is similar to that produced by central ringing into your ear it may be due to leakage from alternating current power lines, accompanied by slight sparking, which, of course, will be heard in any wireless telegraph aerial in the vicinity. If there are alternating currents light leads running to your house, we suggest that you shunt two condensers connected in series across the line and ground them at the middle point. As we understand from your communication, the trouble is more pronounced at night time, and it may be that certain arc lights in your city radiate energy of slightly damped characteristics, which, of course, will set up inductive noises in your receivers.

If your aerial is parallel to the power line we suggest that if possible you swing the former at right angles, thereby receiving the least inductive effect.

Ques.—(2) I have a 6-wire inverted L aerial 142 feet in length by 88 feet in height, the wires being 2½ feet apart. The lead-in wire is about 80 feet in length and the ground wire about 15 feet. Please tell me my wave-length.

Ans.—(2) The natural wave-length of your aerial is about 420 meters.

Ques.—(3) Since Sayville has been using the 4,800-meter wave, should I be able to hear their signals by simply "loading" to their wave-length, or is special apparatus required other than loading coils? I formerly heard this station quite plainly on 2,800 meters.

Ans.—(3) The signals of this station can be attuned to by means of a loading coil, but a similar loading coil should be connected in the series of the secondary winding to maintain conditions of resonance. We do not mean to infer that these coils have similar dimensions because, owing to the different values of capacity in the circuit, their dimensions must naturally be different. Please take into consideration that during a certain period at night time the Sayville station employs undamped oscillations, and you will therefore not be able to hear its signals without apparatus peculiarly fitted for the reception of this form of energy.

* * *

L. C., Wildwood, N. J., asks:

Ques.—(1) What is the wave-length of my aerial, which is 200 feet in length, 30 feet in height on one end and 40 feet in height on the other? The lead-in wire is 35 feet in length, while the ground wire is 10 feet in length. The wires are spaced 18 inches and are of No. 14 B. & S. aluminum.

Ans.—(1) The natural period of your antenna is approximately 360 meters.

Ques.—(2) What does the term "microfarads capacity" mean? Does the variable condenser of a receiving set need to have the same capacity as the antenna?

Ans.—(2) The capacity of an electrical conductor is its ability to store up energy in the form of electrostatic lines of force. The unit of capacity is the farad, which is too large for practical purposes. The microfarad, which represents a millionth of a farad, has therefore been adopted. The capacity of the average amateur's aerial is rather small—not over 0.0004 mfd. There is no distinct connection between the capacity of the variable condenser of a receiving set and that of the aerial, but of course for adjustment to certain wave-lengths the variable condenser must have a certain definite range of capacity. To familiarize yourself with the receiving apparatus we suggest that you note particularly the articles appearing in the series, "How to Conduct a Radio Club," in the April and May, 1915, issues of THE WIRELESS AGE.

Ques.—(3) Please tell me approximately my receiving range, day and night. My loading coil is 12 inches in length by 2½ inches in diameter, wound with No. 26 black enamel wire. The loose-coupler is 5 inches by 9 inches for the primary winding and is covered with No. 22 black enamel wire. The secondary winding is 9 inches by 4¼ inches, wound with No. 36 black enamel wire. There are 16 taps on the coil of the secondary winding. I do not slide the secondary winding in and out of the primary winding as the results are about the same regardless of their relative position. I use an E. I. Company fixed condenser and a catwhisker silicon detector. My telephones are of the Brandes trans-Atlantic type. As an earth connection I use both water and gas pipes.

Ans.—(3) As we do not know the nature of the stations you expect to receive from, it is difficult to give the receiving range. Your receiving tuner is too large for the reception of amateur signals or signals from commercial stations operating on wave-lengths between 600 and 2,000 meters. In fact, when this tuner is adjusted to the shorter wave-lengths the "dead ends" must absorb considerable energy. That apparently no difference is noted in the relative positions of the primary and secondary windings may be accounted for by the fact that this tuner is ill-designed for the wave-lengths of stations in your vicinity.

Ques.—(4) How far can I transmit on the same aerial, using 110 volts alternating current passed through an interrupter similar to that made by the E. I. Company? The current is sent through a 2-inch spark coil. As a condenser I use an old candy jar with tinfoil inside and outside. My spark gap is fixed. I also use a home-made oscillation transformer.

Ans.—(4) Using the aerial as described, the emitted wave will be far above that allowed by the government restrictions, and it will therefore be necessary for you to erect a shorter aerial to comply with the law. Again, it will be difficult to place this small condenser and set in resonance with the antenna circuit. You will probably obtain the best results by simply connecting the spark gap of your set in series with the antenna circuit. With this connection your set should be heard at a distance of 15 miles.

* * *

A. C. S., Lawrence, Mass.:

Ques.—(1) Please give my receiving radius, day and night, with the following instruments: The aerial is 65 feet in length by 30 feet in height, composed of 6 strands of copper wire, spaced 27 inches. My receiving tuner is of the inductively coupled type, having a range up to 2,500 meters. The remainder of the equipment comprises a Brandes 2,000-ohm head set, silicon and perikon detectors and variable condensers.

Ans.—(1) Your receiving range by day is approximately 150 miles; by night you should receive from 800 to 1,000 miles during the winter months of the year.

Ques.—(2) What is the natural wave-length and capacity of this aerial?

Ans.—(2) The natural wave-length is about 188 meters, and the capacitv about .00028 mfd.

Ques.—(3) Should I be able to hear the Key West Naval station? I can hear Arlington (Va.) in the daytime almost as well as at night.

Ans.—(3) You should hear the Key West station at night time during the winter months.

Ques.—(4) What are the wave-length and kilowatts employed by the Key West naval station?

Ans.—(4) Power, 25 k.w.; wave-length, 1,600 meters.

Ques.—(5) When will the new station at Chelsea, Mass., begin operations?

Ans.—(5) The date has not been definitely decided upon. It is not yet completed.

