THE WIRELESS AGE

MAY

1915

SOME STIRRING EXPERIENCES OF OPERATORS

TOLD IN THIS ISSUE

FIFTEEN CENTS

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A list of some of the best books pertaining to the wireless art. We have made arrangements whereby we can supply our readers with any book on wireless published in America at regular published price. We can also import on order any book published abroad. *Send us your orders. They will receive prompt attention.*

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The Marconi Publishing Corporation

450 4th Avenue
New York, N. Y.

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) — May, 1915 — No. 8

CONTENTS

RENEWALS When your subscription expires you will find a renewal blank enclosed. You should fill out and return same with remittance at once to avoid missing a number. Positively no copies will be mailed on any subscription after same expires unless renewed, and we cannot agree to begin subscriptions with back numbers.

CHANGE OF ADDRESS Notify us promptly of any change in your address, giving both the old and new location. Since our mailing list for each issue closes the 20th of the month, changes received after that date must necessarily take effect with issue for the second month following. Postmaster as well as Publisher should always be notified of changes in order to forward mail sent to old address.

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The Deadly Parallel

NEW YORK HERALD, April, 5th

The efficiency of the Herald Wireless Station . . . was demonstrated again when a message, the only one picked up by a land station, was received yesterday, to the effect that the S.S. Prins Maurits . . . was badly in need of assistance, east of Cape Hatteras.

A few minutes before nine o'clock yesterday morning, the operator at duty at the Herald Station heard the cruiser signal for all vessels and land stations to stand-by. . .

. . . The following message was received here: "The Prins Maurits is in distress and badly in need of assistance in latitude 36.30 north, longitude 74.49 west."

At 10 last night the wireless station at Cape Hatteras reported to the Herald Station that nothing had been heard from the Prins Maurits although several vessels had heard weak wireless signals which they believed came from the disabled vessel.

At midnight the wireless operator on board the City of Atlanta . . . told the Herald Wireless Station that the City of Atlanta had searched the vicinity, (etc., etc.).

CAPE MAY LOG, April, 3rd

8:45 A. M. Prins Maurits in latitude 36.10, longitude, 74.00, sending out S.O.S. "Come quickly." Sent position to Cape Hatteras and also sent same broadcast three times.

(Special Report from Cape May)

A few minutes later a British cruiser laying off the Capes called CQ and repeated what I had already sent. The S.S. Princeton at 8:55 A. M. began to give WHB (New York Herald Station) the position, and told WHB she was 24 hours from the PEL.

(Special Report from Cape Hatteras)

The Herald reports that their station was the only one in communication with the Prins Maurits, which was untrue, in fact this is the first intimation that we have had that they received the news at the time. The location was also misrepresented. We received direct word to the effect that the ship was sinking in latitude 36.10, longitude 74.00. This is about 90 miles northeast by east of Cape Hatteras.

(Special Report from Cape Hatteras)

To the best of our recollection we have never worked direct with the wireless station of the Herald on this or any previous occasion, nor do we have any recollection of hearing any of these ships working with that station on the night in question.

(Special Report from Virginia Beach)

We have no record showing that any of our stations communicated news direct to the New York Herald Station.

(Special Report of Operator McKenzie, S.S. City of Atlanta)

The only reason for the New York Herald getting hold of this information that I can give is that the operator may have overheard some conversation between the City of Atlanta which was not in message form, as is common in cases of this sort; as everybody was keeping each other informed of the proceedings.

THE WIRELESS AGE

Statement of the ownership, management, circulation, etc., of THE WIRELESS AGE, *published at New York, N. Y., required by the Act of August* 24, 1912. *Editor, J. Andrew White,* 233 *Broadway, New York; Managing Editor, J. Andrew White,* 233 *Broadway, New York; Business Manager, John Curtiss,* 450 *Fourth Avenue, New York; Publisher, Marconi Publishing Corporation,* 450 *Fourth Avenue, New York. Owners: Marconi Publishing Corporation,* 450 *Fourth Avenue, New York.*

Stockholders holding 1 *per cent. or more of total amount of stock: Marconi Wireless Telegraph Company of America,* 233 *Broadway, New York City.*

Stockholders of Marconi Wireless Telegraph Company of America holding 1 *per cent. or more of total amount of stock: Grenfell & Co.,* 3 *London Wall Bldgs., London, England; Francis Robert Gregson,* 5 *Lowndes Street, London, S. W., England; Heybourn & Croft,* 43 *Threadneedle Street, London, E. C., England; Marconi's Wireless Telegraph Co., Ltd., Marconi House, Strand, London, W. C., England; Simon Siegman, c/o Kuhn, Loeb & Co.,* 52 *William Street, New York, N. Y.; Swiss Bankverein, London, England; Nieuw Amsterdamsch Administratiekantoor, Heerengracht,* 136, *Amsterdam, Holland.*

Known bondholders, mortgagees, and other security holders, holding 1 *per cent. or more of total amount of bonds, mortgages, or other securities: None.*

JOHN CURTISS,
Business Manager.

Sworn to and subscribed before me this 19*th day of March,* 1915. C. J. OLIPHANT,

Certificate filed in New York County, No. 17, *Commission Expires March* 30, 1917.

MAY, 1915

Annual Meeting of the American Marconi Company

AT the annual meeting of the Marconi Wireless Telegraph Company of America, held on April 19 at its offices, Nos. 243 and 245 Washington street, Jersey City, N. J., the yearly report of the directors was presented, a summary of the company's business being given. The following were reelected directors of the company to serve for a term of five years: Edward L. Young, John Bottomley and George S. De Sousa. At the adjourned meeting of the directors held on April 20 the following officers were elected to serve until April, 1916, or until their successors be elected: President, Hon. John W. Griggs; first vice-president, Guglielmo Marconi; second vice-president and general manager, Edward J. Nally; third vice-president, secretary and treasurer, John Bottomley; assistant treasurers, George S. De Sousa and Reuben S. Harlan. Hon. John W. Griggs, Guglielmo Marconi, Edward J. Nally, James W. Pyke, James R. Sheffield, and John Bottomley were reelected members of the Executive Committee for the ensuing year.

The Report of the Directors

The report of the directors follows:

To the Stockholders:

The Directors of the Marconi Wireless Telegraph Company of America hereby submit Balance Sheet and Profit and Loss Account for the year ended December 31, 1914, as prepared by Messrs. Arthur Young & Company, Accountants and Auditors.

The acquisition in 1913 of the tangible assets of the United Wireless Telegraph Company by your company, placed under its control all of the coast stations of importance on both the Atlantic and Pacific coasts, besides which practically the whole of the American mercantile marine is at present fitted with wireless apparatus.

The number of ship and shore equipments now operated by your company is approximately twenty times that of three years ago.

This growth has made imperative a proper organization to operate the company as a public utility of nation-wide importance, and the development of a competent organization and working staff to conduct the business economically and efficiently has been one of the most noteworthy achievements of the twelve months past.

Through exhaustive study of present requirements and future needs many vital readjustments in administration policies have been effected; a searching investigation has been made to determine manufacturing costs and the operations of the company have been placed on a basis which is fair and equable to patrons but allows your company a greater margin of profit.

For the first time since the organization of the company the field of wireless communication has been cleared for proper development. Building up the company to its present strength and importance, which would ordinarily have been a hard enough task, has been made doubly difficult by meeting with competition of companies having no regard for your company's vested patent rights.

The accomplishments of this year, however, reflect the wisdom of the early established and steadily maintained pol-

icy of your company: To remain a progressive public serving utility, directing every energy to bring the wireless art to its highest possible perfection, conducting its business on a fair margin of profit, and at all times giving its clients the best service possible. In conformity with public demand your company's service has been steadily extended and its apparatus developed to a standard recognized by the Government, the steamship owners, railroads and large industrial companies.

Report on Manufacturing

The factory purchased and equipped at Aldene, N. J., has been found admirably suited to your company's purposes. Exceptional shipping facilities, convenience to the New York headquarters, a floor area of 20,000 square feet and ideal hygienic conditions have all added their quota of productiveness to the operation of an equipment comprising nearly 100 types and styles of manufacturing machinery.

Aside from supplying apparatus for new installation contracts, the factory is steadily engaged in producing improved equipments, with the object of gradually replacing all apparatus now in service which (as the Interstate Commerce Commission defines it) is out of date "through obsolescence or inadequacy resulting from age, physical change, or supersession by reason of new inventions and discoveries." In this way clients will have better apparatus as individuals and better service as a system, each unit being benefited with each step in the gradual substitution of advanced apparatus.

Report of Rental Increase

To secure a return commensurate with investment and cost of operation it was found necessary to raise the rental figure of the ship equipment contracts which were acquired with the purchase of the assets of the United Wireless Telegraph Company. These contracts had been made at so low a figure that carrying them to the expiration of their full terms entailed a substantial loss to your company. As fast as these contracts expired your company has endeavored to make new ones on a more equable basis and with provision for the increased cost of operation, due to the necessity of maintaining the great number of shore stations required to give the steamships the service they need and the public the full margin of safety under the regulations of the U. S. Radio Act.

But while your officers were convinced and made known the fact that the condition of the company's business justified asking the increased rates, organized opposition was encountered from steamship companies which had long enjoyed the lower figures. The natural opposition to the added expense was encouraged by manufacturers who offered to steamship owners various types of apparatus for outright purchase, pointing to the advantages of the compulsory opening of shore stations to all ships under the Berlin Convention, through which their individual equipment was made operative with expensively installed and maintained Marconi system of shore stations.

In the face of combined opposition of this character your officers steadfastly adhered to the rental policy, and are pleased to report eventual success in convincing steamship owners of the justice of the rate increase, and as rapidly as the old contracts expire, they have been able to renew at the higher figure.

Under all new arrangements a standard contract has been prepared; no favors or privileges are given to one client in discrimination over any other.

Report on High Power Stations

In addition to the progress made in ship and shore communication, much has been accomplished during the year with the high power stations for long distance work. In the northern district on the Pacific Coast—probably the largest in point of territory in the Marconi organization—there has been completed a powerful station at Ketchikan, Alaska, and a chain of wireless stations to cover this territory has been planned.

Congress recently passed a bill authorizing the construction of an Alaskan railroad at a cost of $40,000,000.00, and with the new transportation facilities it is estimated that the rich production of this region will be enormously increased.

That wireless telegraphy will experience a corresponding rise in commercial importance is evidenced by the fact that for years the only telegraphic communication between the United States and Alaska has been by a Government-owned cable which operates but six hours a day.

At Juneau your company has another station under construction and the United States terminal at Astoria, Oregon, is nearing completion. This latter plant will be ready about May 1, and the first link in the chain will then be opened to public service.

Your company's Trans-Pacific service between San Francisco and Honolulu was opened September 24, and with but few interruptions of short duration, due to the failure of the power company to supply current, has been working continuously ever since. The service rendered has been most satisfactory and almost without complaint from the public.

This service was inaugurated with a substantial reduction in the rates established and maintained by the cable company over a period of some eleven years' operation. As a result your company secured most of the business and, notwithstanding the fact that the cable company was compelled some months since to reduce their rates to meet ours, the volume of wireless traffic still shows a continued increase. Two new classes of messages, the Night Letter and the Week-end Letter, which were introduced into the wireless service, have become very popular with the Hawaiians.

The arrangements made for direct service between New York and London had been practically completed when the outbreak of the war forced your officers to set aside the vigorous campaign through which it had been planned to secure a share of the Trans-Atlantic cable business. The duplex stations at Belmar, N. J., and New Brunswick, N. J., were completed and being tested late in July when word came that the corresponding English stations at Carnarvon and Towyn, in Wales, had been commandeered by Great Britain for the use of the Admiralty. This came as a very serious blow to your company's hopes. A strong Trans-oceanic Department had been organized and twenty-four hour service was to be provided through a new commercial office opened in the heart of New York's financial district.

There is small likelihood that your company shall be able to continue tests or open the stations to public service until the end of the war, but when that time arrives your officers expect to be reimbursed in full, claims for indemnity on losses sustained being included with those which the affiliated English Marconi Company will ask from the British Government.

The direct service between Boston and Norway through the trans-oceanic stations which have been building at Marion, Mass., and Chatham, Mass., has also been blocked by the war. The construction work on both the stations of your company and those in Norway is almost finished and the installation of the apparatus could have been completed before now had it not been that the equipment is being made in England. It is doubtful whether it can be delivered here or in Norway until the war is over.

Norway, though popularly conceived as a country of little commercial importance, in reality ranks fourth in tonnage among all the maritime powers of the world, and the connection with Boston, one of America's greatest seaports, should prove a profitable one when the circuit can be opened.

Development of New Fields

The application of wireless to railroading has made some advances following the graphic demonstration of its utility during the blizzard which swept the Eastern States early in last year. All the railroads in the zone affected were blocked for hours, and in some cases, days, the one exception being the Lackawanna Railroad, which had installed a Marconi system, and through it operated its trains wholly by wireless and without mishap. Two other railroads called upon the Lackawanna to forward messages and were greatly aided during the time when their wire telegraph lines were prostrated. Wireless telegraphy as an auxiliary means of communication is now receiving the close consideration of railroad organizations and from all appearances this branch of your company's

business is soon to be considerably expanded.

Report of the Legal Department

The long series of court proceedings growing out of the exploitation of Marconi's wireless telegraphy, which has tried your officers' patience through many years, has finally been crowned with several splendid decisions rendered in your company's favor.

In a suit entered against the National Electric Signaling Company, Justice Veeder of the U. S. Court on March 17, 1914, decided that Marconi was beyond doubt the inventor of wireless telegraphy and the patents he secured in 1897, 1898 and 1904 were valid. The opinion emphatically stated, "the evidence establishes Marconi's claim that he was the first to discover and use any practical means for effective telegraphic transmission and intelligent reception" of wireless signals.

Following this decision, suit was brought against the Atlantic Communication Company which uses the Telefunken apparatus of Germany. The court granted a restraining order, excepting, however, U. S. Government apparatus and the Government-owned Panama Steamship line equipments; later your company's opponent was enjoined and gave a bond of $14,000.00 to cover apparatus already installed.

Motion for an injunction against Fritz Lowenstein, who has been supplying infringing apparatus to the Government, was opposed by the Navy Department and was denied as regards equipment furnished to the Government.

Testimony is now being taken in two suits pending in San Francisco involving the Federal Telegraph Company and its Poulsen system.

The suit instituted in the Southern District of New York against the DeForest Radio Telegraph & Telephone Company and the Standard Oil Company, resulted in a preliminary injunction from Judge Hough, who voiced decided disapproval of the transaction in these words: *"I am convinced that down to the present time the expense of operation (and of litigation) has been so enormous that complainant* (Marconi Company) *has received no fair return from the invention which under decisions now ruling, I must hold to be of the greatest value and worthy of praise and reward."* Subsequent motions to vary or modify the order were denied and the Standard Oil Company reinstated Marconi apparatus on its ships at the raised rental figure.

Suit for infringement has also been brought against DeForest on the Fleming valve patent, of great importance because of superior effectiveness as a receiver of wireless signals. A counter action claiming infringement of several DeForest patents on modifications of the Fleming valve has been filed in New Jersey.

The Fessenden patents, owned and controlled by the National Electric Signaling Company, were sustained in a suit brought against the Telefunken interests and your company has since entered into a license agreement with the National Company which enables it to use what is known as "high frequency" apparatus, and have in turn granted the privilege of using the two well sustained tuning patents of Marconi and Lodge. Under this agreement your company secures the use of 171 patents owned by the National Company. The agreement further provides for an exchange royalty on all equipment sold or rented, and disposes of all pending appeals and active litigation with the National Company, leaving your company in a very strong position in event of any action arising through its use of "high frequency" apparatus.

Report of the Engineering Department

As a permanent organization your company must look upon service as the big influence in the continued patronage of the public. The policy of gradually replacing old steamship equipments with new and better apparatus has been well begun with the installation of more than two hundred sets during the year ended. It has not been your officers' aim to effect an instantaneous nor a general substitution of the latest production of the engineers, but to work toward the replacement of equipment which would soon become obsolete or inefficient, appreciating that with each change the entire Marconi system would be benefited.

APPARATUS STANDARDIZED

It has been determined that with the recent development in the art the adoption of standardized apparatus is now practicable, and foremost in the record of the year's progress is the design of a commercial set in which the various parts of the apparatus are mounted on a single switchboard panel. With this improved equipment an installation can be made in one-quarter of the time formerly required and with a proportionate saving in labor and expense. Under the old conditions the installing engineer located the various apparatus comprising the set according to his best judgment, uniformity of installation being impossible owing to the varied construction of ship cabins.

ADJUSTMENT SIMPLIFIED

The new standardized equipment has the further advantage of complete assembly and testing at the factory and later shipment intact. In its construction special provision has been made for quick and convenient means of varying the transmitted wave length to prevent interference from other stations, and the tuning apparatus has been considerably simplified.

AUXILIARY PANEL SET DESIGNED

With the growing demand for more powerful emergency transmitting equipment a similar but smaller panel set has been produced and placed in service. It occupies minimum space and is capable of operation with the current furnished by the vessel's main or auxiliary power supply.

GOVERNMENT CONTRACTS SECURED

A variety of experimental fields have been explored and a quantity of research work covered, to the end that some revolutionary changes have been made in apparatus construction. The United States Government has purchased considerable apparatus for the Navy, and your company has supplied all the new equipment for the Army and the Revenue Cutter Service. A line of high frequency measuring apparatus has been developed and outside sources no longer need be depended upon for these important instruments.

WIRELESS TELEPHONE DEVELOPED

It is also practically assured that during the coming year a commercial wireless telephone will be placed on the market.

Revenue from Message Traffic

While in the year ended there has been created a new source of revenue from Trans-Pacific stations, the message traffic between shore and ship has been greatly affected by the war. The revenue from ships flying the American flag has been considerably increased, but the gain thus made has not been sufficient to offset losses due to the withdrawal of so many foreign ships from American waters.

Beginning with November, the curtailment of the revenue from long distance press service and ship traffic show distinct losses over previous years, yet prior to that time and notwithstanding the war, your company's message traffic between shore and ship every month showed a handsome increase over previous years. That this increase would have been greater but for the war goes without saying, but the fact nevertheless remains that revenue from message traffic has been seriously affected by the paralyzing effect of the European hostilities on maritime commerce.

Casualties and Rescues

As in past years, new instances of the humanitarian values of wireless telegraphy are again emblazoned on your company's imperishable record of service to mankind. Although long recognized as an indispensable aid to navigation and an invaluable means for saving life, a greater and more significant fact, borne out again as in years past, is that Marconi wireless has never failed. The apparatus has ever been reliable, the men dependable.

Every important marine rescue of the year was effected with Marconi apparatus, manned by Marconi men. In the courts, laboratories and newspapers, other wireless men and "systems" are occasionally heard from, but when something is done, when wireless is needed urgently, it is always Marconi men and apparatus which respond to the appeal for succor in emergency. While it is true that this effectiveness is in a great measure due to your company's appa-

ratus being installed on practically every vessel of the American merchant marine, it is nevertheless gratifying beyond expression that in the many cases where it has been put to the test there have been no failures. Into the service there has grown what has come to be known as the Marconi Tradition—that Marconi never fails.

Appreciation of wireless operators' devotion to duty has been recorded in the public press reports of many great ocean tragedies, but a record your officers are equally proud of, and take this opportunity to recognize, lies with the many silent heroes who continually rise to emergencies and are overlooked because the mishap has a successful outcome.

The year has carried with it a number of unfortunate marine disasters and many indications of the highest courage and devotion to duty among operators. Standing out clear and sharp is the noble self-sacrifice of Ferdinand Kuehn, who, after flashing a successful appeal for aid, when on January 30th, the passenger laden Monroe sank in fog-bound waters, gave his life preserver to a woman passenger and with it gave also his life.

Worthy of equal commendation is the manner in which Loren A. Lovejoy proved himself the man for an emergency when on the steam schooner Hanalei, pounded on a reef until her wireless cabin was washed away, he signaled code instructions by a pocket flash light lamp to the lifesavers on the beach, and thus directed the work of rescue. Operator Lovejoy was saved and remains in your company's service; his assistant Adolph J. Svenson, who rendered invaluable and heroic assistance, was drowned when the ship broke up and the passengers were being transported to safety.

A memorial fountain to the wireless operators lost at sea has now been completed and stands in Battery Park, New York. The majority of the contributions toward its erection have been subscribed by Marconi operators.

Expenditures and Reserves

In a period of abnormal conditions your company has made steady progress in development of necessary organization and provision for future betterment and growth when the plans for expansion shall be made operative with the close of the war.

Meanwhile, all expenditures for new construction have been reduced by postponing such work as was not immediately necessary, economies have been effected in all stations where it has been possible to reduce the staff and hours of operation, and expenditures of all kinds are given the most careful scrutiny before being authorized.

Your directors have decided on a policy of depreciation and depreciation reserve and have set aside from the operating revenues substantial amounts for the purpose of creating and maintaining proper and adequate depreciation reserve; first, to cover those losses defined by the Interstate Commerce Commission as "suffered through current lessening in value of tangible property and wear and tear not covered by current repairs"; second, to meet depreciation of patents and patent rights.

For the Directors,

JOHN W. GRIGGS, *President.*

The balance sheet of the company will be found on pages 568-569.

THE SHARE MARKET

New York, April 22.

The influence of the speculative trading on the Stock Exchange has not extended to the outside market and the transactions of the day continue regular and equal to the expectations of the brokers. The sagging tendency following spectacular rises in listed industrials is not reflected in curb issues and Marconis remain steady and mildly active. The English shares retain the slight advance reported last month. Canadians are stationary and American Marconis show a fractional advance over the previous quotations.

Bid and asked prices to-day:

American, 2⅝-2⅞; English, common, 9-12½; English, preferrred, 8-11½; Canadian, 1⅛-1½.

MARCONI IN NEW YORK

Guglielmo Marconi arrived in New York on the steamship Lusitania on April 24.

MARCONI WIRELESS TEL

BALANCE SHEE

ASSETS

CURRENT ASSETS:			
Cash:			
At Banks and on Hand	$88,436.26		
At Banks on Deposit	560,000.00		
Call Loans with Bankers	190,000.00		
		$838,436.26	
Accounts Receivable		393,334.70	
Investments at Cost (Market Value, March 20, 1915, $1,402,947.50):			
Railroad Bonds and Notes	$1,101,427.75		
Municipal Bonds and Notes	300,000.00		
		1,401,427.75	
Work in Progress, Materials and Supplies		351,637.84	
			$2,984,836.55
STOCKS IN SUBSIDIARY COMPANIES			18,970.00
FIXED ASSETS:			
Real Estate		$314,506.19	
Buildings, Coast Stations, Machinery and Equipment		4,013,875.75	
Ship Stations		294,735.06	
			4,623,117.00
DEFERRED CHARGES			77,243.70
PATENTS, PATENT RIGHTS AND GOOD-WILL			2,763,005.25
			$10,467,172.50

New York City, March 24, 1915.—We have examined the Accounts and Records of the the above Balance Sheet and accompanying Summary of Operations for the year 1914, 31, 1914, and its Operations for the year ended that date.

ENGLISH MARCONI DIVIDEND DEFERRED

Marconi's Wireless Telegraph Company, Ltd. (the English company) has announced that the directors decided to defer payment of the interim dividend on the ordinary shares owing to the abnormal circumstances prevailing. The usual 7 per cent. dividend is to be paid on the preference shares. The statement to shareholders states that the company has continued since the outbreak of the war in full control of its business, but its stations have been largely devoted to Government work. For this reason the new direct public service with New York, which it had been contemplated would have been opened in the summer of last year, has had to be postponed. In other respects

GRAPH COMPANY OF AMERICA

DECEMBER 31, 1914

LIABILITIES

CURRENT LIABILITIES:			
Accounts Payable			$404,228.48
CAPITAL STOCK:			
Authorized 2,000,000 Shares of $5 each		$10,000,000.00	
Less:			
119,486 Shares subscribed for not yet issued			
100 Shares in Treasury			
119,586		597,930.00	
1,880,414			9,402,070.00
RESERVES:			
For Depreciation of Coast Stations:			
As at January 1, 1914	$138,387.37		
Add:			
Amount set aside from 1914 Profits	30,037.74	$168,425.11	
For Depreciation of Ship Stations:			
As at January 1, 1914	$11,589.72		
Add:			
Amount set aside from 1914 Profits	29,473.50	41,063.22	
Against Expiration of Patents, amount set aside from 1914 Profits		50,000.00	
For Contingencies:			
As at January 1, 1914	$24,314.68		
Amount set aside from 1914 Profits	12,500.00	36,814.68	
			296,303.01
SURPLUS:			
Balance per Certified Accounts, January 1, 1914		$214,693.54	
Add: Net Income for year ended December 31, 1914 (after charging $122,011.24 Reserves)		149,877.47	
			364,571.01
			$10,467,172.50

Marconi Wireless Telegraph Company of America, and as a result thereof have prepared which in our opinion correctly set forth the financial position of the Company at December

ARTHUR YOUNG & Co.,
Accountants and Auditors.

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the company's business has been necessarily disturbed, and considerable business which was pending in many foreign countries has been delayed or deferred. This, however, has been substantially compensated for by Government and other business directly resulting from the war. The works and all the company's staff have been working under the highest pressure throughout the whole period.

A number of matters, including the question of compensation and payment for services, being still in abeyance, the directors are as yet unable to estimate with sufficient reliability the results of the business of last year to warrant them at this moment in declaring an interim dividend upon the ordinary shares. They are, however, of opinion

that there is no reason for deferring the dividend upon the preference shares. The directors contemplated being in a position to give shareholders information with regard to other matters of importance concerning the company's business, but as these still remain under negotiation it has been resolved not to delay further this announcement and the payment of the dividend.

Coupons of the preference shares have been payable since April 19 at the Hanover National Bank, New York.

NEW STATION IN BRITISH HONDURAS

The American Consul at Belize, British Honduras, reports the new wireless telegraph station at that point was on February 6 declared ready to receive commercial messages for transmission, subject "to censorship both at Belize and at their destination"; no code or cipher telegrams being accepted for the present.

The tariff now in effect has been fixed at "ten cents per word, to which must be added the charges of other systems" which works out at 35 cents a word from New York or Washington to British Honduras.

The two towers are each 250 feet in height, the equipment in use having a range of action of approximately 600 miles.

The wave length, as given by the chief operator, is "600 meters commercial, 1,000 meters special with Swan Island."

The station is the property of the Government of British Honduras. This public utility, now completed, gives this colony two telegraphic systems—the overland line, Belize to Consejo, British Honduras, then by cable (3 miles) Consejo to Payo Obispo, in the Territory of Quintana Roo, Mexico; overland from Payo Obispo to Puerto Mexico, Yucatan; and again by cable from Puerto Mexico to Galveston, Texas.

So many miles of the overland line passes through a dense jungle, with frequent interruptions by wind storms and falling trees, that the service has proved very irregular.

WIRELESS COMPASS GREAT AID

Crossing the Atlantic in war time with cabins filled sharpened the appreciation of Captain S. C. Hiortdahl, commander of the Kristianiafjord, of the Norwegian-American Line, for every aid to safety at sea as it has intensified the interest of every other careful master of passenger carrying vessels. He was so struck with the possibilities of one of the latest additions of science as a protector of ships and human life that he spent nearly all his time ashore between voyages last winter in experiments on his own account.

He made investigations in this country as he had done in Norway of the wireless compass or direction finder, perfected not long ago under Marconi-Bellini-Tossi discoveries, and in a recent New York newspaper interview expressed warm admiration not only for what service he had found in its use, but also for the safety at sea possibilities he saw in its development. In Norway and off its coast, he said, he had made extensive experiments with the wireless compass in connection with naval vessels of his country, and had obtained gratifying results. Captain Hiortdahl said he had been enabled to ascertain from the shore and from his own ship at sea the exact bearings of other vessels, as verified by their own observations, the results proving accurate and available up to a distance of 120 miles.

"If this instrument is installed on shore stations, which some of the officials in the Norwegian government telegraphic service propose," said Captain Hiortdahl, "it will be possible to send the exact bearings of any ship from that station to another ship. In case of fog or hazy weather this is of incalculable importance. Imagine the valuable service which could be rendered if such reports could be received and sent from Nantucket, Siasconsett and other points on the coast line at a fixed charge to the ship for supplying its correct bearings and allowing the captain to verify his own calculations. We are experimenting with the device at Nantucket and Siasconsett."

OBITUARY

Major S. Flood-Page
Director in American Marconi Company
Former Managing Director English Marconi Company

WORD was received in New York from London on April 8 that Major S. Flood-Page, a director in the English and American Marconi companies was dead. He was a son of the Rev. S. Flood-Page, who married a daughter of Colonel Shaw. The latter was active in military service, having been wounded at Quebec in 1759 while serving in the 60th Rifles. It was not a surprise, therefore, when Major Flood-Page, inspired perhaps by ances-

Major S. Flood-Page

tral spirit, took up a military career. He became a cadet in 1854 and was gazetted a year later to the Second Madras European Light Infantry. He served in India and Burmah, becoming first adjutant of the Queen's Own Edinburgh Rifle Brigade and for twelve years acting as adjutant of the London Scottish.

His excellent record brought him no little recognition, his services being solicited by military authorities for administrative purposes. Aside from his other achievements in military life he will be remembered because he was the first executive officer of the National Rifle Association. He served on the council board of that organization for forty years.

Major Flood-Page gained success in business life with the same rapidity that had marked his career in military circles. He was at one time secretary and manager of the Crystal Palace, retiring from that office in 1882. Then he became connected with the electric lighting industry which showed considerable activity about the time that he embarked in it. Joseph W. Swan, who was afterwards knighted, and others formed a company for the manufacture of the Swan glow-lamp, and to Major S. Flood-Page was delegated the task of introducing the invention into Australia. Major Flood-Page afterward became secretary and manager of the Edison and Swan United Electric Light Company, Limited.

He joined Marconi's Wireless Telegraph Company in 1899 as managing director, becoming a director of the American Company in 1906. For some twenty years he was a member of the London Chamber of Commerce and took a prominent part in forming the electrical section of the Chamber. During his life he was keenly interested in philanthropic and national movements as well as commercial matters.

Salvation at the Eleventh Hour

Henry McKiernan

The story of how, with hope of rescue gone, the men on the sea-battered Denver were preparing to risk their lives in the small boats, when aid was brought by the wireless appeal of Operators McKiernan and Crone

Fred H. Crone

Buffeted by the seas until she was in a sinking condition, the Denver of the Mallory Line, sent an S O S broadcast over the ocean when she was in mid-Atlantic, 1,300 miles from New York, on March 22. Despite the unfavorable weather conditions, aid was at hand in less than twenty-four hours after the appeal had been flashed and those on the distressed craft—seventy-two in all—were rescued. It was another triumph for wireless and the Marconi operators who sent and received the news of the Denver's plight, eighteen ships being ready to give assistance when the rescue was effected. The following story of the wreck and the circumstances of the voyage preceding it were written for THE WIRELESS AGE *by Henry McKiernan, first operator on the ill-starred craft, and Fred H. Crone, his assistant:*

IF the Denver had started her voyage on Friday the thirteenth, the superstitious among us might have anticipated the disaster which overtook the vessel. It was the thirteenth to be sure when we steamed away from Norfolk, Va., bound for Bremerhaven, Germany, but the day of the week was Saturday. The ship came to grief notwithstanding, the wreck and the incidents of the voyage preceding it being described in our story.

Fair weather and excellent progress marked the first week out of port. Afterward came a northerly gale during which the vessel listed alarmingly. We learned later that a safety plug in a boiler had blown out, making it necessary to empty the latter before repairs could be made, and that the removal of the water caused the list. One of the officers attempted to correct the careening of the vessel by ordering the lifeboats on the port side filled with water and in this he was in a measure successful.

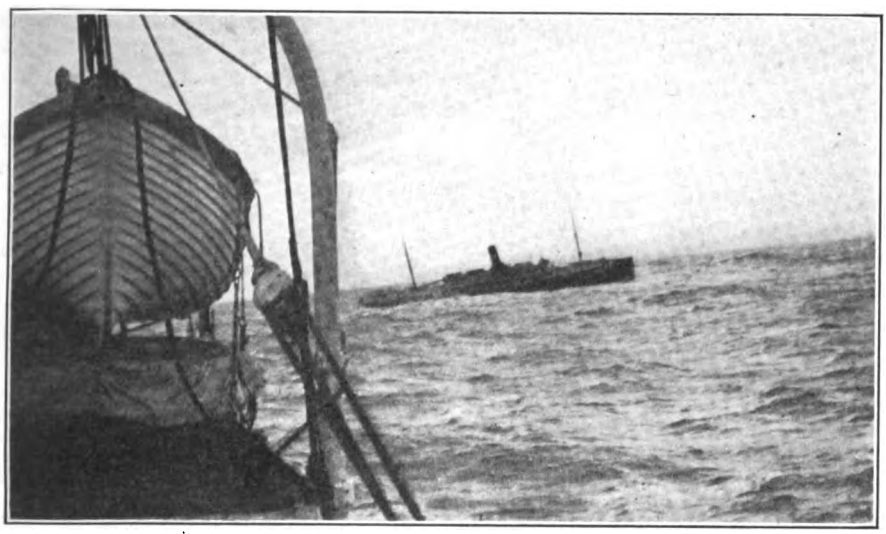
Grim warfare unexpectedly bobbed up astern of us on February 28. On the evening of that day we passed a steamship bound westward. Her actions were strange to say the least, for after she had steamed by she turned about and began to follow us. The boom of her guns and the flashes from their muzzles illuminating the night made us aware that she was not voyaging without a purpose. We did not realize, however, that she took more than a passing interest in the Denver until she was asked by wireless if she wanted us to stop. "Yes, at once," came the reply. It is needless to

say that our captain paid instant heed to the request and a short time afterward a squad of British marines came aboard the Denver, two being detailed to stand outside the wireless cabin with instructions to see that we did not operate the set. We were informed the following day that the British vessel had used only blanks when she fired her guns. When we arrived at Kirkwall we were ordered to take down our aerial and seal the doors of the wireless room. The marines left us at Kirkwall and we departed for Bremerhaven.

As we steamed through the North Sea the fear of the mines was uppermost in the minds of the majority of those on the Denver. However, we managed to reach Lister Deep in safety where we picked up a pilot. We were boarded later by German customs officers who lined up the members of the crew and questioned them. Among the Denver's men was a German who, when he saw the customs officers, gave himself up, declaring that he had returned to his native land to enlist. He caused some excitement among us, however, by pointing out our watchman as a Russian spy. The latter declared that he was a Swede, but the customs men arrested him and took him off the vessel, despite his protests.

Steaming on toward the mouth of the Weser River, we passed the German fleet off Helgoland, the long line of formidable looking war machines extending as far as we could see. That evening we were compelled to anchor and blanket all of our lights. German marines came over the side the next morning and we proceeded on our way to Bremerhaven, reaching there at three o'clock in the afternoon.

We remained a week at Bremerhaven, departing from that city on March 10. On the afternoon of the second day out of port we were stopped by a British vessel which signaled with flags, asking us our destination. The following night another British vessel communicated with us by means of flash-light signals. Again someone else asked us by wireless regarding our position. Thus we steamed on through the war zone.



This photograph shows the Denver after the rescue ships had reached her. It was taken by Operator William V. Moore from the deck of the St. Louis

The Denver ran into a heavy gale early in the morning of March 22, the wind blowing at the rate of ninety miles an hour. It kept increasing in force as the day advanced and we knew that the vessel was standing up under the storm with very bad grace. She was leaking, too, and her steering gear had gone out of commission, making it impossible to bring her head up into the wind. This

left her in the trough of the sea, pounded and tossed about by the waters. It was a critical situation, to say the least.

In this extremity the second mate came to the wireless cabin to inform us that the captain wanted the S O S sent. He added that immediate assistance for the Denver was necessary.

We took turns in flashing the signals and an hour after the first appeal had been spread broadcast all of the vessels within our radius were aware of our position, the Denver being then in mid-oceans, about 1,300 miles from New York. The vessels which received our appeal transmitted it to other craft and soon a small fleet of rescue ships was on its way to succor us.

But we did not feel that our peril was at an end, for the gale continued unabated in its fury, lashing the seas into mountain-like waves and making difficult the navigation of the stauchest craft. Some of the vessels which received our call, were within twenty miles of us, we learned, but they could proceed at the rate of only two miles an hour. So we were compelled to content ourselves with waiting and hoping.

In the meantime we prepared for the worst, making the boats ready for launching and placing a store of provisions in the wireless cabin to be used in an emergency. It is gratifying to be able to record that in those trying hours Mrs. Avery, the wife of our captain, remained outwardly unmoved by our danger, wearing a look of unconcern even as the seas seemed about to accomplish the destruction of the ship.

The following day found us still at the mercy of the gale and the waters. The latter poured into the ship in considerable quantities, the dynamo on which we were dependent for the power for our main set finally being placed out of commission. There still remained the auxiliary set, however, and this we worked to great advantage, the apparatus operating in a highly satisfactory manner.

By this time almost everyone had abandoned hope, although the members of the ship's company fought stubbornly to the very last to save the vessel. This was illustrated by the action of one of the officers who went into the hold to attempt to locate the leak. No one would follow him, but he stood in the water, which reached almost to his chin, until he had satisfied himself that the attempt was useless. Then he came on deck and offered $5 to the first man who sighted smoke.

While these efforts toward our salvation were being made we had been drifting at the rate of about five miles an hour. This, of course, made us sceptical regarding the chances of being picked up by the vessels which were searching for us, although we sent a message telling the direction in which we were floating. We reckoned that they might be scouring the waters for us many miles away and we steeled ourselves to meet any emergency that might arise. The understanding among the members of the ship's company was that they were to take to the boats before darkness arrived without waiting longer for the rescue ships. To embark on the troubled waters in small boats seemed like courting death, but with the Denver so battered and bruised that she was ready to drown at any time this was the only course left.

And while we planned to make a last attempt to preserve our lives thus, all the time fearing that the curtain was about to rise on another awful tragedy of the sea, someone sighted a bit of smoke. It was only a speck at first, but soon it grew into a cloud. Then we knew that the searchers had found us—that the rescue ships were at hand.