* * *

B. C. R., St. Johnsbury Center, Vt., writes:

Ques.—(1) I use two aerials which have dimensions as follows: The first is 475 feet in length by 75 feet in height, with a lead-in of 60 feet, comprising 2 wires; the second is 100 feet in length, 60 feet in height, with a lead-in of 40 feet, comprising 4 wires. Please advise as to the wave-length of each, and approximate capacity.

Ans.—(1) The wave-length of the longer aerial is between 750 and 800 meters, and the capacity about .0015 mfd. The wave-length of the second aerial is 300 meters and the capacity approximately .c004 mfd.

Ques.—(2) If I can hear NAA at noon at a distance of 470 miles, how far should I be able to receive at night, using a galena detector for the work?

Ans.—(2) Your night range is about 1,500 miles during the more favorable months of the year.

Ques.—(3) What make of telephone receiver is used in the Marconi service, and what is its value of resistance?

Ans.—(3) Telephone receivers of various makes and design are used. The majority, however, are furnished by the Electrical Industries Manufacturing Company, New York.

* * *

R. S., Sunbury, Pa.:

After careful observation of your diagram we advise that for general receiving work the aerial shown in diagram No. 2 is preferable.

* * *

N. L., East Orange, N. J.:

Ques.—(1) Please tell me the wave-length and capacity of my aerial which consists of 3 wires, 7 strands, No. 22 copper wire. Each wire is 115 feet in length and wires are spaced 4½ feet apart. At the highest end the aerial has a height of 35 feet from the ground and 32 feet at the other end. The lead-in is composed of 3 wires, each 10 feet in length.

Ans.—(1) The natural wave-length of this aerial is about 270 meters and the capacity approximately .00042 mfd.

Ques.—(2) Please tell me if it will be possible to do long distance work in the evening with this aerial in connection with the following instruments: 2,5co-meter loose coupler, 2 Blitzen variable condensers; Murdock telephone condensers, Brandes Superior head telephones and galena detector. What will be the approximate night and day range?

Ans.—(2) In the daytime you should be able to hear signals from Arlington, while at night, during the more favorable months of the year, your range is from 1,200 to 1,500 miles.

Ques.—(3) Approximately how much wire (No. 22 D.C.C.) would be needed in making a loading coil, which is to be wound on a tube 5¼ inches in diameter to attain a wave-length of 5,000 meters? The coil is to be used with the aerial and instruments mentioned. What should be the length of the tube?

Ans.—(3) The tube should be about 10 inches in length and wound closely with No. 20 D.C.C. wire. A loading coil should also be connected in series with the secondary winding or a condenser of larger capacity connected in shunt to this winding, in order to maintain conditions of resonance.

* * *

H. A. D., Poughkeepsie, N. Y.:

The call letters referred to in your first query are unknown. We have no record of the existence of such stations.

Ques.—(2) Please give me the formula to calculate the capacity for a glass plate condenser.

Ans.—(2) $C = \frac{Ka\ 2248}{T \times 10^{10}}$ mfds.

Where C equals the capacity of microfarads;

K equals the dielectric constant of glass, which varies from 6 to 9:

T equals the thickness of the glass in inches.

The following formula covers a condenser having air as the dielectric, namely,

$$C = \frac{A^2}{4\pi T \times 900{,}000}$$

Where C equals the capacity in microfarads;

A equals the area of the dielectric covered by coatings in square centimeters;

T equals the thickness of the dielectric in centimeters.

Ques.—(3) What is the capacity of a glass plate covered with tinfoil 6 inches × 8 inches, the glass having a thickness of 1/16 of an inch?

Ans.—(3) The capacity of this plate is about .001 mfd.

Ques.—(4) Is there a formula which will

enable one to find the size of a condenser to be employed with a certain size of transformer? I have such a formula, but it does not seem possible that it can be correct. Apparently it gives too large results. My formula is as follows:

$$C = \frac{1000 \times \text{power in k.w.}}{N\ V^2}$$

Where C equals the capacity in farads;
N equals the frequency of the alternator;
V equals the secondary voltage.

As an example: For a ¼ k.w. set having a primary voltage of 110 and a frequency of 60 cycles, also a secondary voltage of 13,000, the formula works out as follows, namely,

$$C = \frac{1000 \times .25}{60 \times 13000^2} = 0.0000000246 \text{ or } .0246 \text{ mfd.}$$

This seems too large for a transmitter of this size.

Ans.—(4) The formula you give is quite correct as well as the result. Please note that this formula is based upon the assumption of a synchronous spark discharge, namely, one spark for each alternation of charging current. You will now observe why it is desirable that an amateur's transformer should have a fairly high voltage, say about 18,000 volts. In this manner a greater amount of primary current can be used.

A similar formula simplified is as follows:

$$C = \frac{W}{V^2\,N}$$

Where C equals the capacity in microfarads;
W equals the watts to be consumed;
V equals the kilo-volts at the secondary of the transformer;
N equals the cycle frequency.

Amateur apparatus ordinarily does not give synchronous spark discharges; therefore the formula is only approximately correct. Please observe also that these formulas are based upon the maximum voltage per cycle of the charging current and not on the R.M.S. voltage. For instance, if the R.M.S. value of the voltage is about 13,000, then the maximum value will be somewhere in the vicinity of 18,000.

* * *

A. B., Lorain, O., asks:

Ques.—(1) Is there any method by which I can fix a ¾ k.w. transformer which has three primary taps, giving ¼, ½ and ¾ k.w. respectively, so that on the ¼ k.w. tap it will not pull down the lights in the house?

Ans.—(1) Not being familiar with the design of this transformer, it is difficult to give a concise reply. You might insert a reactance coil in series with the primary winding or try an alteration of the condenser capacity at the secondary winding. The closed core transformer of the magnetic leakage type gives the least trouble in this respect.

Ques.—(2) Will you kindly advise what mineral is the most sensitive to be used in a cat whisker detector holder, and the prices?

Ans.—(2) Tests indicate that the cerusite detector is the most sensitive of all. These detectors can be purchased from the Marconi Company at a price of $50 each. The crystals are not sold independently of the holder.

* * *

E. J. D., Cambridge, Mass., writes:

Ques.—(1) Will you kindly send me a catalog of your electrical books as I would like something which will aid me to prepare for a commercial examination.

Ans.—(1) Please note the advertisement appearing each month in The Wireless Age; a number of good books on wireless telegraphy may be purchased from the Book Department of the Marconi Publishing Corporation, 450 Fourth Avenue. A book published under the direction of The Wireless Age will shortly appear, giving just the information you desire.

Ques.—(2) Is it possible to purchase the bulb only for an audion set?

Ans.—(2) Communicate with the Cost and Sales Department of the Marconi Wireless Telegraph Company of America, 233 Broadway. The price of the vacuum valve detector is $5 each.

* * *

F. M. C., Dallas, Tex., inquires:

Ques.—(1) What is the natural wave-length of an inclined aerial, composed of 4 No. 14 copper wires spaced two feet apart? It is 73 feet in height at one end and 12 feet at the other end; the length is 64 feet. The total length of the instrument is 90 feet. Is this an efficient aerial for a 1 k.w. set tuned to a wave-length of 200 meters? What distance could I expect from it?

Ans.—(1) The natural wave-length of this aerial is approximately 190 meters. It is a little too long for operation on a wave-length of 200 meters on account of the fact that the secondary winding of the oscillation transformer must be connected in series. The additional inductance of this winding will raise the wave-length to a value above 200 meters, and of course may be reduced by the insertion of a short wave condenser. A condenser for this purpose may consist of a single sheet of glass, 8 x 8 inches, covered with tin-foil, 6 x 6 inches. It is doubtful whether your set will consume 1 k.w. on a wave-length of 200 meters because the power consumption is limited by the capacity of the condenser. The condenser cannot have a capacity value of more than .01 mfd. The maximum transmitting distance will be from 25 to 35 miles.

Ques.—(2) What is the wave-length of an aerial composed of 6 No. 12 copper wires spaced 3 feet apart; the horizontal portion is 80 feet in height at one end, 73 feet in height at the other. It is 145 feet in length. The vertical portion is 70 feet in length, and the total length of the instrument is 240 feet. Is this an efficient transmitting aerial for a 1 k.w. set tuned to a wave-length of 425 meters? Furthermore, what distance could I expect?

Ans.—(2) The natural wave-length of this aerial is about 400 meters, which is just a little too long for operation on a wave-length of 425 meters. This aerial should be reduced in dimensions so that the natural wave-length will be about 385 meters. This reduction will allow a certain amount of inductance to be connected in series with the secondary winding to attain a wave-length of 425 meters. Are you sure that the government authorities will allow you to operate your set on this wave-length? You should ask the inspector in your district whether this will be possible.

Ques.—(3) What reading of amperes should be expected in each of the aerials referred to?

Ans.—(3) On a wave-length of 200 meters you need not expect a current value of more than 1½ amperes, but on a wave-length of 425 meters your set should, if properly adjusted, give a current reading of, say, 4 or 4½ amperes.

* * *

R. F., Molalla, Ore.:

Ans.—(1) We are glad to know that this department has aided you in solving your wireless telegraph problems. If you desire instruction at a Marconi School, communicate with the Superintendent of the Pacific Coast Division, Merchants Exchange Building, San Francisco, Cal.

Ques.—(2) On what wave-length does N.P.F., Cape Blanco, Ore., send?

Ans.—(2) This station is listed as employing 2 wave-lengths, one of 300 meters and the other 600 meters. The range is supposed to be 100 miles.

Ques.—(3) Is it possible for me to construct a receiving outfit to hear signals at a distance of 3,000 miles at nighttime?

Ans.—(3) Yes. Read the article, "How to Conduct a Radio Club," which appeared in the January, 1914, issue of THE WIRELESS AGE.

Ques.—(4) I have an aerial consisting of 4 strands of No. 16 aluminum wire. It is 125 feet in length and 75 feet in height at one end and 50 feet at the other. What is the natural wave-length?

Ans.—(4) The natural wave-length of this aerial is about 350 meters.

We are not able to give definite advice why your receiving set does not work. We should know the complete details of the set and see a wiring diagram of the connections. A number of circuit diagrams applicable to your purposes have appeared in previous issues of THE WIRELESS AGE.

Operators are instructed in the Marconi service between the ages of 18 to 25 years.

* * *

R. E. M., Stanislaus, Cal., says:

Ques.—(1) Referring to the January, 1914, issue of THE WIRELESS AGE, on page 325 in the article entitled "Elementary Engineering Mathematics," I should like to ask if equation 3 is correct. The only way I can obtain the answer of 3,230 centimeters is to change the 10^{-5} to 10^5, then it checks within 1 centimeter. Also it says immediately below equation 3 that "This will be the equivalent of a plate 2.27 feet square." Is this correct? Any additional information will be greatly appreciated.

Ans.—(1) This is a typographical error. It should read 10^5. You will obtain the value, 2.27 feet, by extracting the square root of 3,230 and converting the result from centimeters to feet. One inch = 2.54 centimeters.

Ques.—(2) I should also like to have a formula sufficiently accurate for calculation of the inductance and capacity of an aerial of the inverted L type, the average height, the length of flat top, the length of the vertical parts, the number of wires and their distance apart, all being known quantities. The aerial under consideration is to be 150 feet in height at the open end, and 75 feet in height at the end where the lead-in is tapped on. So far the only data I have been able to obtain are for a single wire aerial suspended either vertically or horizontally.

Ans.—(2) For a discussion of this subject we refer you to the article by Dr. Cohen in The Electrician for February, 1913.

* * *

A. C. M., Seattle, Wash., inquires:

Ques.—Please tell me the wave-length of the Marconi station at Ketchikan, Alaska, and the size of the set installed there at the present time.

Ans.—A new installation has just been made and the wave-lengths to be adopted have not been definitely decided upon.