After a while the Manhattan, the smoke of which had heralded our salvation, was seen off our starboard bow. The St. Louis, the Vestris and the Megantic appeared soon afterward. The Manhattan and the Megantic, bound for New York, having been chosen as the craft to which the Denver's people were to be transferred, the boats were launched and the work of taking us off the wreck began. Considerable difficulty was encountered in this because the seas were still running high. We of the wireless cabin were among those who were taken to the Megantic.

The S O S which we sent started eighteen ships searching for the Denver.

They included the Lakonia, the El Dia, the Manhattan, the Oscar II, the Carthaginian, the Colorado, the Gulflight, the Nile, the Maryland and the Rotterdam. They stood by until the rescue had been effected, but their aid was not needed.

Additional details of how the rescue of those on the Denver was effected are contained in the log book of Joseph A. Worrall, Marconi operator on the steamship Medina, bound from Rotterdam to New York. They are as follows:

March 22, 1:50 P. M.—Received information from the steamship Ardmore that the Denver is sinking. Informed captain, but we are 200 miles astern and tremendous seas are holding us back.

2:32 P. M.—Gave KED (the Denver) our position and our speed.

2:40 P. M.—(the Megantic) offers assistance to KED. It will take him sixteen hours to get there.

3:10 P. M.—Exchanged signals with the Denver.

3:15 P. M.—The Ardmore says that they can't reach the Denver for two days.

4:10 P. M.—KED (the Denver) is now in communication with KUA (the Gulflight).

6 P. M.—The Denver sends out, "The Captain says come as quickly as possible."

6:45 P. M.—KED (the Denver) reports the fires out and getting the lifeboats ready to launch. He is sending out S O S continually.

7:40 P. M.—KED says: "We have been drifting southeast since our 2 P. M. position. We are sending off rockets."

March 23, 2:30 A. M.—MCZ (the Megantic) working KED (the Denver), using emergency gear. KED's position is now 38.50 N., 48.50 W.

4:50 A. M.—The following ships are now on their way to the assistance of the Denver: KSL (the St. Louis), MCZ (the Megantic), PHP (the Vander Duijn), MBN (the Maryland), KKY (the El Dia), GKK (the Manhattan), and MJZ (the Vestris).

7:10 A. M.—KED sends position and says the Denver needs immediate assistance. Expects to leave the ship any minute.

1:23 P. M.—Have heard nothing from KED (the Denver) for four hours.

1:38 P. M.—KED calls CQ and says they see a ship off the starboard bow.

1:50 P. M.—GKK (the Manhattan) says they see the Denver.

2:15 P. M.—KSL (the St. Louis) says he can see KED now.

2:25 P. M.—KED (the Denver) says they are now lowering boats.

2:35 P. M.—After finding out that KSL (the St. Louis) was bound for Liverpool and GKK (the Manhattan) was bound for New York, the Denver's captain decided to take the latter.

3:25 P. M.—GKK (the Manhattan) says two more boats are needed. MZC (the Megantic) is alongside the Denver.

4:10 P. M.—GKK (the Manhattan) advises all ships that no more assistance is required.

Marconigram Tells of Rescue

A wireless message from the Marconi-equipped steamship Seminole of the Clyde Line to the United States Coast Guard offices in New York City, told of the rescue by that vessel of the crew of the schooner Robert Graham Dun. The men abandoned the craft after it had been wrecked by a gale on April 3. The schooner was off the Virginia Capes when the crew took to a small boat which was picked up by the Seminole.

Reprimanded for Swearing

The United States Department of Commerce has written to a wireless operator in a commercial station in Massachusetts warning him that unless he is careful of the language which he uses his license would be revoked. He recently ended a message with a word which shocked those who heard it and complaint was made to the Washington officials. Code letters were used by the operator to spell the word that gave offense.

PERCHED high on the rocky escarpments which line the east bank of the Aisne, the Chateau Veaugirard dominated the whole valley for miles up and down its length. To tourists and to peasant folk alike its red French tile roof, its soft creamy stucco walls and its huge south chimney, built from the granite quarries of the Aisne, had long been a picture that the eye rested on admiringly from many a road turn, many a wooded promontory in the river valley below.

Just now it was occupied by the Germans, by the younger officers of the staff of General Von Slausen, who sprawled perplexedly over a huge war map, which, in relief contours of one meter apart, was spread on a great plank table set up on saw bucks in the grand salon of the chateau.

All the Veaugirards had fled toward Paris at the first sweep of the German armies, their butler in striped vest and no coat, their maids staggering under huge half-packed portmanteaus, their poodle without his collar, La Comtesse with her jewels and her vanity box crammed into a needlework basket—all bundled into the family six-cylinder automobile and speeded, along with the honking, squalling, blatting jam of thousands of other machines, down the road to Paris.

All but Mlle. Marie De Veaugirard. M. Le Comte was already with the government at Bordeaux; Jean, the younger brother, lay buried in the rose garden—killed in a brush with the Uhlans just down the road from the Chateau; Etienne, her older brother, lieutenant in the 107th of the Line, had, so the villagers whispered, disappeared. And so Marie stayed within the German lines, attended only by old Nannette and the house major-domo, Pierre; finding herself the hostess of a number of very gallant and scrupulously polite young German staff officers.

"I swear, I can't fathom it!" sighed young Captain Von Hasebrouk of the Magdeburg Fusileers, raising himself off the war map on his clenched knuckles. "From this point here"—indicating a promontory on the map—"down to the bend of the river, everything we do is known in the French lines, within apparently ten minutes from the time we set about doing it. If we place a new battery, their shells pick it out with uncanny accuracy; if we start an aviator anywhere near the chateau, a French airman is already on the wing and waiting for him; if our air scouts send us details by wireless concerning their dispositions, the wireless message is intercepted and the enemy's positions changed to some surprise manoeuver when our troops move. Even the War Office wireless messages from Nauen are relayed into the French lines."

"Mademoiselle De Veaugirard—she is being watched?" ventured Von Nurdenburg, the Bavarian engineer officer.

Von Hasebrouk regarded him with Prussian scorn. "Infantile! Of *course*

she is being watched—every moment of her life, since we took possession of the chateau! She is virtually a prisoner within its walls."

Von Nurdenburg's black Bavarian eyes snapped and the red Heidelburg scars on his cheek deepened. "Beast!" he muttered under his breath. Then aloud, "Only this," said he mildly, "those concrete gun bases up in the quarries, ordered in three weeks ago, are not in yet. We can't start a squad of men on them but a flock of shrapnel finds us out; and I tell you that those quarries are in plain sight of this building, from its rear windows."

"Another thing," put in Liebnitz, of the Saxon Hussars, "have you noticed that they never fire on this house? We use the roof for a wig-wag station, but nothing but rifle bullets come this way, scrupulously never a shrapnel shell."

"Humph!" grunted Von Hasebrouk testily, "Easily explained! They do not, my dear sir, take the same pleasure in making targets of a French chateau as we do. Enough with such foolishness!"

"Sorry I spoke!" retorted the Saxon stiffly as he saluted and went from the room.

"Herein!" snapped Von Hasebrouk a few minutes later in response to a knock on the door.

An orderly entered. "General Von Slausen's compliments, sir," he said, handing out a sealed packet.

Von Hasebrouk tore open the envelope and read. Then he gasped with emotion. *"Mein Gott!"* he choked. And then, *"Mein lieber Gott!"* he almost sobbed, "What shall we do?"

The staff gathered around him enquiringly.

"Listen!" began Von Hasebrouk, in a trembling voice. "'General Headquarters, Ninth Army Corps, St. Menthonne. An Imperial Zeppelin is to arrive tonight at Pont-les-Clayes, behind the ridges to the rear of your position. The utmost secrecy must be maintained as to its whereabouts until such time as it shall be launched upon a raid upon the enemy's ammunition base to the rear of Craonne. You will do everything in your power to assist Colonel Count Von Rheinfels commanding this Zeppelin, and are in particular cautioned to guard against the enemy's spies learning anything of the existence of this airship.

"'(Signed) Von Slausen, Lieutenant General Commanding Ninth Army Corps, Army of the Rhein.'"

There was silence for several seconds after Von Hasebrouk's voice died away. He glanced at the row of blank faces in front of him, as if searching there for a way out of the difficulty.

"Gentlemen, what shall we do?" he appealed piteously.

"Ach!" muttered the Bavarian under his breath, "Prussia is quick enough to howl when cornered! There is one thing you can *not* do, my dear Captain," he declared, raising his voice, "and that is to admit to the Old Fox that we're likely to leak."

"Absolutely! One thing is certain, Pont-les-Clayes at least can *not* be seen from this chateau, my dear lieutenant; and I shall see to it, at once, that double sentries are posted at every point from which it *can* be seen."

He telephoned headquarters for further details and then went out with the rest of the staff to look over the approaches to Pont-les-Clayes, leaving Von Nurdenburg puzzling over the war map. Presently a small door to the left of the great chimney opened, and Marie de Veaugirard entered, her brown eyes glistening under long wet lashes. She glanced furtively at the big fire-place and looked anxiously around the room, stopping in some confusion upon discovering Von Nurdenburg sprawled over the map. The Bavarian's dark eyes dwelt upon her curiously as he raised himself hurriedly from the table. "Pardon, Mlle. De Veaugirard"—he paused awkwardly, eyeing her fixedly in silence.

"Er—isn't it—er—a bit chilly this evening?" he remarked lamely, glancing at the fire-place.

"Why, no, Monsieur, not so early in September," returned Marie. "Do you really feel chilly, M. le Lieutenant?"

"I really do, Mademoiselle," insisted the other artfully, "Er—what do you say

The room was filled with the deadly flashes and blinding smoke of his pistols

to a nice roaring fire in yonder chimney?" he suggested.

Her hand jumped to her breast, a slight, involuntary movement instantly suppressed, but it did not escape Von Nurdenburg.

"Mon Dieu!" she gasped, "Ah, bon! I shall ring for Pierre," she continued aloud, moving swiftly towards a small concealed push button in the side of the chimney wall.

Von Nurdenburg regarded her minutely. "*Mais, non!* mademoiselle, *je prie!*" he protested smilingly.

"Not to ring for Pierre?" questioned the girl wonderingly, "*Alors!* I shall go call him, then."

Von Nurdenburg blocked her way. "Pardon, Mademoiselle! It is unnecessary," said he inexorably. "I myself will call an orderly and have my men bring some logs."

For an instant the girl's self-possession deserted her. Then she pouted coquettishly. "Ah! I hate him! Don't you?"

"Who?" he breathed, answering her mood with his eyes.

"That Prussian," she waved a hand at the door whence Von Hasebrouk had disappeared.

"Oh?"

"You are not suspicious. You don't like him, I hope! Why I'm no longer mistress of my own household even, thanks to that *boche* captain's orders."

"Mademoiselle! You are mistress of me, though, and of anything I can do that you choose to command!" responded the Bavarian ardently.

"Do let me ring for Pierre, then. It is odious to me to see your soldiers in their great cowhide boots come tramping into this salon with heaven knows what loot they may have plundered for firewood."

Von Nurdenburg bowed profoundly. "Ah, Mademoiselle, I am *desoleé, desoleé!* but I can not permit you to touch that button! What that electricity may do, where it will go we know not; it exceeds my duty to permit you to."

"Ah, brave Bavarian!" taunted Marie, "afraid of a common house push button for calling the servants! Oh, la-la!" she laughed merrily, shrugging her shoulders. "May I not even call him, then?" she enquired with a delicious note of sarcasm in the rising inflexions of her voice.

The Bavarian felt a mad wave of desire for her sweep over him. What scheme wouldn't he compass to mould that girl to his wishes! To crush that lithe form to his breast; to fold that little head with its raven curls into his arms! Ah....! He mentally blew a kiss to the ceiling.

At this juncture Pierre himself appeared. "Pierre!" commanded Marie, arching her eyebrows meaningly, while Von Nurdenburg hesitated. "Bring fire wood!" she ordered, pointing to the huge fire-place.

Pierre looked blank consternation for an instant, then, collecting himself under her meaning glances, "*Oui, oui, mademoiselle; j'en fais, tout de suite!*" He muttered something to himself and hobbled hurriedly out of the room.

Marie turned to the Lieutenant blandly. "You see, Monsieur le Lieutenant, it is so simple!"

Von Nurdenburg looked at her relieved. This girl could be no spy; she meant no harm. If it was sight espionage that they were undergoing, she at least was in no position to see or communicate anything. If wireless espionage—but that was impossible. He waved the thought from his mind as unreasonable; no aerial of any kind in sight, no place of concealment for any possible sending and receiving set that had not already been thoroughly searched by his men. Besides, Pont-les-Clayes, where the Zeppelin was to land, was so far down behind the hills of the Aisne as to be out of reach of all the French field batteries, out of reach of anything but the dropping shells of the great 45-centimetre howitzers of the French, seven miles away at Craonne. And how could she possibly communicate with them? Better a conquest of this girl, now that he had the chance, than to worry about her being a spy. His eyes softened as he turned them upon her again in the deepening twilight. All was quiet along the front, not even the occasional bark of a field piece interrupting the silence

as the soldiers on both sides set about their evening meal.

"Ah, mademoiselle, but can you forgive me?" he began, his eyes glowing ardently upon her. Marie could read eyes as well as any girl that ever wore an aigrette, and she proceeded to devil the susceptible Lieutenant still further.

"If," said she archly, "Monsieur will do me a little, just a little favor, he *shall* be forgiven!"

"Anything! Anything within my duty as a soldier, Mademoiselle!" agreed the officer eagerly.

"Would it be within Monsieur's duty as a soldier," pouted Marie, "to look out of the window and see if we have a chicken left in the garden for dinner tonight?"

"It shall be done, little one!" responded the other. "And then, may I claim a little reward Mademoiselle?" he suggested burningly.

"Perhaps!" murmured Marie, demurely.

"Ah!...." He tiptoed swiftly to the window and peered out into the garden. Marie snatched up the yellow headquarters despatch still lying on the war map, read it and replaced it carefully before Von Nurdenburg turned.

"Aha! There *is* one, Mademoiselle; a fine rooster. We shall have him tonight with some excellent champagne that our soldiers—" He paused and blushed as he saw Marie's face darken. "A thousand pardons, Mademoiselle, for mentioning that wine! It is very unfortunate that we should have—er—taken it. May I be again forgiven?"

"Listen, Monsieur," said Marie suddenly, "do you hear nothing?"

A faint distant buzz, like the hum of a droning bee penetrated the room.

Von Nurdenburg started. "One of your daring airmen, doubtless, mademoiselle," he laughed gallantly.

Marie chuckled, a gentle teasing little laugh. "*'Ein voglein kommt geflogen'* Monsieur, perhaps," she quoted softly.

Von Nurdenburg whirled about swiftly, a gleam of awakening suspicion in his eyes. They fell upon the scrap of paper still lying on the war map. *Pst!* The Headquarters despatch! How could he have forgotten it! Could she have read it?

"What do you mean, mademoiselle?" he demanded harshly, "I do not in the least understand what you are talking about."

Marie tilted back her chin and smiled at him provocatively. "Oh, la-la!" she derided, "don't we in France know the hum of an aeroplane as well as you in Germany? It is nothing, nothing to go into a temper over. Listen! There, it comes to rest, Monsieur le Lieutenant, if you please."

"An aeroplane," repeated Von Nurdenburg, watching her narrowly, "or, Mademoiselle, a——?"

"Or a ——" she shrugged her shoulders, "Zut! the what-you-call-him—Zep—you finish it!" she ended in adorable helplessness.

Again Von Nurdenburg felt relieved. Surely she knew nothing of the despatch; or else she must be a consummate actress. His hand grasped the yellow slip and he tossed it over to her. "Or this!" he remarked nonchalantly.

Marie's eyes grew wide as she read it, Von Nurdenburg watching her closely.

"The barbarians!" she gritted under her breath. Then, suddenly aloud, "Oh, Monsieur, but you have been indiscreet! You have been cruel! You have deliberately made me a—a spy!" she gasped.

"Precisely!" grinned the officer, "Mademoiselle de Veaugirard you know too much! You can never, now, be out of my sight! You are under ar—"

"Oh, Monsieur!" she flashed at him beseechingly, reproachfully.

"Unless—" breathed Von Nurdenburg.

Marie started. "Unless?" said she wonderingly.

"Unless," returned Von Nurdenburg softly, opening wide his arms, "you come over to our side—to *my* side!"

Marie raised an arm as if to ward him off. It had grown quite dark and she looked about anxiously for help. Then a faint tremor shook the building, and at intervals, another, and yet another, while faintly came the distant boom of heavy artillery.

"My God! What was that?" exclaimed the Bavarian, his eyes distending with horror.

Marie stiffened. "That, Monsieur," said she icily, "is the sound of *our* 45-centimetre howitzers!"

Followed the shrill whistle of huge shells high overhead, and almost instantly the detonating crash of bursting shrapnel, to the rear of the chateau—at Pont-les-Clayes!

Von Nurdenburg tore his hair. "You devil!" he burst out at her, "you knew! You read that despatch and got word to your people somehow—I don't know how—but you shall die for it! Tell me how you did it instantly before I shoot you dead!" he stormed, drawing his automatic and levelling it at her.

Into the room just then crept old Pierre, upon his face an expression of regret. "Mademoiselle," said he deprecatingly, "I am *desoleé,* but there is no fire wood."

"Enough!" shouted Von Nurdenburg, "Hans! Rudolph! Heinrich!" he ordered as the sentries rushed into the room. "Seize that man! Mademoiselle, you are under arrest! Don't dare to move a step! Don't move so much as an eyelash! Heinrich!" he added to the third guard, "get a hand grenade and explode it up that chimney. I'll find out what all this mystery is about, and that damned quick."

Marie gave a stifled scream. Immediately Von Hasebrouk and the staff burst into the room, "Ruined!" he shouted, "the Zeppelin's ruined! Shot to pieces with the enemy's 45-centimetre shells within ten minutes from the time she landed at Pont-les-Clayes! Arrest that woman! Von Slausen will he here in three minutes, and—*Ach, Gott!* we'll all be court martialed! Arrest that woman, I say!"

Three burly guards laid hands on Marie. Von Nurdenburg started to intercede. "Pardon, my captain," said he deprecatingly, "but it is unnecessary. I have already placed her under arrest; I *know* that she has had nothing to do with this, for she has been under my sight every minute since you left this room. I beg of you not to make her endure the indignity of being seized and held by our common soldiers; consider her noble birth—"

Von Hasebrouk swept him with a scornful glance. "Yes, Lieutenant," retorted he cuttingly, *"do* spare the feelings of our beautiful enemy!" He saluted her sarcastically. "You lovesick saphead!" he continued roughly, turning upon Von Nurdenburg, "I do believe *you* have had something to do with this also. Consider yourself under arrest!"

Von Nurdenburg half drew his sword, replaced it and fumbled furiously for his card. "At your service, sir! Any time, any place, any weapons!" said he bitterly, flinging the card in the other's face.