* * *

C. R., Brooklyn, N. Y., inquires:

Ques.—(1) Is it the length of the wire or the number of strands in the wire of an aerial that causes the signals to come in louder and from a greater distance?

Ans.—(1) Many variable factors enter into this case. High power transmitting stations generally emit waves of great length and consequently the receiving aerial must have considerable length to be in resonance. For the reception of amateur signals the aerial should be of small dimensions, but for the reception of the longer wave-lengths increased dimensions will give increased strength of signals.

* * *

F. H., Portland, Ore., writes:

Ques.—(1) I am just entering the amateur field and wish to advise you that I know nothing about wireless telegraphy. I borrowed a copy of THE WIRELESS AGE from a friend and observed that you answer questions, so I thought I would write for advice as to the kind of apparatus to obtain for my first experiment. We are located in a low place so that I believe I require a high aerial in order to obtain results. Please advise me as to the cheapest equipment I can purchase suitable for my needs. Would the fact that there are two cherry trees about our house prevent the reception of signals?

I expect to be a subscriber to your magazine soon.

Ans.—(1) The article entitled "How to Conduct a Radio Club" appearing in the June, 1915, issue of THE WIRELESS AGE will give you the information you want. The cherry trees will have a slight adverse effect on your receiving range. It will not be great enough to be concerned over, however.

M. A., Philadelphia, inquires:

Ques.—(1) What is the wave-length of my aerial which consists of 4 wires spaced 3 feet apart, 65 feet in length by 50 feet in height at one end and 70 feet in height at the other end? The lead-in is taken off the middle.

Ans.—(1) The wave-length of this aerial is about 230 meters.

Ans.—(2) With the apparatus you describe you should be able to hear the signals from the naval station at Colon, Panama, during the nighttime. It is indeed remarkable that you were able to hear the signals from the station in Florida you refer to in the daytime. If you are positive of this result you may consider your receiving apparatus as extremely sensitive.

Ques.—(3) What wave-length does the naval station at Colon, Panama, send on?

Ans.—(3) Three wave-lengths are employed—300, 600 and 1,800 meters.

Ques.—(4) When the Brooklyn Navy Yard transmits on a wave-length of 1,000 meters I can hear that station almost as loud on a wave-length of 2,000 meters. Can you explain this?

Ans.—(4) This effect is due to forced oscillations in the receiving circuit and it hints at ill design of your receiving tuner. You will find upon investigation that, even though your receiving set is apparently set at a wave-length of 2,000 meters, there are some complicated phenomena connected with the coupling, etc., which, in reality, place your receiving tuner in effective resonance with the 1,000-meter signals.

Ques.—(5) Do the Delaware, Lackawanna & Western railroad wireless stations work at nighttime, and, if so, on what wave-lengths?

Ans.—(5) The station in New York City works in the daytime only between the hours of 9 A. M. and 5 P. M. This station is in communication with Binghamton and Buffalo. The wave-length of the Hoboken (N. J.) station is 2,160 meters, that of the station at Binghamton 1,800 meters, and that of the station at Scranton about 2,250 meters.

* * *

C. A. H., New Berlin, N. Y., writes:

Ques.—(1) I have a T aerial 70 feet in height and 160 feet in length, consisting of four wires spaced 4 feet apart. Will the efficiency of my aerial be increased by changing it to the inverted L type?

Ans.—(1) As a receiving aerial it will make little difference whether you employ the T or inverted L. The natural wave-length of your aerial is about 450 meters and for the reception of amateur signals it is likely that better results will be obtained with the T type of aerial rather than the inverted L. For the longer wave-lengths, such as are employed by Cape Cod, Arlington and Sayville, the inverted L type is preferable on account of the longer natural wave-length.

Ques.—(2) Should I take my lead-in wires from the end of the aerial nearest to the station I desire to receive from, or in the opposite direction?

Ans.—(2) The lead-in wires should be taken off the end of the flat top nearest to the station from which it is desired to receive.

* * *

A. L. M., Calhoun, Ky., writes:

Ques.—What have you relating to the construction and operation of a receiving set designed particularly for receiving time signals by wireless?

Ans.—No articles devoted particularly to this subject have been published. Data were given in the January, 1914, issue of THE WIRELESS AGE covering a number of receiving tuners having a definite range of wave-lengths. Additional data were given in the February, 1915, issue of THE WIRELESS AGE, in which receiving coils of definite wave-lengths were described.

* * *

L. B. W., Angola, Ind., writes:

Ques.—(1) I have a coil rated at a 3-inch spark. The primary comprises two layers of No. 14 copper wire; the core is 2 inches in diameter. The secondary has 14 sections, each being 6 inches in diameter by 3/8 of an inch in thickness. Should not this coil give more than a 3-inch spark with batteries as the primary power?

Ans.—(1) The rating as given is quite correct for a coil of these dimensions.

Ques.—(2) Could my coil be safely operated on a 110-volt, 60-cycle alternating current circuit without an interruptor? If so, how?

Ans.—(2) Your coil is not suited for operation on 60-cycle current and experiments should be avoided.

Ques.—(3) At what power would my coil be rated in kilowatts and what transmitting range could be expected on an aerial 100 feet in length by 40 feet in height, consisting of two wires?

Ans.—(3) The maximum range is about 15 miles. The energy consumption of the coil will be about 75 watts.

Ques.—(4) Can you tell me why the signals from Arlington are louder at my station in daytime than at night?

Ans.—(4) We can give no definite reason for this effect.

Ans.—(5) The peculiar signals which you hear from Arlington are code messages being dispatched to the various vessels of the United States naval fleet.

* * *

F. E. H., New York, writes:

Ques.—(1) Will you kindly give me specifications and directions for the construction of a 1 k.w. open core transformer to be operated on a 50-cycle, 110 volts alternating current circuit, without an interruptor of any kind?