The door beside the chimney opened and General Von Slausen—called by the Ninth Corps the Old Fox—stood in their presence. He glowered for a full breathless minute upon the flustered officers, his chest heaving with suppressed agitation. "Having lost His Majesty's Zeppelin; having failed most lamentably in your duty, young gentlemen, may I enquire as to the meaning of this scene?" he demanded in his thin, sarcastic, inflexible accents.

Discipline thrown to the winds, every officer in the room started to explain at once.

"Silence!" thundered the irate General, holding up his hand. "Captain Von Hasebrouk! I believe that you command this—er—assemblage," prompted the Old Fox sardonically.

Von Hasebrouk clicked his heels together in military salute. "Sir, if you will bear with us but for a moment," he begged, getting his wits together, "I believe we have here the solution of a mystery that has been troubling this section of our line for some time past."

"I do not understand," interrupted Von Slausen unsympathetically, "what mystery? Why was it not reported to Headquarters before?"

"Will the General please pass over that point for the present? I will gladly go before court martial for it later," beseeched Von Hasebrouk. "This woman—"

The General nodded impatiently, tapping his foot in unwilling permission for

the unfortunate officer to proceed. "This woman, this chateau, I mean—we are convinced, has some secret way of intercepting messages and collecting information and passing it on into the enemy's lines. We are sure of it now."

"Yes; now that His Majesty's Zeppelin is gone!" barked the angry General, "why was I not told of this before? Might not my poor brains have helped the astute intellects of you young gentlemen to have stopped this leak?"

"Sir, I beg of you!" pleaded Von Hasebrouk. "Let me now give you the facts: Sometimes the enemy appear to be informed of such of our troop movements or battery emplacements as can be seen from this house; sometimes of things which obviously can *not* be seen from here, such as for instance the attack of the Zeppelin just now. Even your war office messages from Nauen to headquarters appear to be known by the enemy immediately opposite us even before your messages come to us, sir, by orderly or telephone. And I'm convinced, sir," he concluded, "that this girl, here, is somehow at the bottom of it, or at least knows something about it."

"Who is she?" asked the Old Fox.

"She is Mademoiselle de Veaugirard, daughter of the old Count; she has remained at the chateau after her family fled to Paris before our advance."

"Reason?" queried the Crafty One.

"Her younger brother is buried here, I believe; killed in an action with our Uhlans down the road a bit."

"Humph!" ejaculated Von Slausen sardonically, "a fine reason, a pretty reason, my young gallants!"

The staff winced in silence.

"Seems reluctant about having a fire built in that big south chimney yonder," put in Von Nurdenburg traitorously.

Marie stole at him a glance of inextinguishable hatred.

"That's all right!" turned the Old Fox with cheerful savagery, "have a hand grenade full of deadly gases exploded up the chimney and that'll smoke out any spies you may have harbored there."

"That has been ordered done, sir. And she seemed very anxious to press that little button on the chimney a while ago, too," added the Bavarian, eyeing Marie maliciously.

Marie never wavered as they all scrutinized her closely.

"Young gentlemen, this is all beside the point," declared Von Slausen decisively, bringing down his heavy sabre with a thud and crossing his hands upon its hilt. "To my mind it looks like a clear case of wireless espionage, and the apparatus must be concealed somewhere in this building."

"But sir, there's not a yard of aerial wire in sight anywhere," expostulated Von Hasebrouk, "let alone a sending and receiving set that could take Nauen."

"All right. It's here just the same. And if you gentlemen can't find it, this girl can be *made* to tell you where it is if any of you had the gumption to make her. She can tell you, and she *shall!*" gritted Von Slausen, "for it's clear in my mind that she has furnished the eyesight information to the concealed operator, wherever he may be. Is it not so, girl?" he demanded roughly, turning suddenly upon her.

Marie regarded him with flashing eyes. "Monsieur le General!" her clear voice rang out, "I know nothing of what you speak; but, sir, as I am a de Veaugirard, sooner than reveal a military secret of my country, I would hang for it gladly!"

"My dear young lady, you *shall* hang for it, and that at once! But, before you pass from among us, you shall tell us of this wireless; or else—do not mistake me, mademoiselle—you shall be given to these, our common soldiers, you, a de Veaugirard, to do their brutal will upon you, unless—"

"Infamous!"

"Certainly, but war! Choose, mademoiselle, and that right quickly!"

"Hang me! Let me die, Monsieur le General! Gladly will I give an innocent life for France!"

"You shall die a thousand times, mademoiselle, before our soldiers are through with you, unless you tell us of this wireless," exclaimed Von Slausen brutally. "Choose!"

Marie bit her lip and faced him bravely in silence.

Von Slausen waved his hand and the

grinning guards advanced. She fought them with all her strength, while the officers stood about, silent and cynical. One great brute clasped her about the waist and imprinted a kiss upon her cheek.

"*Etienne!*" she screamed in a voice of piercing agony, "*Etienne!* Help! Save me!"

There was a thud of feet in the fireplace, and a young French lieutenant of the Line crouched before them, an automatic levelled in each hand. He wasted not a word, but opened fire at once. The room was filled with the deadly flashes and blinding smoke of his pistols. Von Slausen reeled and tumbled where he stood; Von Hasebrouk fell in the act of drawing his automatic; the three soldiers dropped Marie and dashed for their rifles outside; Von Nurdenburg bolted incontinently through the door with them, completely unnerved; and the last survivor of the staff collapsed where he stood, shot through the heart.

De Veaugirard slammed shut the door and locked it, grabbed Marie's hand and fled with her over Van Slausen's body, out through the chimney side door and up the dark, rear stairs to the second story.

"Courage, sister!" he gasped, "Henri de la Rochette is coming for us in his monoplane! I wired him when I overheard your row downstairs. If we can hold the roof for ten minutes all will be well. Have you anything about you that can shoot?"

Marie showed him an automatic, fully loaded. "Von Hasebrouk's—I picked it off the floor as we went out!"

"Good! Ten good shots! Come! *Vite!*" They ran up to the third story, opened a dormer window and stepped out on the great copper gutter of the red tiled roof.

"Quick! In behind the chimney! Crouch down, now, close as you can between the tiles and the chimney!"

De Veaugirard kicked the copper gutter with his heel. "Good bye, old friend!" said he, "the best concealed aerial a man ever had!" He laughed. "Marie, there's three hundred feet of copper gutter and flashing six feet wide, under the tiles of this roof, and with my instruments hooked into it for an aerial I could hear Nauen, and every word that they sent from the wireless aboard that Zeppelin. I told Craonne about her ten minutes ago—and you heard the result. And then all their aeroplane despatches, every headquarters order. *Fictre!* but one hates to give up a chance like that! But I couldn't abandon you to those brutes, dear, not even for France!"

"But your instruments in the cave in the chimney, Etienne? Do you think they will find them?"

"Oh, they're gone! *Les boches* will destroy them, along with the chimney and the house itself in a few minutes, as soon as their artillery begins on it! Listen to the tremendous row down in the street! Now their field batteries are opening up on this house. Hug down close, little sister, or the shrapnel will get you!"

The chateau began to quiver under the impact of shells striking its walls, and presently the acrid fumes of smoke from the burning house floated up around the eaves of the roof.

"*Tiens!* But we shall be grilled like pickled herrings if De la Rochette doesn't hurry!" quoth De Veaugirard cheerfully. "Here he comes now!"

Far across the valley of the Aisne appeared a little, flying speck. With incredible swiftness it swooped towards them, growing larger and larger every minute. The German picket line opened fire upon it, and then the skirmish line of sharpshooters, but still the monoplane kept on. Next a spattering fire arose from the trenches of the main line, and a battery on the hill elevated its muzzles hastily and belched a shower of shrapnel upon it.

Suddenly the monoplane stopped. "Ah, ah! Mon Dieu! Let me die! They've killed him! My Henri! The devils! The devils!" screamed Marie hysterically.

"*Mais, non!*" exclaimed her brother, roughly. "Keep down, foolish! He's only shut off the motor and is volplaning. Get ready to jump, quick!"

Etienne rose and clambered to the tiled ridge of the flat topped roof. Suddenly a trap door some twenty feet

away burst open and two German soldiers with their rifles poked up through the opening, one of them levelling his rifle at Etienne. Marie opened fire on him with her automatic, while De Veaugirard turned and fired also. There was a swift interchange of shots and when the smoke cleared away the hatch was empty. Marie clambered after her brother as the monoplane soared down upon them. For a single instant the De Veaugirards were silhouetted on the flat top of the red roof, while rifle bullets from below whistled all about.

"Grab for any part of the frame you can reach, he will not stop," commanded De Veaugirard, raising Marie in his arms. "Now!"

As the monoplane slowed down and hopped and bounded along the roof, they snatched and clung, while De la Rochette again started his motor. Then they went soaring upward in a great circle, while shots rang out far below. De Veaugirard clambered up into the car, and the two men pushed and pulled Marie after him into the machine. Up, up, higher and higher into the clouds, out of reach of rifle fire, soared the monoplane; then it turned toward a landing point far distant from the force that was menacing them—the encampment of the French Army.

"Never again will I get a concealed aerial the equal of that copper flashing roof," remarked De Veaugirard, after he had reported to his commanding officer. "But," glancing tenderly at his sister, "if ever the Army sends me on spy duty again, may I have a true blue pal, like you little girl, with me!"

And he clasped her in his arms while De la Rochette looked on with envious eyes.

DECREMETER OF INSPECTORS DESCRIBED

R. H. Marriott, radio inspector of the Department of Commerce, delivered an interesting address to the members of the Radio Club of America at a meeting of the club held at the East Side Y. M. C. A., New York. His subject was the Kolster decremeter as used by the inspectors of the Department of Commerce. A discussion of the principle involved and an explanation of the instrument, given in detail, was followed by an actual demonstration of its use.

The operation of the instrument described is based on the well known Bjerknes formula; namely, the measurement of the current flowing in a wavemeter circuit at resonance and the corresponding value of current with a decrease in resonance.

An important consideration in the construction of the instrument is that the variable condenser used is designed to have a straight line law of calibration, the capacity of the condenser increasing progressively and in proportion to the divisions of the condenser scale. It is thus possible to make the instrument direct reading, the value of the decrement being obtained by a simple observation of the deflection of the hot-wire wattmeter used as an indicating instrument. That is to say, the corresponding decremeter reading is obtained directly on scale geared to the variable condenser.

In addition to the facilities afforded for reading the value of the decrement, this instrument contains a crystal detector and head telephones connected unilaterally to the decremeter circuit for obtaining the point of resonance. The instrument also contains a buzzer excitation circuit by which the decremeter at once becomes a small transmitting set emitting waves of a definite frequency and may thus be used for the calibration of the receiving apparatus at a given station.

IN THE SERVICE

The copy book maxims warn young men against the folly of drifting, but once in a while there comes to light an instance of a man who drifts right into his proper sphere. Such a case is that of James M. Sawyer. Not that Sawyer pursued an aimless career; on the contrary. The turning point in his working life, however, came in 1902, when he was engaged in drafting and drawing. On one occasion he was asked to do some work for a wireless company and almost before he was aware of the fact he found himself actively engaged in the art. Today he is superintendent of the Maintenance, Repair and Inspection Division of the Traffic Department of the Marconi Wireless Telegraph Company of America, with headquarters in New York.

To begin at the beginning of Sawyer's life it will be necessary to go back forty-five years to Waterville, Me., where he was born. He received his education in that city, but opportunity summoned him to Boston when he was nineteen years old. Here he engaged in electrical construction work, becoming an employee of the Edison General Company. During the years that followed he spent part of his time in Boston and the remainder in traveling about New England, installing electric light and power plants. But the ever-active Opportunity wouldn't permit him to remain permanently in Boston and in 1896 he removed to Philadelphia, where he entered the electrical department of Wanamaker's store. A year afterward he became superintendent of construction for the Sawyer Electrical Company and when the company became the Standard Electrical Construction Company he was made president of the concern.

It was about this time that Sawyer got into touch with wireless in the manner referred to previously in this article, and as the days passed he found himself more closely identified with the radio field. It was not a great surprise, therefore, when in 1914 he became an employee of the International Telephone Company, which was formed in Jersey City, N. J., in that year. Incidentally he also took part in an indirect way in the war which was then being waged between Russia and Japan, for the latter ordered a quantity of wireless torpedoes from the International Telegraph Company and Sawyer was connected with the carrying out of the commission. When the company was absorbed by the United Wireless Telegraph Company he was placed in charge of the factory accounting department, becoming superintendent of the maintenance and repair department in September, 1911.

Upon entering the employ of the Marconi Company he was placed in charge of the Maintenance and Repair service. The scope of his work was broadened recently when the inspection of Marconi apparatus on vessels touching at New York was placed under his direction. Divisions similar to the one of which he is in charge, have been established by the Marconi Company in Boston, Philadelphia, Baltimore, New Orleans, Galveston, Chicago, San Francisco, Cleveland and other cities.

A Girl Operator's Story

The Trials and Delights of Wireless as Related by Miss Cecil Powell

Miss Powell and her set

This is the story of the early experiences and struggles in wireless telegraphy of a girl. She not only owns and operates a ¼ k.w. station in Hartford, Conn., but has passed the examination for a First Grade Amateur's License and intends to try to obtain a First Grade Commercial License. She is said to be the only girl wireless operator in Connecticut.

I AM a stenographer employed by an inventor. This may count for my liking for everything scientific or mechanical, especially the construction features.

My initial interest in wireless was due, I believe, to the fact that my employer had a station in his home where he frequently discussed radio work with a friend who was also a disciple of the spark. I enjoyed listening to them and my interest in the art grew. Finally I became imbued with the determination to take up the study of wireless.

On top of this resolve came a surprise. My employer and his friend, apparently surmising that I was ambitious to be more than a mere onlooker in wireless asked me if I would like to become the owner of a station. The question fairly swept me off my feet. But, of course, I answered in the affirmative, and almost before I was aware of the fact, I had become an active participant in the work which to me was so absorbing.

I was considerably excited when the day came for putting up my set. The aerial, to which we first gave our attention, consisted of two No. 24 cotton covered wires held by ropes in the branches of two trees about fifty feet apart. Then came my receiving set, shining and pretty. The first evening it was connected up, I was filled with elation. But this changed to despair when I heard the signals. It did not seem possible that I ever should be able to master those dots and dashes. My friends sent to me slowly, however, and after a time I was able to distinguish a dot from a dash.

My troubles were not at an end though, for when I reached home one evening a short time after my set had been installed, I discovered that my aerial was down. Investigation showed that one of the ropes holding the wires had been cut. Repairs should be made at once, I decided, and, notwithstanding the fact that the weather was far from fair, I enlisted the aid of the Man-of-Our-House and set about the accomplishment of the task. It was not an easy one by any means, but after two hours' effort, assisted by suggestions from the Lady-of-

Our-House, the aerial was restored to its former position. But not for long.

In the excitement of installing a transmitting set in my station this mishap was soon forgotten. With the aid of my wireless advisers a ¼-k.w. closed core transformer was constructed and, the other essential parts of the apparatus having been obtained, I began to work several stations in the neighborhood. For a brief period everything went smoothly. But one evening the No. 24 wires in my aerial succumbed to the force of a sleet storm and came down.

One of my friends in wireless whom I shall call Instructor A, heard of my ill-luck and volunteered to help me put up an aerial that would have stability as its main feature. With his aid I extended the wires from the roof of our home to that of a neighbor's, giving me about 300 feet of height and forty feet of length—a considerable aerial for a girl amateur. But the aerial did not remain in place and a few days later some of my other wireless friends—Instructor B, and the Man-of-Our-House—helped me to put it up again.

The difficulties with my aerial having been satisfactorily settled, I was now confronted with the problem of what kind of a gap to use. I had an ordinary open spark gap, but as I did not like the noise resulting from its use my friends decided that it would be advisable for me to substitute a quenched gap. I had little success with the quenched gap, however, and received several shocks. Concluding that the trouble was due to my condenser which had twenty glass plates, we made one of five. But this plan was not successful, so we took out the five-plate condenser and replaced the one with twenty plates. We also added one of fifteen plates. After that the results obtained were excellent.

My detector was responsible for some of my most exasperating experiences. On some occasions the signals would come in clear and distinct. Again I would answer my call, throw back my aerial switch and listen in vain for a reply. Then, while I was waiting, the last part of a message evidently intended for me would reach my ears. My sending would also throw my detector out; this invariably occurred when important communications were being transmitted.

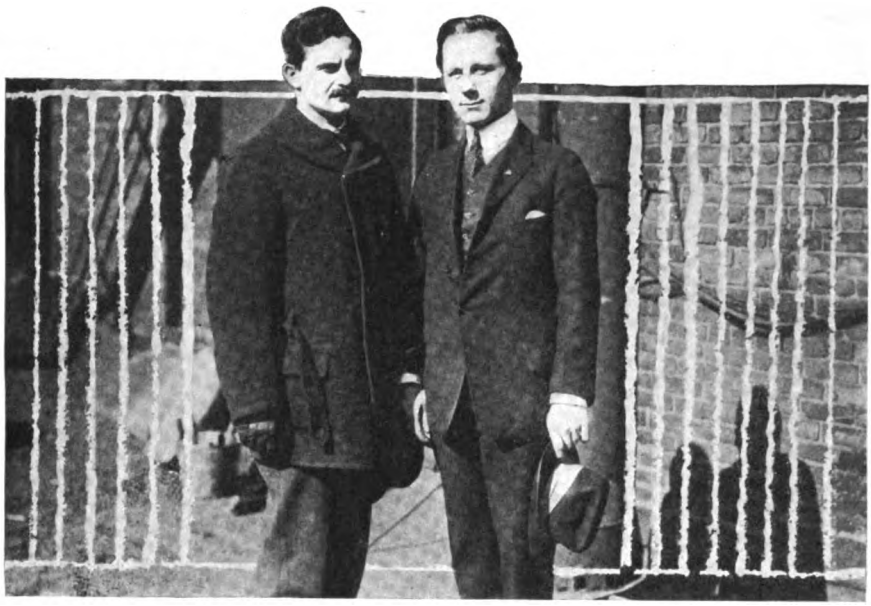
Before I bring to a close this account of my wireless impressions I intend to tell of a visit I paid one evening to Instructor A's station. He invited me to operate his set and I had been at the key only a short time when I received an answer to my call from a distant station. The operator there believed that Instructor A was sending. He was somewhat surprised, therefore, when he was informed that he was about to be introduced to a girl via wireless. To tell the story in brief, we enjoyed a chat lasting some little time and then another amateur made himself known by means of dots and dashes. This led to more introductions and before the evening was at an end I had talked with a considerable number of stations.

Exchanging thoughts by wireless is good fun. Moreover it has many advantages over verbal communication, the principal one being that it keeps folk with whom you are talking wondering what you look like.

Ithaca Amateurs Organize

An organization to be known as the Ithaca (N. Y.), High School Wireless Club, has been formed by fifteen pupils in the science department and Instructor E. D. Arnold. The object of the club will be to promote the instruction of wireless telegraphy in the High School. Membership will be open to all. A petition requesting the appropriation of $29.05 for the completion of the partly-erected apparatus on the roof of the school building was granted by the Board of Education at a meeting held recently.