Ans.—(1) The following data are applicable to a transformer of this construction: The primary core is made of No. 30 iron wire and is 3 inches in diameter by 25 inches in length. It is then covered with five layers of Empire cloth and wound with two layers of No. 10 D.C.C. wire. The secondary winding has 38 pancakes; each is 1/8 of an inch in thickness and has 1,125 turns of No. 30 S.S.C. wire. The secondary winding is insulated from the primary winding by a hard rubber tube ¼ of an inch in thickness.

Ques.—(2) Please tell me how far the transmitting set referred to will carry in connection with a flat top aerial 90 feet in length by 80 feet in height, consisting of four strands of No. 22 wire; wires spaced 2 feet apart?

Ans.—(2) The wave-length of the aerial is about 320 meters. It will be raised considerably by the insertion of an oscillation transformer. Inasmuch as the emitted wave will not comply with the law, you should erect an aerial of decreased dimensions having a natural wave-length of about 160 or 165 meters. If, however, you are allowed to operate this transmitting set in connection with the larger aerial, no difficulty should be experienced in attaining a distance of from 40 to 60 miles.

* * *

F. F., Olympia, Wash., inquires:

Ques.—(1) What is the most efficient length and height of an aerial to be used for both transmitting and receiving purposes? It is to cover a range in receiving from 200 to 2,500 meters by means of a series variable condenser and for the longer wave-lengths will have a condenser connected in shunt. It is proposed to use this aerial for transmission purposes by the insertion of a series condenser. The flat top portion is to have a distance of not more than 60 feet above the surface of the earth.

Ans.—(1) The operation of an amateur transmitting aerial with a short wave condenser connected in series is not entirely satisfactory. The maximum wave-length which your aerial may have for both purposes is 200 meters. When the transmitting set is connected to it the emitted wave without the series condensers will be raised to a value above 200 meters, but can be reduced to that value by the insertion of a condenser of proper capacity. An aerial having a natural period of 200 meters is not wholly suited to the reception of 2,500-meter signals, but fair results can be obtained by efficient design of receiving apparatus. Inasmuch as the natural period of your aerial is 200 meters the insertion of the primary winding of the receiving tuner in series will raise it to a value above that amount. You, therefore, require for the reception of amateur signals a variable condenser of a fair range to be connected in series with that circuit for reduction of wave-length. We do not advise the erection of an aerial of greater wave-length than that given.

Ques.—(2) What should be the size of the glass and foil for the series condenser when transmitting?

Ans.—(2) The condenser should consist of two plates of glass 8 x 8 inches, ⅛ of an inch thick, covered with foil 6 x 6 inches. The plates should be connected in series.

Ques.—(3) How many wires should the flat top aerial contain?

Ans.—(3) Four wires spaced 2 feet apart.

* * *

F. H., Newark, N. J., asks:

Ques.—(1) What is the law for the amount of power to be used in the primary winding to cover a certain distance?

Ans.—(1) If you refer to the United States restrictions, the following applies: Amateur stations may employ up to 1 k.w. of energy in their transmitting sets, provided they are more than five miles from a naval station. When within five miles of a naval station the transformer input should not exceed ½ k.w.

Ques.—(2) Describe how you can calculate whether your wave-length is greater than 200 meters.

Ans.—(2) This observation is preferably made by means of a calibrated wave-meter.

Ques.—(3) Can you give a simple explanation of how the sending and receiving sets work?

Ans.—(3) We refer you to the articles on "How to Conduct a Radio Club" published in THE WIRELESS AGE for April and May, 1915. Note also the article in the series on "How to Conduct a Radio Club," published in the June, 1915, issue of THE WIRELESS AGE. This gives general information for those new in the amateur field.

Ques.—(4) I have a 2-inch spark coil. About how many watts will it consume?

Ans.—(4) About 30 watts.

Ques.—(5) When I send with this coil, my galena detector is knocked out of adjustment. How can this be avoided?

Ans.—(5) The receiving detector should be disconnected from the receiving circuits and short-circuited with a small switch during the periods of transmission; or, if desired, a condenser of 5 microfarads capacity may be connected around the detector during the periods of transmission.

* * *

L. F. S., Los Angeles, Cal., asks:

Ques.—(1) Please give full data for the construction of a 1 k.w. open core transformer.

Ans.—(1) See the answer to the inquiry of F. E. H. in this issue.

Ques.—(2) What causes the fading out of long distance signals?

Ans.—(2) This matter has never been definitely settled. Various theories have been advanced, such as the absorption of reflection and refraction of the wave energy. In many cases the fading out of signals has been attributed to poor design of the transmitting apparatus. This assertion, however, has been in the main disproven. See pages 112 to 115 in "Text Book on Wireless Telegraphy," by Rupert Stanley.

Ques.—(3) Is it not unlawful to use the signal . . . ——— instead of ——— . . . which is supposed to take the place of the word "from"?

Ans.—(3) The rules of the International London Radio Telegraphic Convention make no stipulation for the use of the first signal, authorizing the second one only.

* * *

R. F., Detroit, Mich.

Ans.—A condenser comprising plates of the size you suggest should have a final and total capacity of .01 mfd. for operation on a wave-length of 200 meters. Each plate, as you describe it, will have a capacity of .0004 mfd., and you should therefore connect twenty-five of these plates in parallel to reach the desired wave-length.

With a condenser of this capacity the primary winding of your oscillation transformer need not consist of more than two turns of copper ribbon having an inside diameter of about 8½ inches. The secondary winding may have from 10 to 12 turns, depending, of course, upon the size of the aerial with which it is to be employed. The secondary voltage of the transformer you describe is a little low for amateurs' work; an amateur's transformer preferably has a secondary voltage of from 15,000 to 18,000 volts.

A rotary spark gap suitable for your needs should have 10 stationary electrodes and 2 movable; that is to say, 5 on each side of the complete circle.

* * *

C. G. H., Newark, Ohio, inquires:

Ques.—(1) Is the Key West, Fla., station on the Keys or on the Florida mainland?

Ans.—(1) It is situated on the Keys at a considerable distance from the mainland, about 40 or 45 miles.