The members expect to complete their wireless station in a short time. The big aerial will be erected from the big chimney to the central tower on the roof of the building, fully thirty feet out of reach. The lead wire will be stretched over the northwest wall through a window into the small room in the science department to be known as the wireless room. As an assurance of safety, a ground wire and lightning transmitter will be included in the apparatus.



Milton W. Grinnell and Arthur E. Ericson, Marconi operators imprisoned in Bremen

Prisoners of War

By Arthur E. Ericson

WHEN fate frowns and the putative swords hanging over our heads are on the verge of dropping, harbingers of possible peril generally appear. That was my idea of the way adventures begin until Milton W. Grinnell and I, Marconi operators on the steamship City of Macon, found ourselves locked up in a German prison as suspected spies. Then I realized that the most startling events can come like a bolt out of a clear sky.

Grinnell was detailed as first operator and I as second when the Macon departed from New York on December 29 last, pointing her nose toward the route which leads to Bremen, Germany. It was our first trip abroad and the voyage of course had somewhat more interest for us than the runs which the vessel had been making between Boston and Savannah.

Therefore we might be expected to look forward to the cruise with a few anticipatory thrills—especially in view of the fact that we were crossing in war times. But the days passed without anything out of the ordinary to mark them and we arrived on January 9 at Scilly Island light, Great Britain. Here we were stopped by a British cruiser. She would not respond to our request by wireless for instructions regarding how to proceed through the English Channel, however, and the captain of the Macon, deciding to communicate with her by means of Morse lamp signals, summoned me to the bridge to operate the light.

It was almost broad daylight, but I succeeded in establishing communication with the cruiser, and shortly afterward we steamed away for St. Helen's, Isle of Wight. The Macon arrived at St. Catherine's light late that evening and anchored, our captain determining to wait for daylight before attempting to steam into St. Helen's. While we lay there a British torpedo boat loomed up in the darkness and I was again

called upon to operate the flash-light. From the commander of the torpedo boat came a message saying that he had instructions to escort us into St. Helen's; that we should follow in the wake of his craft. The Macon, therefore, weighed anchor and felt her way through the night after the British vessel.

Arriving at St. Helen's, we were again compelled to lay to—this time for a pilot to direct the Macon to another point in the Channel where she was to take aboard still another pilot. A fog blocked our voyage, too, and all the next day we were compelled to remain at anchor, blanketed in the dense mist. On the following day, however, the heavy curtain lifted somewhat and we made preparations to continue our voyage. The pilot having boarded the vessel, the antenna was dismantled and the door of the wireless cabin locked. Then we weighed anchor.

At Yarmouth, where we stopped, the commander of the Macon was instructed to extinguish all unnecessary lights and to keep covered those which were essential for use. These precautionary measures were explained by the fear of the British officers that some Zeppelin, on a bomb-dropping raid, might mistake the Macon for a British steamship and select her as the victim of an attack. Steaming away from Yarmouth, the Macon headed for Whitby, where she dropped her pilot. Then she made her way toward the mouth of the Weser River.

It was at half past seven o'clock on the morning of the day that we arrived in the neighborhood of the Weser that the events directly responsible for the difficulties in which Grinnell and I became involved began to shape themselves. I was at breakfast when the first officer called my attention to an aeroplane swooping toward us. It provided an excellent opportunity for a snap shot and, hastening to our stateroom, I told Grinnell to come on deck with his camera. The aviator in that machine, it seemed to me at the time, was most accommodating. When he had approached within a short distance of the Macon, he shut off the power of his engines and volplaned still closer. Then he removed his headgear and surveyed the vessel from bow to stern. His curiosity evidently having been satisfied, he started his engines and continued on his way—but not before we had photographed him and the aeroplane.

The incident did not remain long in my memory—I was too much interested, perhaps, in the scenes that were unfolded as we steamed along. Passing Helgoland about noon, we arrived off the mouth of the Weser about two o'clock. Here we were boarded by pilots and marines, the latter being in charge of several officers. The Macon had not proceeded far when we approached a mine field. Our proximity to the nest of combustibles was heralded by an order for the members of the ship's company to go below. All of the blinds were closed also, this measure being taken to prevent us from locating the mines.

Just as we passed Bremerhaven the soldiers left the Macon to board a tug following in our wake and we were permitted to come on deck. The sight of the city nestling on the banks of the river suggested another possibility for a photograph and we operated the camera with considerable eagerness, our performance being viewed by the soldiers on the tug astern. No other incident worthy of mention occurred until we docked at Bremen. This was about half past eight o'clock in the evening.

The Macon had not been long at her dock when we found that using a camera in war times is embarrassing to say the least, this conclusion being induced by the visit of three detectives who came to investigate our photographic industry. Two days later Grinnell and I were taken off the vessel and, our cameras having been confiscated, lodged in a cell in the city. We were kept under the same lock and key for three hours and then I was escorted before a magistrate.

My examination was conducted with the aid of an interpreter, for the magistrate was unable to speak English. I

was asked many questions, a considerable number of which had to do with our voyage through the English Channel. The magistrate was anxious to know what I saw and how many warships the Macon had passed, but I was deaf to these questions. He was greatly interested also in the fact that at one time in my life I had been employed as an aeroplane mechanician. It is likely that the photographs which we took of the aviator just before we reached the mouth of the Weser had something to do with his questions. After my examination I was searched and again locked up—this time in a cell by myself.

Our adventure began to take a more serious turn on the second day of our imprisonment when one of my jailers informed me that "We have orders to shoot you at sunrise." If he made the statement for the purpose of frightening me, as I suspected, he was disappointed, for I assumed a look of indifference and appeared to be thoroughly absorbed in a book. The latter I finished reading on the fifth day I spent in prison. When I asked for another book I was handed a copy of the New Testament. Whether this was an ironical suggestion that I needed religious instruction or was intended to convey the idea that as a condemned man I ought to read the Bible, I was not able to determine.

Adventures as well as the prosaic happenings of life must have an ending, however. Thus when one of my guards came to me at seven o'clock in the evening of our sixth day in prison and motioned for me to dress I instinctively felt that finis was about to be written in our story. What kept me wondering and guessing, though, was *how* the story would end.

I was not kept long in suspense, for another guard, evidently appreciating my feeling of uncertainty, informed me that Grinnell and I were to be liberated. To my jailer I only said in a commonplace way: "Is that right?" I felt, however, as if a weight of hundreds of pounds had been lifted from my shoulders.

In the office of the prison my companion and I were given part of the money that had been taken from us when we were searched. In accordance with instructions we returned the following day and received the remainder of our cash.

It was without regret that we departed from Bremen on the Macon February 1. And as we steamed down the Weser I had ample time for reflection, my thoughts having to do chiefly with the difference in comfort between my stateroom on the vessel and the cells in the Bremen prison. These conclusions followed:

That taking photographs in Germany nowadays is synonomous with being taken by the police; also that I won't repeat my offense, at least not with the same camera, for it is still in the possession of the Bremen authorities.

Other War Incidents

Interesting details of the Falkland Islands battle are contained in a letter written by W. A. Lacey, Marconi operator at the station there. The letter has been made public in a newspaper dispatch from London. Lacey says:

"The Germans were well aware of the utility of the station, as a determined attempt was made to destroy it on December 7. This day must have been especially set apart by the meteorological deity in charge of the Falkland Islands weather, for contrary to our usual leaden skies and high winds the day was perfect. There was scarcely a ripple on the sea and the horizon was clear cut, both being helpful factors to our outposts in sighting the enemy and to our ships in the engagement which followed.

"At 7:30 A. M. smoke was sighted to the southward, which materialized into two enemy cruisers, and later the smoke of three others was seen. The first two, the Gneisenau and Nurnberg, headed

straight for the station until they were about four miles off, when they presented their broadsides to us and trained their guns on the power house. Their movements were clearly visible through glasses. Orders were given to abandon the station—not from the Germans, but from our governor—which we did, retiring about 250 yards west and taking shelter behind the rocks whence we had a clear view of the proceedings.

"As soon as we were clear the guardship in Stanley Harbor let go two twelve-inch shells at the foremost German cruiser, and considering that the enemy was not visible from the harbor, the shooting was admirable. The shells fell one just forward and one just aft of the Gneisenau, the next two were better. One hit the water right abeam of the Gneisenau, ricocheted, and landed aboard. The firing was directed from the observatory.

"The enemy did not appear to like being shot at from an invisible battery which outranged their guns, and they turned southeast to get out of range without firing a single shot at us. A parting greeting landed alongside the Gneisenau, which was by this time stern on. Survivors state that Admiral von Spee, who went down with his ship, was at a loss to know where those shells dropped from.

"Meanwhile our cruisers were forcing steam and put to sea before the Germans were lost to sight, the fast British cruisers preceding for scouting work. We reoccupied the station and started the engine for power, working with our ships. Immediately we touched the key all the Germans pressed their keys, making indescribable noises by altering their spark frequencies rapidly. It has never been my lot to receive through such a jungle, and I trust never will be again. Our signaling continued without interruption, despite their efforts.

"For about two hours pandemonium reigned in the ether. After all orders had been given by wireless, the working ceased until the Germans tried to communicate with each other and our fleet returned the compliment by jamming them, with what success we do not know. The Germans disappeared in a southeasterly direction with our cruisers in hot pursuit.

"At 3 P. M. Admiral Sturdee made a signal which would have warmed Nelson's heart, and one which should be recorded in the annals of the British Admiralty, 'God Save the King.' The signal was taken up and flung far and wide through space by each of the fleet in turn until it seemed as though it would never cease. I consider it a privilege to have been one of the few to hear the signal. Had the wireless been in vogue in Nelson's day no doubt his memorable signal would have been Marconied.

"Later the flagship signaled: 'Scharnhorst and Gneisenau sunk. Where are the others?' Immediately the news was received a wild cheer went up from the small band gathered in the power house and we felt justified in drinking to the King."

The White Star steamship Cymric which arrived in New York on April 6, received the wireless distress call flashed by the African liner Falaba which was sunk by a German submarine in St. George's Channel on March 28 with a loss of more than 100 lives. Captain Beadnell, of the Cymric said he went aboard the Falaba on March 26 in the dock at Liverpool to inspect her. The Cymric left the landing stage just ahead of the Falaba, the two vessels maintaining the same position as they steamed down the Mersey. They separated in the Irish Sea, the Cymric making for the westward to pass Fastnet for New York and the Falaba heading to the southward for Las Palmas. At seven o'clock in the morning of the day the Falaba was sunk the Cymric picked up the distress call sent by the former, which read, "Submarine alongside. Am putting off passengers in boats." Captain Beadnell wanted to steam at top speed to the assistance of the craft, but the instructions of the Admiralty forbid commanders of vessels to enter into the danger zone when the enemy's warships are near. Therefore he continued on his course. A short time afterward the Cymric's operator heard the response to the S O S from British warships.

How to Conduct a Radio Club

By E. E. Bucher

ARTICLE XIII

TO the extent that the receiving apparatus is concerned, tuning may be defined as the process by which the elements of a receiving set are adjusted to secure audible response from a distant transmitting station. To obtain signals of readable strength it is important that certain adjustments be made at the receiving apparatus for each transmitting station that will set up sufficient energy to make the head telephones of the receiving apparatus respond.

Commercial receiving tuners are fitted with a so-called "stand by" circuit. As the name, in a sense, implies, it is the circuit which wireless operators employ when "standing by" or waiting for a call from stations of different wave-lengths. The stand-by circuit of a receiving tuner generally employs a coupling of about 20 per cent. between the primary and secondary windings; this makes the set, as a whole, responsive to a fairly wide range of wave-lengths, but does not give the maximum intensity of signals for any particular wave-length.

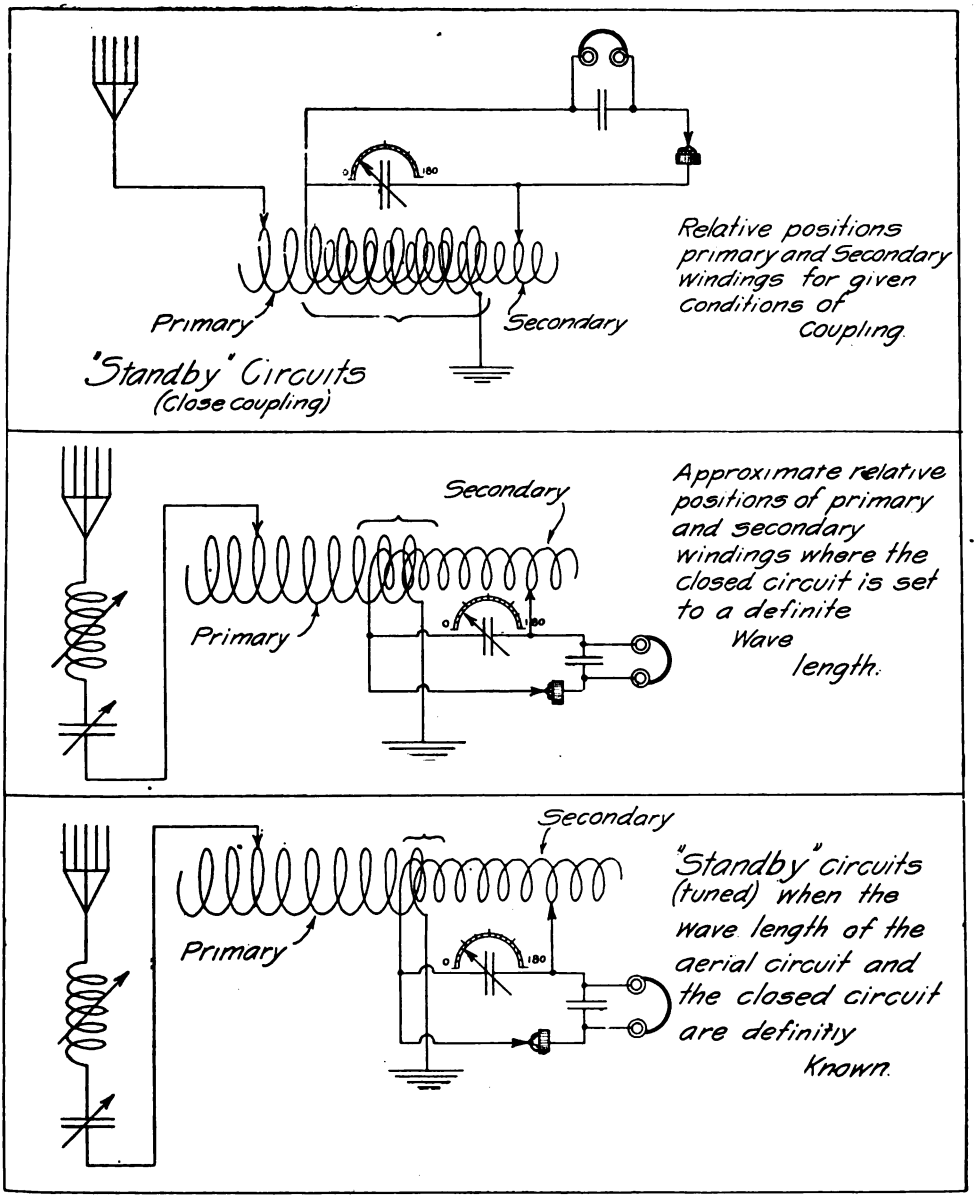
The writer does not wish to intimate that an infinite range of wave-lengths can be heard at a single adjustment of the inductance and capacity values of a given receiving set; there are limits in either the maximum or minimum values, but with the receiving tuners ordinarily employed in commercial or amateur work, it is possible to select such values of inductance or capacity in the primary and secondary circuits that the set will respond to wave-lengths over a certain small range, although not with the maximum strength of signals or over the maximum distance that these transmitting sets might carry otherwise. When signals are thus heard, however faintly, the variable elements of the tuner are then altered to suit the characteristics of the wave of the distant station until the maximum of response is secured.

It is a matter of some importance when employing the "stand-by" circuit that the condenser in shunt to the secondary winding of the receiving tuner be set at a zero or nearly zero value of capacity. In fact with the average tuner the addition of capacity at that point under conditions of tight coupling (between the primary and secondary circuits) is detrimental to the strength of signals except in certain cases where it may be necessary to secure a closer adjustment than is obtainable by the use of the multiple point switch alone.

"Stiffening" the Circuits

Unless the antenna circuit includes a considerable amount of localized inductance it is apt to be a fairly highly-damped circuit for reasons other than those due to the absorption of energy by the local detector circuit. On account of its inherent radiating properties, a portion of the energy collected by the antenna from a passing electro-magnetic wave is reradiated into space and the oscillations therefore do not attain the amplitude that might be obtained under more suitable conditions.

With a given aerial, as inductance is added in series, provided the high frequency resistance does not exceed a certain critical value, the aerial is given a more defined time period of vibration, making it more responsive to electro-magnetic waves of a given frequency. Hence it is observed that it is less difficult to separate stations having different wave-lengths or different characteristics.



Figs. 1, 2 and 3

Suppose, for example, the aerial at a given receiving station is of such proportion that in order to reach a certain wave-length only a small value of inductance is required to be connected in series at the primary winding and, furthermore, interference is experienced from some foreign station the emitted wave of which is "broad"; then the circuits at the receiving station may be "stiffened" in the following manner:

The wave-length of the antenna circuit is decreased to a definite value by the insertion of a condenser in series and then restored to the original value by the addition of inductance at the aerial tuning inductance. If the value of the capacity of the antenna is thus decreased, and the value of inductance increased, the decrement of damping is decreased. In other words, when an oscillatory circuit is stiffened by the

method just described, interference from unwanted wireless stations of other wave-lengths is reduced to a minimum. This is an adjustment of prime importance with which all radio operators should become familiar.

Conditions for "Stand-By and Tuning" Adjustments

The conditions of a receiving tuner to be responsive over a small range of wave-lengths may be tabulated as follows:

(1) An antenna of such proportion as to have a minimum value of localized inductance for adjustment to a given range of wave-length.

(2) Close coupling between the primary and secondary windings of the receiving tuner.

The conditions of the receiving tuner for the best syntonic effects are:

(1) A small aerial "loaded" with a considerable value of inductance for adjustment to given wave-lengths, or

(2) With a given aerial, the insertion of inductance in series and also capacity in series to maintain normal adjustment of wave-lengths.

(3) A small value of coupling between the primary and secondary windings.

(4) The employment of a condenser in shunt to the secondary winding (under conditions of loose coupling).

The condenser in shunt to the secondary winding gives increased strength of signals when the coupling between the primary and secondary windings is small or of low value. In this case the condenser acts as an energy-storing device for the secondary current and will increase the amplitude of oscillations.

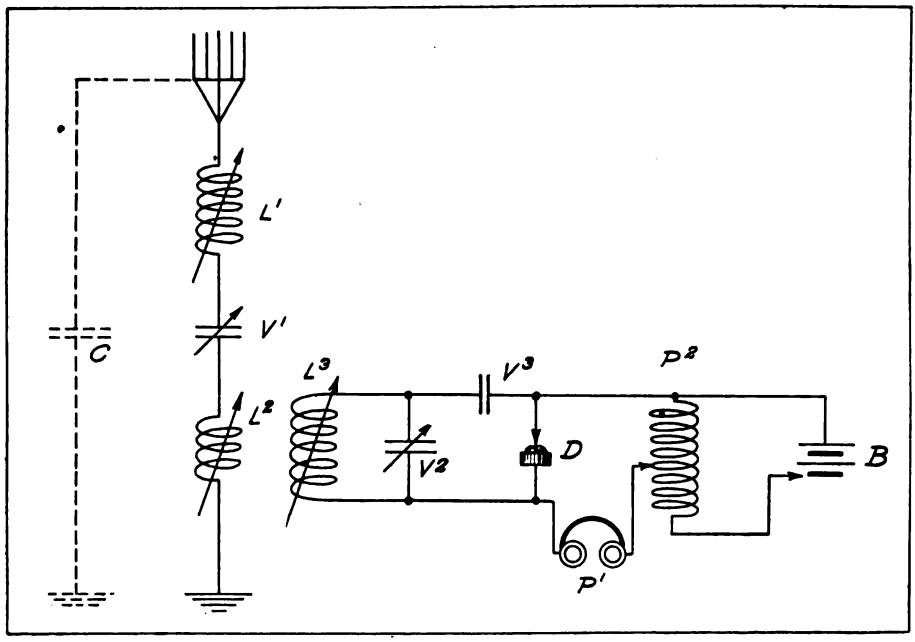


Fig. 4

The wireless operator often observes that it is possible to separate two stations at his receiving tuner having identical wave-lengths. In some cases this is due to the fact that the signals from one of these stations is stronger than from the other, but in other instances these results can be obtained on account of the fact that two transmitting stations may have identical wave-lengths but may have different characteristics.

When a receiving set is calibrated, it becomes at once apparent that the receiving apparatus may be adjusted to a given wave-length with several adjust-

ments of inductance and capacity in either the open or closed circuit. The one, therefore, to be selected is that which will give the receiving station similar characteristics to the sending station. Also, when the apparatus is adjusted to the wave-length of a given station, interference may be experienced simultaneously from another station of different wave-length owing to the two degrees of freedom of oscillation (under conditions of tight coupling). Should this be the case, the open and closed oscillation circuits of the receiver must be individually adjusted to the wave-length desired and the degree of coupling between the primary and secondary windings be at a minimum value or as is consistent with the strength of received signals.

To avoid a "broad" adjustment in the secondary circuit of a receiving tuner, the conditions necessary in the primary circuit hold, namely, inductance should predominate and the capacity should be of small value.

The Practical Adjustments of a a Receiving Tuner

We shall briefly consider three methods for the practical adjustment of a receiving tuner as follows:

(1) Where the primary and secondary circuits are not calibrated in advance.

(2) Where the secondary circuit is properly precalibrated.

(3) Where the primary and secondary circuits are individually precalibrated, and a chart of wave-length adjustments supplied.

With the conditions of (1), adjustments to stations of various wave-lengths can only be obtained by experience and experiment.

The method of procedure is as follows:

(a) Very close coupling should be employed between the primary and secondary windings.

(b) The condenser in shunt to the secondary winding is set at zero.

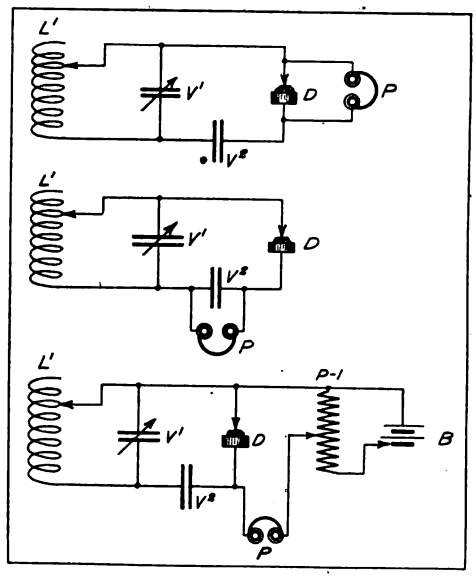
(c) About one-half the value of inductance furnished with the secondary winding should be connected in the circuit.

(d) The inductance in the antenna circuit is altered until the signals from the desired station are heard.

When the signals are thus heard:

(a) The inductance in the secondary winding is altered to ascertain if increased strength of signals can be obtained.

(b) The coupling between the primary and secondary windings is slightly decreased and a smaller value of inductance included, followed by a slight increase of capacity of the condenser in shunt to the secondary winding.



Figs. 5, 6 and 7

(c) The antenna circuit is "stiffened" by the method previously described.

In this manner stations, the wave-lengths of which are definitely known, may be brought to the maximum strength of signals and the corresponding positions on the inductance and capacity scales tabulated for future reference.

The adjustment of the receiving tuner to a station, the wave-length of which is definitely known, under the conditions outlined in (2), is a simple matter. In this case, the secondary winding of the receiving tuner has been precalibrated and a chart showing the values of inductance and capacity necessary for a given wave-length is furnished. The method of procedure is as follows:

(a) For the wave-length desired, the inductance and capacity values at the secondary winding are so selected that the inductance predominates and the capacity used is at a minimum.

(b) A fair degree of coupling between the primary and secondary windings is employed.

(c) The inductance in the antenna circuit is altered until the station desired is heard.

(d) If interference is experienced, the antenna circuit is stiffened by the method described.

Under the conditions imposed in (3), the receiving operator may adjust both circuits in advance to the wave-length desired, with the assurance that a calling station will be heard without variation of the variable elements of either circuit.

By reference to the chart furnished with the set:

(a) Such values of inductance and capacity in the antenna circuit are selected as will give the wave-length desired.

(b) Selections for the same wave-length are made in the secondary circuit.

(c) A medium degree of coupling is employed between the primary and secondary winding.

After the desired station is heard, either the primary or secondary circuit may be "stiffened" as desired.

When the condenser in shunt to the secondary winding of the receiving tuner is set at the zero position and tight or close coupling employed between the primary and secondary windings, it is often observed that the secondary circuit will respond violently to a definite wave-length, but not at all proportionately to other wave-lengths. In certain cases this is due to the distributed capacity of the coil. Every coil of wire has distributed capacity, namely possesses the property of storing up energy in the form of electrostatic lines of force between adjacent turns. With coils of a certain length, this capacity may attain to such value as to give the coil a distinct time period of vibration. Hence, when wave-lengths similar to the natural period of the coil are received and the entire coil is in use the maximum intensity of signals is obtained; but if only a portion of the coil is employed, and the wave-length is obtained by placing a condenser in shunt to the used portion, considerable energy losses may result.

To afford the student a clearer idea of the conditions under the three methods of adjustments described Figs. 1, 2 and 3 are published.

Fig. 1 shows the circuits of a receiving tuner for "stand-by" work. In this case about one-half the value of the secondary inductance is employed and the condenser in shunt is set at the zero position. The used turns of the secondary winding are placed directly underneath the used turns of the primary winding; hence, a close coupling is effected.

In Fig. 2 the wave-length of the closed circuit is definitely known, and a small amount of the capacity of the variable condenser in shunt to the secondary winding is employed. The used turns of the secondary winding are placed partly inside the used turns of the primary winding, the degree of coupling being fairly "loose."

In Fig. 3, the wave-length of both the open and closed circuits is known, hence a small value of coupling is employed.

Fig. 4 is a diagram comprising the fundamentals of a receiving set which appeared in the April issue of this series.

Receiving Detectors

The adjustment of a receiving detector to the maximum strength of signals is largely a matter of training and experience. This is particularly true in connection with the crystalline detectors for which definite instructions cannot be given for the location of the most sensitive point.

There is some difference of opinion as to the actions taking place in these detectors during the reception of signals. It is beyond the scope of this paper to enter into a complete discussion of the subject, but we may consider briefly the actions of the crystalline detector as used in certain circuits.

In Fig. 5, L-1 is the secondary winding of a receiving tuner, V-1 the condenser in shunt, V-2 the fixed condenser, D the crystalline detector, and P the

head telephone. The energy stored up in the condenser, V-1, is released in the form of high frequency electrical oscillations which flow readily through D in one direction, but are opposed in the opposite direction on account of the rectifying properties of the crystal. Thus in a single series of incoming oscillations the condenser, V-2, is charged by the impulses of the wave train and, owing to the preponderance of current in one direction (on account of the rectifying action of the crystal) the opposite coatings in the condenser, V-2, are charged to a definite polarity. On the completion of the charge (which has accumulated during a wave train), a discharge takes place through the inductance, L-1, and the head telephone, P, causing a single sound.

Under the conditions shown in Fig. 6, the condenser, V-2, is charged by a series of direct current impulses through the rectifying action of the crystal, D. The accumulating charge of the pulses thus produced by single wave train discharges aperiodically (in one direction) directly through the head telephones, P, creating a single audible sound.

When the receiving detector is supplied with an auxiliary battery circuit, as shown in Fig. 7, the actions are as follows: In this case, the current from the local battery, B, is caused to flow through the crystal, D, and the head telephones, P. The current flow through the crystal and head-phones is regulated by the potentiometer, P-1. When connected in this manner during the reception of signals there is superimposed upon the direct current already flowing through the crystal an alternating current of high frequency. If the flow of battery current is adjusted to a certain definite value, the alternating electromotive force pulses in one direction will cause a considerable rise in the value of current flowing through the head telephones from the local battery and the impulses in the opposite direction will cause a slight weakening of the circuit from the local battery. Owing to the fact that the added voltage through the head telephone circuit is greater than the subtracted voltage, the total effect is an increase of current through the head telephones from the battery. In other words, the head telephones are traversed by a series of impulses of increased strength, corresponding to the spark frequency of a distant transmitting station.

Thus it is evident that the head telephones are not operated directly by the energy from the aerial circuit, but this energy is employed to increase the current from a local battery circuit.

The sudden increase of current from the local battery circuit is not entirely due to the fact that voltage is added in one direction and subtracted in the opposite direction, but is also accounted for by the peculiar characteristics which all crystalline detectors possess, namely, in respect to conduction they do not obey Ohm's law; that is to say, the current flowing through the crystal at first does not increase directly with an increase of electromotive force, but after a certain critical potential is reached the rise in current is considerably greater than the value to be expected from Ohm's law. In actual operation sufficient battery current is allowed to flow through the crystal, D, to reach the critical point referred to. For closer investigation, the reader should be familiar with the plotting of the volt amperage characteristics of non-uniform conductors.

(To be continued)

RENEWAL OF LICENSES

The Bureau of Navigation announces that applicants for renewal of station and operator licenses must submit the originals of old licenses with the application for renewal. Service records of the operators must be kept complete at all times on the back, giving the time of service at all stations at which they are employed.

A fraudulent entry on the reverse side of an expired license was recently detected at the Philadelphia Navy Yard and the operator's license was suspended for a period of three months.

Gano Dunn has presented the College of the City of New York with a new wireless set to be used in the radio-engineering course.

Monument to Juarez in Alemada, Mexico City

A Handful of Experiences and Observations of Mexico and Mexicans in Peace and at War

J. Edw. Jones, Marconi Operator

MANY of my fellow operators have told of their experiences in the West Indies and the Central and South American countries, but only once have I read in THE WIRELESS AGE an operator's experience in Mexico. This surely cannot be the fault of the material for, limited as my knowledge is, I can see that there exists no more interesting place nor more interesting people on which to base an amateur literary effort. It so happens that my career as a wireless man has brought me in close contact with the land of the Toltec and Aztec, and as best I can, I shall set down from my diary and from memory what I have seen and heard.

My first assignment in the wireless service was to the Texas, of the Swedish-American Line. She was lying at Newport News and I journeyed there from New York in the comfortable Old Dominion steamship Princess Anne. There was a gay party aboard, some charming passengers and a general air of good fellowship; in sight of the Virginia shores my career-to-be looked highly promising.

How different was the reality I faced a few hours later! The Texas was certainly no beauty; and my visions of mighty passenger ships and gaily chatting people, ambling about the deck to strains of soft music—you know, all the novelist stuff—well, they just weren't there. Sparing you further details of

my sensations, let it suffice that I gulped down my disappointment and manfully and straightway reported to the captain. And he told me I wasn't wanted! In broken English I was given to understand that he had one operator and did not need another.

I explained that it was the first day of October, 1912; the date when the law calling for two operators on certain ships became effective. He knew nothing of it; furthermore, he doubted. I could see that, very plainly. After some moments of suspense, however, I was told: "You stay here, ann-e-way; wait till I find from my company's agents if dis ting iss true."

It was hardly what you'd term an auspicious beginning, but "dis ting" was true and from then on they tried to make the 'Merican operator comfortable in every way. Among the crew were four men who could speak fairly understandable, though somewhat weather-beaten, English, and a fifth claimed, but did not display, knowledge of a few words. The senior operator could speak no English whatever, so my trip held many operating difficulties, as you may well imagine.

We sailed the following morning at eleven. At noon I copied the weather report and took it up to the captain. He looked surprised, then puzzled. "Wat iss dis?" he said.

I told him. "Wedder report?" he repeated, wonderingly. "Dis iss der first ting ob dis kind I hev ever receibed sense dis wireless hass bin on my sheep. It iss nice."

I told him then of my understanding that it was one of the things expected from the wireless and he assured me that it was greatly appreciated and he would be obliged for anything of the kind I might give him in the future. I left the bridge highly elated, feeling in my ignorance of the service that I had accomplished something notable.

En route to Vera Cruz my elation subsided. To-day I would call it an uneventful voyage, but at the time it seemed a most portentous one. Everything, including my impressions of the glories of the seafarer's life, arose within me and left, via the starboard rail, for parts unknown.

But I did not die, as I had hoped. And arriving at Vera Cruz, my solemn resolution to stay ashore forever, abandoning once and for all the position I had worked hard eight months to obtain—all the usual oaths of allegiance to terra firma, in fact, had vanished along with once poignant memories of mal de mer departed.

It was my first trip below the temperate zone and no doubt the initial view of a tropical city atoned for much that might otherwise have appeared of importance. So let it be recorded that certainly not more than nine seconds after the doctors released the ship I went forth blithsomely in search of adventure and a drink.

That the liquid refreshment sought should have been through choice soft, has nothing to do with my reference to familiarity with the temperate zone; it was merely a matter of personal preference, for which of course I can take no special credit. Nevertheless, I needed that drink. I wanted to drown some memories. For what on board was dignified by the name of water had long since lost all resemblance to H^2O, holding not even a haunting remembrance of the accredited water taste, and leaving only hopes that the pleasant fizz and bite of ginger ale could wash away the taste of—well, to be graphic—a motorman's glove.

In my searching, Vera Cruz was polite to me and wished to serve me; this was quite apparent and easily understandable. But as the same could not be said of my Spanish I remained thirsty for quite some time. Finally a cheerful brigand translated my gesticulations with approximate correctness and just as cheerfully short-changed me on the reckoning. This I did not learn until later, when I also learned that it is the national form of welcome to purchasing strangers, no discrimination being made if the article desired is of the earth earthy, or takes the form of ecclesiastical statuettes.

For seven days I continued my Vera Cruzing in solitude, investigating the mysteries of cigar manufacturing, fruit preserving and the shipment of ore, cof-

Progreso, a thoroughly uninviting town where the author contracted malaria

The Cathedral, Mexico City

Bullfight, showing thrust to the hilt

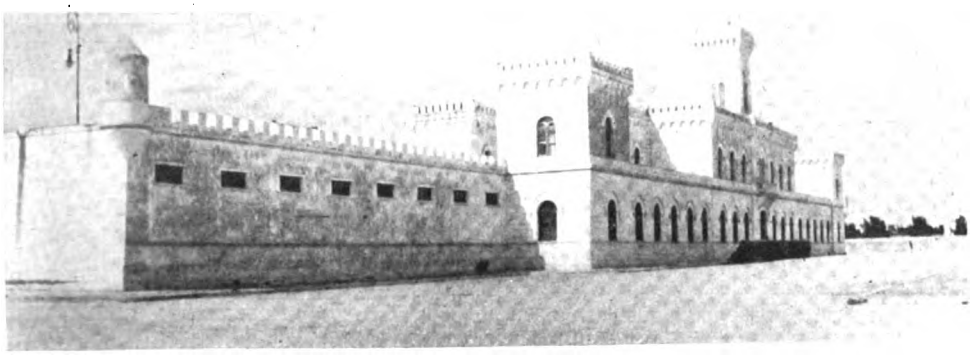
fee, dyewoods and vanilla, with no one to carry on a regular conversation, either on ship or on shore. Consequently I did not know what was going on.

The day before we were due to sail I occupied my usual bench in the Plaza, enjoying the shade and observing with interest the customs of the people. All was peaceful and quiet. The local color considerately displaying its tropical lassitude in form and action, as per the best travelogue specifications, I had given myself over to somewhat philosophical thoughts; it may be even that I dozed.

Suddenly there was a popping of guns. A great commotion arose among the people and through the streets to the south came running a company of soldiers. The bullets were whistling uncomfortably close, and when the soldiers took up a position across the Plaza I moved away rather hurriedly. A number of civilians had the same idea at the same time and we crossed in a group to the Café Diligencias, providentially situated and appropriately named.

From there we watched a sharp little skirmish, lasting about half an hour. The firing was steady and though considerable in volume displayed characteristic Mexican inaccuracy. Nevertheless, I distinctly saw some severely wounded and several fall before the defenders of the Plaza retreated to the northern outskirts of the town.

As I hurried back to the ship I passed three soldiers lying stiff and cold in the again peaceful park, and on the Avenida



The penitentiary at Merida, Yucatan, impressive for its cleanliness

de la Independencia were two others staring upward with sightless eyes.

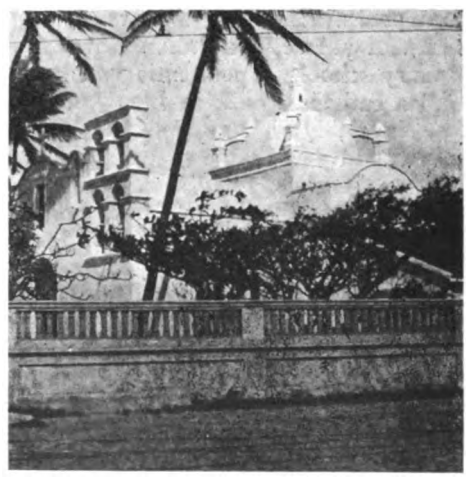
When I reached the ship she was about to put out into the stream. There were some refugees on board and many others had sought out other ships lying in the harbor. The skirmish, I then learned, was part of the first revolution of Felix Diaz against President Madero. It seems that the fighting had been going on for several days outside the town. Everyone knew about it but me, it appeared; and I realized for the first time how needless, and how dangerous is the shortcoming of the average American, a man of one language.

With a cargo consisting mainly of paper pulp we sailed the next morning for Tampico. There we learned that Felix Diaz had been taken prisoner at Vera Cruz through treachery and was imprisoned in the fort San Juan de Ulloa.

Tampico was particularly interesting and the eight-mile trip up the Panuco River afforded continuous opportunity to observe the oil tanks and refineries of one of the largest oil producing ports in the world. As we left the same evening for Galveston I will dispense with further mention of Tampico here, telling more of this Utopia later; for I saw it again under vastly changed conditions.