Ques.—(2) I have a 30,000-volt transmission line at right angles to my aerial and at a distance of about 100 feet. I have heard of placing two extra outside wires in the aerial and grounding to certain apparatus. Can you give me information regarding the nature of this equipment? The inductive noises from this transmission line interfere considerably.

Ans.—(2) An article covering this particular subject appeared in the series on "How to Conduct a Radio Club" in the July, 1914, issue of THE WIRELESS AGE. In the system described a second aerial is erected near to the transmission line and earthed through a second primary winding of the receiving tuner. This primary winding is so constructed and connected up that it is in magnetic opposition to the ordinary winding connected to the aerial. In this manner the inductive influences from a transmission line may be decreased considerably.

Ques.—(3) Are the stations recently opened by the Marconi Company at Belmar in operation? What wave-length and what time do they work?

Ans.—(3) Owing to the fact that the corresponding stations in England have been taken over by the British Admiralty, these stations are not yet open for commercial use.

* * *

K. B. W., Carroll, Ill.:

Ans.—Regarding your communication relative to harmonic tuning: The harmonics of a transmitting set do not carry to any appreciable distance. While they may, to some extent, exist, the radiated energy is extremely feeble.

An antenna having a natural wave-length of 500 meters is, as you already understand, entirely unsuitable for work on 200 meters, and it is preferable therefore to erect two aerials, one having a wave-length of 500 meters to be used for the reception of long wave-length signals, and the second one to have a maximum receiving wave-length of not more than 600 meters.

For the pure reception of amateur signals the receiving antenna should have a natural period of not more than 180 meters. An antenna having linear dimensions of 60 feet and a height of 40 feet will have a natural wave-length of about this value.

Numerous attempts have been made to receive signals from a distant station by adjusting the antenna circuit to a definite wave-length and then the local detector circuit to some sub-multiple of the natural frequency. In some cases, when the receiving station is nearby to the transmitting station, signals are received, but they are not particularly due to harmonic tuning. They are simply the result of forced oscillations, owing to the closeness of the transmitting apparatus.

When an amateur receives 200-meter signals on a wave-length adjustment of 1,200 meters, the results are probably caused by ill design of the receiving tuner which results in the complicated phenomena that may give some portion of the circuit a natural wave-length of 200 meters, resulting in the reception of the signals. This, however, cannot be the most efficient condition of the circuit and by proper re-design of the antenna system and associated receiving apparatus increased strength of signals will be effected. In order to cover the maximum distance it is positively necessary that the stations be in electrical resonance throughout.

For the results of certain experiments along this line we refer you to pages 279 and 280 of Pierce's "Principles of Wireless Telegraphy."

* * *

R. F. C., Westerly, R. I., asks:

Ques.—(1) Please advise me as to the probable wave-lengths of an aerial comprising 3 wires spaced 3 feet apart, 40 feet above the earth, and 100 feet in length.

Ans.—(1) The natural wave-length of this aerial is about 250 meters.

Ques.—(2) I already hear the signals of the Arlington station in the daytime. Will I be able to hear the Key West Naval station at nighttime?

Ans.—(2) You should receive the signals of this station during the more favorable months of the year at night with little difficulty.

Ques.—(3) Will a bell ringing transformer be practical for a 2-inch coil with alternating current?

Ans.—(3) We have witnessed no experiments in this direction, but have been advised that several amateurs have so operated induction coils.

Ques.—(4) Will you kindly give me advice for the construction of a simple wave-meter?

Ans.—(4) Note the article in the series on "How to Conduct a Radio Club" published in the February, 1915, issue of THE WIRELESS AGE.

Between the Log Lines

Editor's Note:—All commercial wireless operators are required to keep a record of communications sent by wireless to and from vessels and shore stations, setting down also any incidents of the wireless traffic which serve as a guide to the heads of the department. The record is called a "log" and is turned in by the operator on the completion of each voyage. Land stations, too, send in reports regularly. For the most part these documents are made up of an uninteresting mass of data, of value only to traffic officials; but occasionally a note of human interest creeps into an entry. Sometimes the incidents are humorous, and often they are dramatic. The few random extracts printed on this page give some idea of the highly diversified life of the commercial operator of today.

OPERATOR J. A. JACKSON, on the steamship Santa Rosalia, lying at her dock at Santa Rosalia, Mexico, says that at half-past eleven o'clock on the night of October 6 he was "aroused by shots on shore and a great tumult." An explanation of the disturbance is contained in an entry in the log, an hour later: "Boleo Company's representative informs us a revolution has broken out on shore." At half-past one o'clock in the morning, it is recorded, Jackson "worked NWG (U. S. S. West Virginia, flagship of the Pacific fleet) and told him that the chief of arms had been killed and serious trouble was feared. Help urgently required." At two o'clock the firing had not stopped and it was not until two hours afterward that the log records "Turned in," showing that Jackson had sought relief from his long night vigil in slumber. He did not spend a long time in his berth, however, for at fifteen minutes after nine o'clock he "worked NBJ (the United States warship Albany at Guaymas) and informed him of the trouble. The Boleo Company's representative requesting immediate assistance." Jackson's log relates that he told the Albany at half-past twelve o'clock in the afternoon that the revolutionists had imprisoned the German consul and at eight o'clock in the evening he flashed the news that "the Boleo Company's manager and about 100 ladies and children would be aboard this ship to-night for protection. One man killed on shore so far this evening." The following morning at seven o'clock "the Albany arrived and anchored outside the breakwater." As the log tells the story of the lapse of time from eight o'clock in the evening of the day the Albany arrived to five o'clock in the afternoon of October 11: "Nothing stirring on shore. Albany left early this morning for Guaymas."

* * *

Log entries refer to the difficulties encountered by the steamship Santa Marta. Virginia Beach says that at eight minutes to nine o'clock on the night of February 18 "KLG (Santa Marta) is in trouble yet. Sea very rough. They are going to try steering with hawsers over the stern." At fifteen minutes to three o'clock in the afternoon of the following day the revenue cutter Onondaga was on her way to the Santa Marta, the Virginia Beach log relating that at five minutes after nine o'clock on February 20 "the revenue cutter is now alongside KLG" (the Santa Marta).