The voyage ended with a call at New Orleans and our return to Newport News. Leaving the ship at the latter point I journeyed to New York and was immediately assigned to the Ward Line steamship Morro Castle. I remained on

Vera Cruz in peaceful days



Church in which a black Christ is worshipped

her a year and eight months, during which time I figured in another revolution, one so-called war, was twice held by the Mexican government, twice taken into the United States transport service and was an unwilling participant in a train wreck. These adventures will not figure here in detail, however, as my purpose in this story is merely to give some scattering impressions of Mexico and her people as I found them.

This type of article was done particularly well by J. Terrence Scott under the title "A Year on a Tramp," published in THE WIRELESS AGE for August, 1914. I thoroughly enjoyed that article, my interest being both academic and personal. I have often wondered if Mr. Scott remembers me taking a message from him when he was but two hundred miles south of San Francisco and giving it to Galveston, although we were only just leaving Havana. There was good wireless equipment on the Morro Castle and while on her I worked many long distances.

But returning to my subject: Progreso is the first port of call for Ward Line vessels; it is one of those thoroughly uninviting tropical towns, built on a sand bar and of importance only as the port of entry to the State of Yucatan and as the shipping point for its capital, Merida, twenty-five miles inland. Merida is known as the City of Bells and is impressive in its cleanliness, regularity of street arrangement and fine squares and parks. It has a university, a government palace, a museum, various secondary schools, a penitentiary, a hospital and a cathedral built in 1598. This edifice is richly decorated with gold and silver and I saw many valuable paintings. Merida's forty thousand inhabitants are mainly engaged in the production of sisal grass for export. This is also known as "heniquen" or hemp and is exported principally to the United States.

Just outside Merida lie the two cities Uxmal and Chichan Itza, only recently unburied. There I saw ancient architecture that was very beautiful and bearing close resemblance to the Egyptian ruins. Showing a higher civilization than anything yet discovered on the American continent, the designation "The Egypt of the Western Hemisphere" has been given to Yucatan.

Merida was intensely interesting, but Progreso was not only dull, but unkind. On my first visit there I proved its rumored unhealthfulness by contracting malaria.

Journeying from Progreso to Vera Cruz the wireless stations of the Mexican government at the latter point and at Campeche are in communication with the ships. I had heard favorably of a lady operator being stationed at Campeche, but the endearing terms that may be heard hurtling through the air at all times conjure up a picture of feminine loveliness that is somehow inconsistent with the excellent service maintained by this station.

The snow-capped peak of Orizaba is sighted two or three hours before the vari-colored domes and steeples of Vera Cruz are seen from the dock; the perpetual snow of the volcanic cone seeming strangely out of place as a background for this semi-circular city.

A suggestion of Moorish in the city's architecture accentuates the charm of the Plaza Principal, where the band plays on certain nights and soft-eyed senoritas mingle with gaily bedecked hombres. Here the beginning of ninety per cent. of Vera Cruz courtships are beneath the eye of the beholder. Mexico, interesting by day, is fascinating at night.

Bull-fights are of course a feature of social life. American tourists may hold up their hands in horror at the statement, but I must confess I can now find what at first I thought impossible: real enjoyment in the spectacle. Other features deserving of mention are a church where a black Christ is worshipped and a cemetery holding a quaint tablet dedicated to the memory of the young men who lost their lives fighting against the United States in 1847. Both of which, as the popular Ruggles of fiction fame has it, "would never do with us."

The wireless station is at the southern end of the town and situated in a lonely spot; yet it is comfortable and a hospitable reception with a good smoke and liquid refreshment has always awaited me there.

There is an old joke about a certain American city's chief charm being the train that leaves there. The railroad trip between Vera Cruz and Mexico City is one not soon forgotten. Vera Cruz is interesting, but the capital is wonderful. Furthermore, the actual journey is a revelation along some lines. I have made it many times but I still find it exciting. The distance is about 250 miles and the train climbs from the sea level 7,600 feet to the tableland and through vegetation of every conceivable tropical and temperate variety. Cordoba, the center of the finest coffee-growing district, is the first large town reached. I expect that the coffee exported is undeniably good, but the concoction natively brewed here is, even to a seasoned traveler, undrinkable.

Through tunnels, over trestle bridges, clinging to the steep sides of gorges, twisting and turning so that the brakeman and engine driver can almost shake hands, hanging over a precipice with a sheer drop of 2,000 feet, the tiny train winds its way upward to the shadow of the peak of Orizaba, 17,375 feet above the level of the sea.

At Orizaba women venders of fruits and flowers importune the passengers, and an hour and a half later appear again to effect further sales of the same stock to the same passengers. You learn that they have climbed on foot straight up the mountain while the train has been winding along its circuitous route.

Esperanza, a tiny village but growing rapidly through gold and silver strikes, is next encountered, and beyond is Apam, the center of the pulque industry. Pulque is the famous riot-inciting drink of Mexico, an insidious concoction of fermented juice of the Century plant, in appearance a milky white and sour to the taste.

At San Juan Teotihuacan a glimpse is had of two genuine pagan pyramids, dedicated by the Aztecs to the sun and moon. The largest is one-third as high as the great pyramid of Egypt and both are surrounded by a great area wherein lie vestiges of many tombs.

Continuing then on the tableland, the sacred hill of the Virgin of Guadalupe is passed and pointed out as the saint of the seamen. Snow-topped Popocatepetl gleams in the distance and Iztaccihuatl reflects the legend of the White Woman from a height of 17,550 feet.

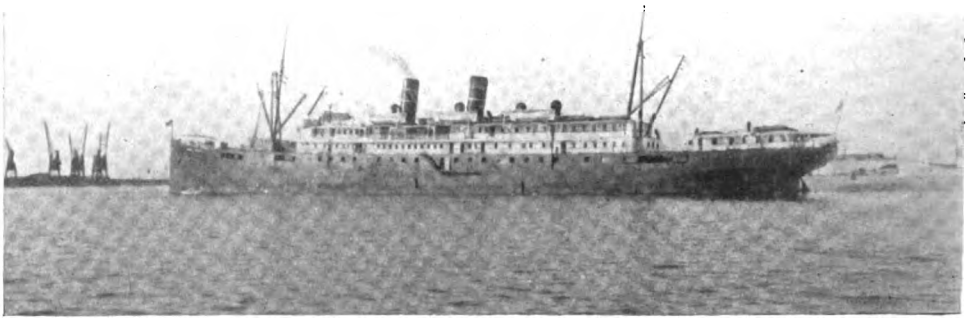
Over the railroad that required thirty years and thirty million dollars to build the train continues on past the Lakes of Tenochtitlan and glides slowly down into the City of Mexico itself.

My first trip I have said was the most exciting, the novelty of teetering on the verge of 2,000 feet drops to destruction seeming almost commonplace in later trips. But in another particular was the initial journey distinctive. Another revolution had started in the night, one that resulted in the overthrow of the president and party in power. Felix Diaz, released from prison by the kindness of Madero, had turned the Federal army from the president and secured its allegiance. With many other followers he had won a good grip on the city. Shells were screaming overhead. The heavy firing was centered on the National Palace, still in the hands of Madero, Diaz's base of operations being the arsenal. All day I watched the bombardment from the house of a Mexican deputado (since shot by order of Huerta) outside the line of fire. Everywhere people were preparing to leave the city and guns were being placed at all points. Before the day closed Madero twice sent an attacking force of 250 men to take the arsenal; both times they were mowed down in droves by the invader's machine guns.

On the second day no street was safe; the firing came from all directions and the houses of all Madero sympathizers were being shelled. Many were destroyed and the offices of the newspapers El Heraldo and Independiente were completely wrecked.

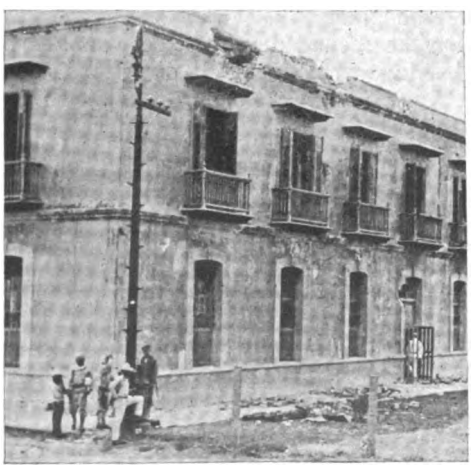
The following day saw a temporary lull in the firing and I took a coach to the station, very glad to leave for Vera Cruz with a trainful of refugees.

When I next saw Mexico City three months had elapsed and most of the buildings had been repaired. This time I made the railroad journey in the night. We were passing through the section of country infested by the Zapatistas



The Morro Castle lying in Vera Cruz harbor at the time when Huerta was chastised

Ruins of the days of Cortez, Antigua



The Naval Academy after the shelling

when the engine driver saw ahead a peon vainly trying to pull two burros off the track. Figuring that it represented a trap, instead of slowing down he speeded up the engine and rode over them. Instantly several shots rang out and a band of outlaws sprang from cover; but by then we were going at full speed and escaped through the rain of bullets with but a few broken windows.

In peaceful days there is a strange fascination about Mexico City. As the saying goes: "He who drinks the water will ever desire to return." The city holds close to a half million residents and certainly more beautiful buildings on the average than any place in the world. Spreading over an area of about twenty square miles, it nestles down in an immense basin-shaped valley embracing perhaps two thousand square miles encircled by high mountains. Beautiful beyond expression is the view of the valley and girdling mountains as seen from Chapultepec Hill, three miles from the city.

The buildings reflect a certain Oriental suggestion along with the influence left by centuries of Spanish domination. Residences seldom rise over two stories in height and have exquisitely planted inner courts. The roofs are terraced and here and there the pinnacled dome of a semi-public building rises and flashes in the sunlight, of which incidentally there is plenty in a climate of eternal spring.

The famous Cathedral, standing on the spot where once stood the great tem-

Taking aboard the Morro Castle 1,083 marines to enforce a salute to our flag

ple of the titular god of the Aztecs, lifts two open towers more than two hundred feet in the air and spreads out to a length of 426 feet. The interior decorations are magnificent, the carved choir alone being valued at a million and a half dollars. Some of the most beautiful decorations in the world are alleged to be included in the National Theatre, still incompleted because of constant revolutionary warfare.

The main streets running from the four points of the compass intersect at the Zocalo, the popular name for the Plaza Mayor, the largest in the city. The Municipal Palace faces the Cathedral on this location, and here too the monotonous National Palace stretches its dismal length. It is said that this park's rare beauty has risen over greater human sacrifice in battle than can be found anywhere in Mexico, and that more blood has been spilled on this ground than on any single spot on the American continent.

From the Zocalo street cars start in every direction, the most modern electric service having been developed for the steadily increasing urban population. Besides the regular passenger service a freight schedule is maintained; and the system even has hearses and mourners' carriages.

San Francisco street, the main business thoroughfare, proved a revelation; it connects the Zocalo with the Alameda and during the late afternoon hours elegantly attired men and women overflow the narrow streets and fill the cost-

Clearing wreckage after bombardment

Our boys occupying Vera Cruz

ly equipages that file slowly along the rows of shops, hotels and clubs.

In the Paseo the socially elect have their avenue, even as business centers along one highway; every Mexican who possesses a vehicle or can hire one seeks this beautiful drive between five and seven in the evening. For two miles to its terminus at Chapultepec the boulevard runs between a double avenue of fine trees, with every quarter mile a circle of flowers and shrubbery or statuary of historic interest. I feel that I can say without reservation, that it is one of the handsomest driveways in the universe.

At Chapultepec Castle, which is now a palace, a military school, a fortress and an observatory, may be obtained the wonderful view of the valley I mentioned before. In the park there is a fine looking wireless station, but I understand it has never done much real work, possibly because it is surrounded by the high mountains.

On the whole, Mexico City is one of the most alluring spots on earth, and one of the most progressive in adopting the many things we call modern. Perhaps this is what makes the eternal pigmy warfare stand out in such sharp contrast. I recall that as I left for Vera Cruz I asked a native which side he was on in the struggle between Huerta and Carranza. He promptly answered: "I do not know—yet; that is, I do not know which side is going to win." This is patriotism as the peon sees it.

Arriving on board on sailing morning, a Vera Cruz detachment of Mexican soldiers followed close behind and demanded that we deliver up Vasquez Gomez, a rebel leader who had been smuggled aboard the ship. The captain allowed the soldiers to search the vessel but the insurgent was not found. After being detained for two days we sailed for Havana and, much to my surprise, Vasquez Gomez turned up urbane and smiling from the secure hiding place he had sought in an effort to join his fellow rebels in the north of Mexico.

A short time after this I encountered a rebel force at close range. On a trip to Jalapa, the capital of the State of Vera Cruz, the train was wrecked and fifty thousand dollars taken from the guards' van. This happened in a mountainous country within which, wherever the land is cultivated, are produced luxuriant crops of bananas, pineapples, oranges, tobacco and coffee.

Jalapa's main distinctions appeared to be hills and rain. There is not a level street in the city and the houses look as if they had been dropped right in among the hills; any resident will praise the place in one breath and in the next guarantee that it will rain ten months out of twelve. On rainy Sundays the band plays in the Municipal Building; this, the Cathedral and the main plaza are the principal points of interest. The main plaza is carefully laid out in flower beds and is reputed to be bewilderingly beautiful in good weather; I cannot verify this statement as during the time of my visit it continued decidedly wet. I will vouch for the band, however, and do not hesitate to say there is no better anywhere in the world. Aside from the facts just mentioned, the only other impression I have of Jalapa is that Americans must be few and far between; I know we attracted no end of attention as we promenaded up and down to the strains of enticing music.

About this time the Carranzistas were surrounding Tampico and pressing the Federal garrison very hard. A general exodus of the inhabitants resulted and the Morro Castle was ordered from Vera Cruz to Tampico to act as transport for the refugees. When we arrived off La Barra, the entrance to the Panuco River, a strong "norther" was blowing and we were told that but an hour before this town had been the scene of a stiff battle which ended in a rebel retreat. Here Admiral Fletcher's Chief of Staff came aboard and I handled many messages between him and the Admiral during the two days we lay there.

It was perhaps two months later that I made a trip to a place called Antigua. With a railway station that was nothing but a tumbled down shack and a river ferry in the shape of an old Indian dugout, the antiquity implied in the name was very much in evidence. To add to the impression, when the river had been crossed I found that the chief

interest of the town lay in some rare old ruins dating back to the year 1519, the time of Cortez. The people here were all Indians and although they showed us the greatest respect, it was mingled with unconcealable wonder. A hotel or restaurant was an unheard of convenience so we arranged with a private family for dinner. The food proved to be a strange series of Indian dishes but, much to our surprise, exceedingly good ones to eat.

Many things interesting to me occurred at various times in the period that followed, but that this narrative may not drag out interminably I will just touch on two later visits to Vera Cruz and one to Tampico.

We were just about to leave Vera Cruz for New York on one of my trips when a Mexican gunboat dropped anchor about two hundred yards away and trained her guns on us. It then developed that we would not be permitted to sail until we had given up eight Mexican Congressmen, deserters from the Huerta administration, and reported to be on board. This was not entirely unexpected because I personally knew one of them, Tomas Pineiro, a deputado for Vera Cruz State, and he had told me on his arrival that he was afraid we would be stopped. Six of the men were found by the authorities and were taken into custody, Pineiro among them. The two others could not be found and it was afterwards said that they hid in the room of Mrs. John Lind, the wife of the American special envoy, while she sat out on deck all night long. As a matter of fact, these two deputados were hidden in the room, but she did not know it, having previously changed to another room and later gone ashore when she learned we would not sail. We spent the night looking down the muzzles of the Zaragosas' guns and all on board breathed a fervent sigh of relief when we were permitted to leave for New York in the early morning.

A short time after this I started on my last trip to Mexico. Huerta would not salute the Stars and Stripes, so, acting as a United States transport, we were ordered to Philadelphia, where we loaded 1,083 marines, large quantities of guns and ammunition, Red Cross supplies and the grim paraphernalia of war. From the League Island Navy Yard, amid cheers of thousands and the tooting countless whistles, we sailed on the momentous voyage which the world watched with bated breath.

The ship was croweded; men and guns were up the rigging, down the holds, everywhere. It was impossible to step out on deck at night without setting foot on a sleeping marine.

At Key West we picked up our convoy and two ominous appearing torpedo boat destroyers stuck close by our side from then until we had steamed slowly through the lines of battleships lying outside Vera Cruz harbor and reached the dock.

The Chester and the Prairie were inside the harbor; between them they fired about 130 three-inch shells into the town. Marines were landed from some of the battleships, under orders to occupy the custom house. They were received with a withering fire which came from all directions, customs officers, policemen and even civilians firing from windows and roofs and from behind the doors of the buildings. A fusillade from the Naval Academy building followed; five hundred Mexican cadets were secreted there. The Chester immediately concentrated her fire and the building was soon in ruins. I understand that every cadet was killed.

There were no Mexican soldiers in the town, Gen. Maas having withdrawn his troops beforehand and entrenched them on the sand dunes back of the city. Twice every day our naval seaplanes would rise and reconnoitre these forces.

Towards the evening of each day, as the firing subsided, I would take a walk ashore and see what further damage had been done. Somehow I always felt secure; perhaps because it never entered my mind that I could be picked off any minute by a civilian sniper. But then there were the changed conditions to observe and I had little thought for anything else. The Vera Cruz which had succumbed to United States authority was a very different town from the one I had known. Buildings were shattered, familiar landmarks were no more, the-

atres were being used as stables and soldiers were everywhere. Nothing seemed natural and it was hard to realize that this was but a tiny sample of warfare as the Powers wage it.

My ship was ordered to lay out in the harbor and wait for refugees and we wireless men had certain hours to stay on watch. On one occasion I heard the pre-arranged distress call, S I S — — — —, from the company guarding the water works. "We are being attacked and want reinforcements," they said, and scarcely a minute later army headquarters replied: "Reinforcements on the way." I give this incident to illustrate one advantage of wireless in war.

Another use of wireless was of great value. The train we were running from the interior was wireless equipped when it was first learned that the wires had been cut, and from this moving train we were told each day how many refugees to expect, long before they arrived.

We lay at Vera Cruz four weeks and then were ordered to Tampico to take on more refugees.

I mentioned earlier in this article that Tampico lies eight miles up the Panuco River, a stream lined with oil tanks and terminals, warehouses, paraffin plants and the agitators of the refineries. When we arrived river steamers and ocean tugs were moving up and down with tank barges in tow and here and there was a chalan, the long poling boat of the Indian, coming often great distances and loaded with vegetables, raw sugar, pineapples, charcoal and chickens. These are sold in Tampico and they return with purchases made in town, the round trip often taking months to make.

I learned that further up the Panuco there were many American farms deserted, fully a thousand acres of bananas were rotting. No gringo, as they call us, was safe. Property of the foreigners was being seized and often wrecked from pure rage. Shells from Federal gunboats had destroyed one huge building; I was told that the ruins I was looking at represented a loss of over half a million dollars.

For me the Indians took on added interest at this time, for I knew that the Indian peon is the only friend of the American in Mexico. The country's population comprises less than a half million whites, less than one in thirty. About one and a half million are of mixed breed; the remaining thirteen millions being Indians. The Indian is absolutely reliable, honest and trustworthy. The half breed, on the other hand, has no virtues and all vices, is an amazing liar, is thoroughly dishonest and ever treacherous. The mobs in Tampico that cried for the slaughter of the gringos were composed of these mixed breeds.