* * *

Operator Worrall on the Medina, from Rotterdam bound for New York, on January 22, entered the following in his log: "9 A. M. Passing the vicinity of where yesterday the German submarine sank the British coast patrol ship Mascot. Various bits of flotsam and wreckage are drifting by."

* * *

From Virginia Beach comes word that Operator F. O. (A. Y. Forrest) of that station recently inspected the Dacia while she was lying at Norfolk, and coming down the ship's ladder with Captain McDonald a moving picture man busily turned the crank for the delectation of the curious public.

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Vessels Equipped With Marconi Apparatus Since the June Issue.

Names	Owners	Call Letters
Escaut	Belgian Government	OSE
Lydie	Belgian Government	OSL
Grace Dollar	Dollar Steamship Co. (re-equipped)	WSF
Schooner Oregon	Crowley Launch & Tugboat Co.	WOU
S. M. Fischer	Reid Wrecking Co.	WPH
Santa Rita	Sun Co.	WTG

PERSONAL ITEMS

Edward J. Nally, vice-president and general manager of the Marconi Wireless Telegraph Company of America, left New York for San Francisco and Hawaii on June 5, accompanied by Mrs. Nally and their children.

David Sarnoff, assistant traffic manager of the Marconi Wireless Telegraph Company of America, was in Rochester, N Y., recently, where he attended the convention of the Association of Railway Telegraph Superintendents.

Sydney St. John Steadman, of the English Marconi Company, who has been in New York for several weeks, has left for San Francisco.

Charles S. Franklin, of the English Marconi Company, who accompanied Guglielmo Marconi on the latter's recent visit to New York, sailed for England on June 3.

The radio inspector of the Bureau of Navigation at San Francisco recently sent word to Washington that awards made known give the Bureau of Navigation a silver medal for educational demonstration of methods and apparatus for enforcement of Federal radio laws. Frederick C. Kolster, as collaborator, received a bronze medal and R. B. Woolverton, as collaborator, received honorable mention.

The wedding of Miss Elsie A. Guldeman, of Los Angeles and A. W. Peterson, of the Hillcrest Marconi station at San Francisco, took place on April 29, at the home of Judge Michael Roche, a friend of the couple.

Frederick M. Sammis, chief engineer of the Marconi Wireless Telegraph Company of America, has returned to New York after a trip to the Northwest, where he made an inspection of the stations in the Northern District.

THE SHARE MARKET

New York, June 22.

Pending the re-opening of the important patent actions postponed by Mr. Marconi's departure for the war without completing his testimony, trading in American Marconis is reported by the brokers as lighter than for several months. Up to the closing hour no sales for the day had been reported and one prominent trader is authority for the statement that his office had not executed an order in six days. This would show, according to Wall Street opinion, that share holders are refusing to part with their stock until the favorable decision expected shall influence a rising market. Trading in other Marconis remains about the same, the conditions reported in the June issue still maintaining in an idle market. Prices show no appreciable decline or advance from the established levels of the past few months.

Bid and asked quotations today:

American, 2¼-2⅝; Canadian, 1-1½; English, common, 9½-14; English, preferred, 8½-13.

MARCONI A LIEUTENANT

A newspaper dispatch from Rome says that Guglielmo Marconi has been made a lieutenant in the Aeroplane Corps of the Italian Army.

RIO DE JANEIRO OFFICES MOVED

The offices of Marconi's Wireless Telegraph Company, Limited, in Rio de Janeiro, have been removed to 37 Rua Visconde de Inhauma opposite the headquarters of the Ministry of Marine and near the offices of the Royal Mail Steam Packet Company.

RADIO RAVINGS

Conducted by D. Phectiff Inslater

SENSELESS

He was a wireless operator—
She was a thoughtless maid—
Out on the grassless lawn together,
Under the treeless shade,
Playing a game of netless tennis,
This, with a bounceless ball—
When from their dineless middle regions
Echoed a soundless call.

Then through the pathless walk they ambled,
Each with a stepless gait,
Into the flyless room for dining;
Each to a foodless plate.
Each with a smileless face then settled
Down in seatless seat.
"Ah, what a tasteless taste!" he muttered;
"Oh, for a biteless eat!"

First 'twas a meatless meal they ordered;
Topped with a crustless pie;
Next o'er an iceless ice they dallied,
Each with a blinkless eye. . . .
Ah, what an endless end I'm reaching—
End of this wordless drool—
He paid the check with a centless dollar
Earned in the Marconi School.

"William," she read, means good. "James means beloved. I wonder——"

A flush mantled her cheek.

"I wonder," she softly murmured, "what George means?"

"George means business, I hope," said mother.

Speaking of money—which, in these very solidly United States, is the Universal Occupation—reminds us of the time that Radio-Fitz charmed a Sweet Young Thing aboard the Momus and heard her chirp, "A penny for your thoughts!"

Hm, soliloquized the operator, 'tis progress—a better offer than THE WIRELESS AGE ever made me.

Which, of course, is a libelous statement. Fitz was paid very generously for his contributions, so generously in fact, that we haven't had one of his pen effusions in a long time.

Lots of our authors have forsaken art for commerce, though. One of our most loyal amateurs recently started making transformers. He announced that he would sell them—but only to big supply houses. We hoped he would, and said so. Several weeks elapsed, though, and not a word was heard. Then we wrote. The reply surprised us. In one big supply house he had been given two orders.

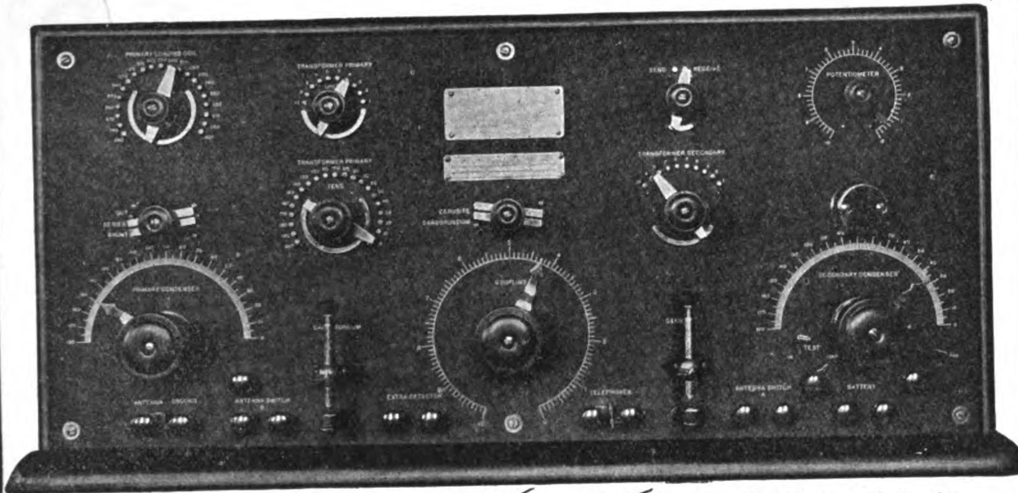
One was to get out.

The other was to stay out.

Giving, to fill out the page, this merry quip a nautical turn means reversion to war talk. . . . And why not? . . . What has become of the Neutral-Americans? . . .

Confidently, then:

Is the Atlantic fer boatin' or verboten?



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S O S

The Marconi Wireless Telegraph Company sends no S O S messages for material—it must be tested and tried, especially for this latest type of Marconi Receiving Set for the U. S. Government and high power stations.

The front panel of this, said to be the most efficient instrument of its kind, had to be of extremely high insulation, had to be non-hygroscopic, that's why it's of

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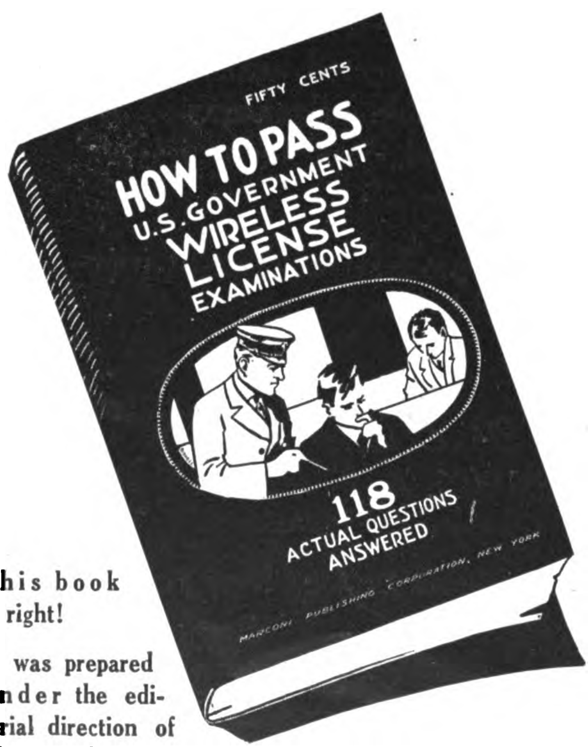
Ans.—By the rules of the London Convention the normal wave lengths for a vessel are 300 and 600 meters, either one of which is to be used for calling purposes. The convention regulations also specify that any wave length between 300 and 600 meters may be employed for communication after the call has been effected.

In case of accident to the antenna at sea, if, for example, a portion of it were blown away, on account of the reduced wave length of the aerial, the aerial tuning inductance might not have sufficient

Sit down and write out the balance of the answer—if you can! And this is a very simple question, taken at random from a collection that covers every phase of the license examinations.



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FOR SALE—Wireless Amplifier, exactly as described on page 394 of February, 1914 issue of Wireless Age, $100. Wireless Age, Dept. M. 450 Fourth Ave., New York.

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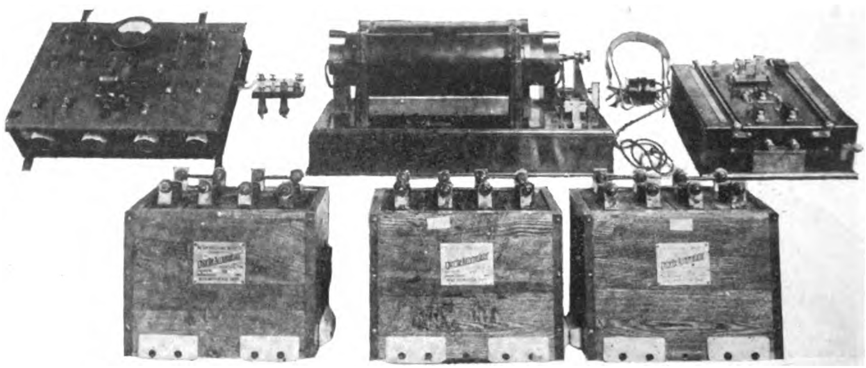

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Descriptive circular on application to Dept. M.

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The Marconi Ideal

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Courtesy means respect, politeness, kindliness. It is synonymous with good breeding.

The reputation of any public utility rises or falls on the friendship of the public. An act of indifference to a patron, though it be from the humblest employee, is a reflection on the whole organization.

The spirit of the Marconi Company will be known to the public chiefly as it is reflected in the acts and attitude of its employees. An inquiry, no matter how trifling it may seem to the employee, may be of relatively large importance to the questioner and should be met with respectful interest. That man is approaching closest to the Marconi Ideal, who, in the performance of this or any other service, behaves with a politeness which relieves the customer of a sense of obligation.

Every reference to "Marconi", whether written or spoken, is a reminder of a great service rendered to mankind. It is our company's privilege to bear a birthright founded on one of the greatest of all man-given benefits to humanity. Let us be worthy of it, and of its ideal, and in so doing, build character for ourselves and promote the fair fame and prosperity of our company.

E. J. Nally,

Vice President and General Manager