Of the Indian many stories of faithfulness were heard; as an instance, there is this one from the oil fields:

When the Americans were driven from the Topila field one Indian stuck to his post and without instructions continued moving the flowing oil from wells to the tanks and emergency reservoirs. Three times the Mexican Federal soldiers strung him up by the neck in an endeavor to make him join the army. His dogged reply was:

"I don't want to fight. I have trouble with nobody. I don't want trouble. When I first work for gringos I had nothing. I went barefoot; now I wear shoes. I used to work for sixty centavos a day. Now I get four pesos. I have a nice house; I have chairs; I have a talking machine. And once I lived like a dog. No, I will not be a soldier and fight. I want only that you leave me alone." The behavior of the Indians toward the Americans was the one bright spot in these dark times in Mexico.

So that better appreciation may be had of what our good citizens who were fleeing for their lives were leaving behind, I will insert here a word or two about the oil fields of Tampico. In ordinary times a steady procession of ocean tankers come in, load and go out the same day. Some of the crews never set foot on shore during the year, for the larger vessels load at the rate of nine thousand barrels an hour. And for this supply there are wells and refineries that have cost staggering sums of money and produce almost fabulous returns. I know of one well with an eight-inch hole that throws 185,000 barrels a day—

think of it: a year's product at this rate is worth in United States gold coin more than twenty-seven million dollars! The Panuco field alone is estimated to contain oil worth two billion dollars, double the reported fortune of Rockefeller, the oil magnate. And this is but one of three fields.

Picture this industry if you can, and then try to conceive a situation which arose. General Zaragosa and his four thousand Federals had been forced to evacuate Tampico and were caught between two Mexican rebel forces. He retreated across country to the Panuco oil fields and knowing he was beaten sent a message to the rebel General Gonzales that if attacked he would fire the oil wells. The rebels did not attack. But only because if the oil wells were ruined there would be no loot from the gringos.

The situation equals anything an imaginative novelist could conceive. Illiterate men with childlike minds and incapable of self-government—and any one of them could have applied a match to a kerosene saturated wad of cotton waste and started a two billion dollar fire! . . . That is Mexico; a treasure house held by overgrown children.

But this must be my last paragraph; I know I have already exceeded the space allotted to me by a generous editor. It but remains then to say that we took on our refugees, returned to Vera Cruz for more, learned that we were to leave immediately for New Orleans and New York, and turned the vessel's nose north with unbounded joy; for during those last two weeks the thermometer had stood at 110 in the shade. Soon after we arrived home the Morro Castle laid up and I was assigned to another ship. Just now I am running the German blockade in the Great War; but, as a widely quoted traveler maintains, that is another story. Some day I hope to tell it, too.

BORDER CHAIN FOR SIGNAL CORPS

Plans are being developed by the Signal Corps to open a wireless system of telegraph to extend from Galveston, Tex., to the Pacific Coast, along the Mexican border. By such a system the commander of the southern department and the commander of the Second Division in Texas could be kept in constant touch with the troops in the field or along the border. This is made possible by the large tractor aerial outfit now stationed at Fort McIntosh, which has a sending radius of from 200 to 250 miles.

There are also outfits of wireless telegraphy which have a radius of a hundred miles at Galveston, Brownsville, San Antonio and Laredo. It is proposed to supplement these by large field or tractor plants at posts, which will extend the service to the southern Pacific coast. Another tractor outfit is being built and may be sent to Texas or to some post along the border. This will have a four-wheel drive motor car, which will give it greater power in traveling over bad roads.

The use of wireless will be studied by the War College on its annual ride, some time in May or June. This year the War College class will study the Antietam campaign, and a small tractor with a radium of a hundred miles will be assigned to the class.

RAILROAD WIRELESS ABROAD

An interesting example of the use to which wireless telegraphy is being put is provided in an account of the construction of the trans-Australian railroad. It will be necessary to lay the tracks through more than 1,000 feet of unoccupied territory and as a result the question of establishing communication between the workers at the widely separated points in which they will be engaged was at first a troublesome one. The Federal Government was, however, persuaded to establish wireless stations along the proposed route of the railroad.

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
"Break-Ins"

To the up-to-date wireless amateur who designs his station to carry on communication effectively, the question of the best means to provide for quickly changing his aerial connection from transmitting to receiving and vice versa is of no small importance. A positive and easy "switch-over" is essential in exchanging rapid, uninterrupted messages.

There are two methods in use for making the aerial serve its double purpose, viz., the time honored D.P.D.T. switch, with various refinements and additions, such as extra blades for shorting the detector while sending, etc., and the more convenient and up-to-date "break-in" connection. The advantages of the latter are well recognized, but as ordinarily installed in amateur outfits it is far from perfect.

To those not familiar with this system, a short discussion may not be amiss. A "break-in" connection does away entirely with any form of intercommunication switch, and enables calls to be received from a distant station between signals when sending. In other words, the receiving set is always in a responsive condition the instant the key is released, enabling the distant operator to "break-in" at any point and request a certain part of the communication to be repeated, or to suggest a change of wave-length in order to avoid interference from other stations.

There are two general types of "break-in" systems in common use. The first employs a key, carrying on an insulated extension an additional pair of contacts, which close the ground circuit simultaneously with the closing of the key or preferably just before the ordinary contacts meet and admit current to the transformer primary. The drawing (Fig. 1) will explain the connection more fully. The terminals of the receiving set are connected directly across the break in the ground lead, so that when the transmitting key is open, the primary winding of the receiving transformer is connected to the aerial through the secondary winding of the oscillation transformer. When the key is depressed the receiving instruments are shorted, the antenna circuit completed and the transmitter set in operation. The theory of operation is self-evident, but there are a number of important details to be considered in the construction.

Unless special attention is paid to instrument grouping, the ground wire will be of necessity long and circuitous. This amounts to an unnecessary addition to the transmitting wave-length, which is sometimes highly undesirable in these

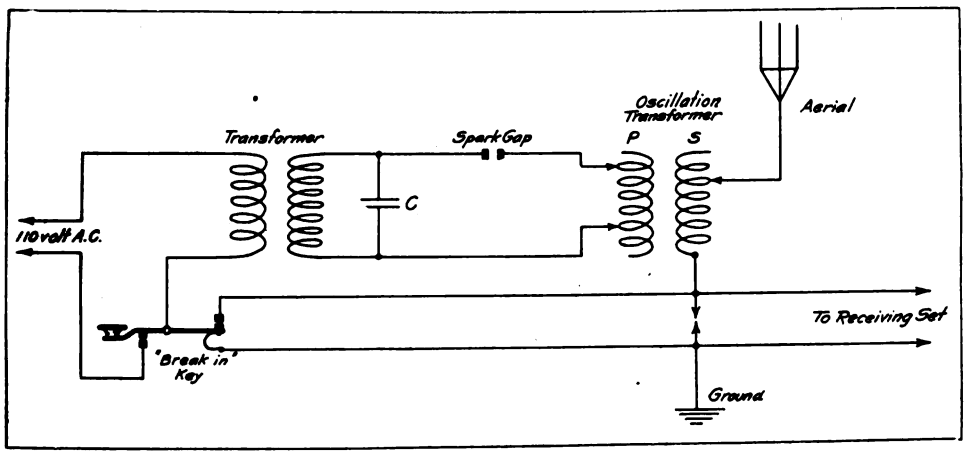


Fig. 1, First Prize Article

days of the wireless law. The remedy is, of course, to locate the key on the table so that the ground lead may be as heavy and direct as possible.

In any case the multi-point key "break-in" necessitates the bringing of the high potential currents of the open or radiating circuit uncomfortably close to the low voltage primary line supply, notwithstanding the fact that the extension arm is insulated. In order to avoid mechanical difficulties, the extension should be as short as possible and the material of which it is composed should be the best hard rubber or any substance of equally good insulating qualities. If this detail is overlooked the result may be a destructive arc into the power line, or at least undesirable leakage with the possibility of personal danger to the operator.

Unless the key is properly designed mechanically, it is very apt to be clumsy and poorly balanced, causing fatigue in operating it. Since the extension must be long enough to secure adequate insulation, and the studs sufficiently large to make a good contact, the key is very apt to be heavy on this end. Accordingly it is a good idea to insert a small spring under the extended portion to obtain snappy action.

One of the secondary pair of contacts should be adjustable vertically. But this refinement alone is not sufficient to overcome the difficulty of adjusting the two pairs of studs so that they both meet squarely and with equal pressure.

Contact A (Fig. 2) can be profitably fitted with a light spring, as shown. This accomplishes two results: it allows the antenna circuit to be closed *first* and makes a firm and positive contact. It also enables the transformer to be de-energized *first* when the key is released, insuring against the flow of current in contacts A and B either when they first touch or separate. The contacts are thus kept free from oxidation by arcing, obviating resistance losses in the antenna circuit, and at the same time precluding the possibility of a portion of the antenna current being diverted into the receiving set. The total elimination of sparking makes possible the use of broad copper or brass studs for the secondary contacts (A and B).

The second type of "break-in" referred to is the connection shown in Fig. 3, employing simply a "needle gap" in the ground lead around which the receiving set is shunted. This method of connection appeared only recently and has found great favor in the amateur wireless field because of its simplicity. In this respect it has an advantage over the multi-point key just described.

In operation, the high voltage antenna current, on account of the frequency of the oscillations, passes easily across the gap in preference to the path through the inductance of the loose coupler primary; when the transmitter operations have ceased the receiving set is immediately in position for receiving signals, the small air gap insulating the aerial from earth.

By this method the antenna circuit is never positively closed. There is always in consequence an energy loss in the form of heat at the "needle gap" when sending. This naturally leads to the question of the construction of the gap itself. Two small rectangular sheets of 1/16-inch brass, each filed to a perfectly straight knife edge and secured to a marble base with means for accurate adjustment, will make a good gap that does not heat excessively. (See Fig. 4.) The air space should be as small as consistent and the sparking uniform all along the edge.

The writer has found, however, that this type of "break-in" can only be employed to its best advantage when a vacuum valve detector is used for receiving, because, despite the small size of the air gap, an ordinary crystal detector is invariably knocked "dead" by stray currents during the periods of sending. The detector adjustment might be maintained to some extent by pulling the receiving tuner secondary entirely out of the primary each time before transmitting, but the proper tuning adjustment for the distant station is thus lost, causing more inconvenience than by the use of an old-fashioned "throw-over" switch. The amateurs who use vacuum valves which are not knocked out of adjustment by heavy discharges will no doubt develop the "gap break-in" to the limits of efficiency.

It must not be forgotten that in any "break-in" system the received impulses must pass through the secondary of the helix or oscillation transformer. This necessitates a perfectly clean contact between the clips and the conductor of the sending inductance.

The "break-in" system is no doubt here to stay and the picturesque switch, usually of a size out of all proportion to other portions of the equipment will cease to be a fixture on the amateur's instrument table.

M. K. ZINN, *Indiana.*

Note.—The simple "break-in" method having a small discharge gap in series with the earth as described by the contributor was first developed by Marconi's Wireless Telegraph Co. and has been in commercial use for a number of years.—Technical Editor.

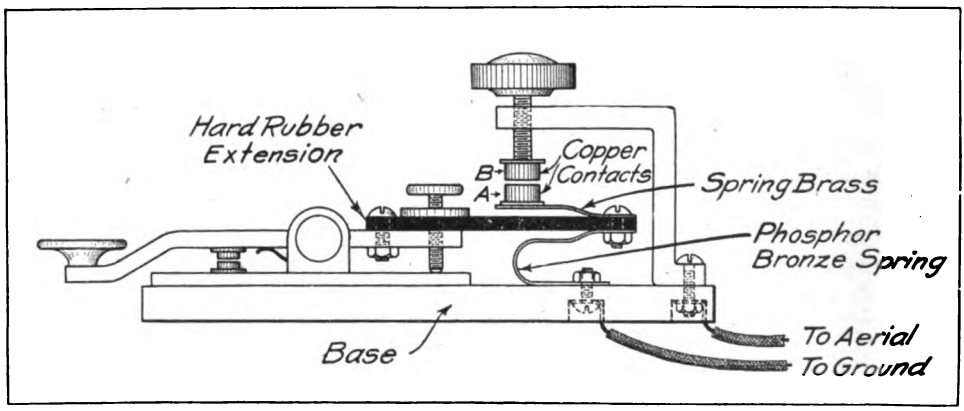


Fig. 2, First Prize Article

SECOND PRIZE, FIVE DOLLARS
A Rotary Gap Within the Reach of Everyone

Of the many designs of rotary spark gap dischargers presented to the amateur readers in various publications I have never seen one which could be constructed cheaply and easily.

After careful thought on the subject, I hit on the following design which I have found gives excellent results; in fact, the tone produced by my spark gap is among the best in this section, being high and clear, resembling a 500-cycle synchronous spark set.

Referring to Fig. 1, the U-shaped piece of brass which holds the stationary spark electrodes is of ¼-inch square brass rod bent to the dimensions given. After bending 10 equally spaced holes are drilled and tapped, as shown, to receive ten No. 8/32 brass machine screws ⅞ inch in length. These screws are held from turning by a lock-nut.

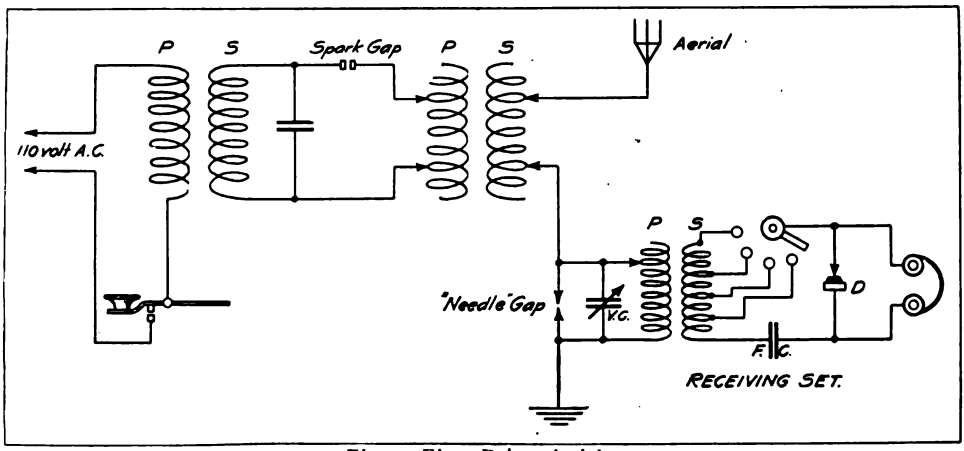


Fig. 3, First Prize Article

Care should be taken that these holes are equally spaced and bored radial so that the inner ends of the screws will be in line and exactly the same distance apart.

The U-shaped piece of brass is mounted on the base with brass angles. These should be heavy enough to prevent vibration of the stationary spark point.

A piece of fibre is turned up to ¾ inch diameter by 1⅜ inches in length and a hole ¾ inch in depth drilled in the center of one end to receive the motor shaft. The fibre is held to the shaft by two 8/32 headless set screws. At a distance of ⅜ inch from the other end, a 3/16 inch hole is drilled at right angles to the line of the shaft. Through this hole is placed a piece of seamless brass tuning 3 inches in length by ⅛ inch and 3/16 inch inside and outside diameter, respectively.

Each end is tapped to receive an 8/32 stud, 1 inch in length, which is held from turning by a lock-nut as indicated. This tubing is held central in the fibre by a set screw in the center of the end. This set screw is put in a tight thread and filed off to a point. The point runs in a piece of carbon held against it by a piece of spring brass. The carbon should be fastened loosely to the spring.

The motor should be fastened to the base at such a height that the shaft is at the center of the semi-circle. Then by adjustment of the screws in the tubing and in the semi-circle, the movable arm should rotate as closely as possible to the stationary electrodes and with exactly the same clearance all the way around for each point.

One connection is made to the semi-circle of brass, and the other to the spring brass brush which holds the carbon. Great care should be taken that the tubing is perfectly balanced in the fibre so that there will be no vibration while running. The motor may be run by a battery or from a source of alternating current giving from 4 to 6 volts.

I use this gap in connection with a ½ k.w. transformer, but for higher powers I suggest that a new set of spark discharge points should be turned, drilled and tapped, and then screwed on the end of the machine screws used in the present design.

It should be remembered that in order to get a high speed from a series motor the load, which in this case is friction, from the wind, should be just as low as possible.

An important feature of this gap is that it works very well with a low voltage transformer since there is but one air gap to be bridged.

HOMER R. SEELY, *Massachusetts.*

THIRD PRIZE, THREE DOLLARS

A Magnetic Aerial Switch

The average amateur station is apt to be over-stocked with commonplace apparatus and may be deficient in up-to-date labor-saving appliances like those employed at Government and commercial

wireless telegraph stations. One of the most common of these appliances is the magnetic aerial switch for operation by distant control.

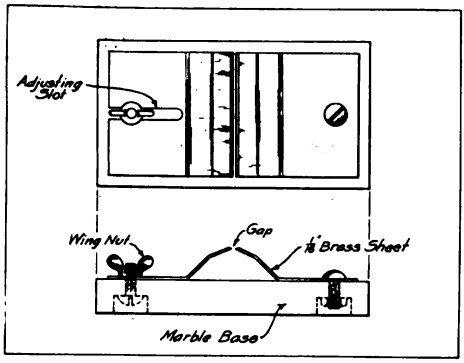


Fig. 4, First Prize Article

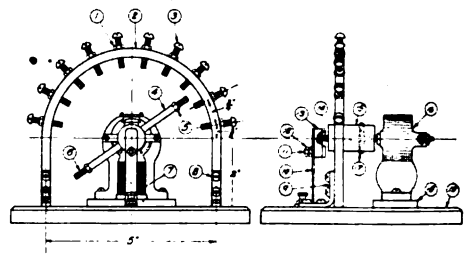
A complete set of drawings for one which I designed is included in Figs. 1 to 9. The dimensions given in these drawings may be altered to meet the requirements of the maker; if possible, however, they should be the same.

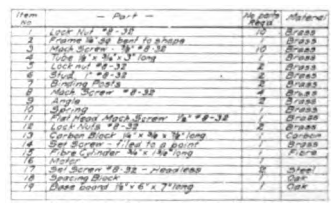
The operation of this device will be clearer from an inspection of Figs. 1 to 9, from which it will be understood that when one of the push buttons shown is pressed the aerial switch is thrown to the right, and when the other is pressed the aerial switch is thrown to the left. This is accomplished by a series of five electro-magnets, four of which are stationary and one mounted on a pivot.

A front elevation is shown in Fig. 1, a side elevation in Fig 2, and a rear elevation in Fig 4. The base for the switch is constructed of a ¼-inch piece of fibre or hardwood (the former being preferable) having dimensions of 6 x 10 inches. A hole ⅜ of an inch in diameter is drilled in the exact center for the shaft, and four similar holes are drilled, one in each corner, ½ inch from the edge. These latter holes are intended to take the supporting screws which extend through porcelain knobs into the wall or table on which the switch is to be mounted. Various other holes are drilled for binding posts, etc., as indicated in the drawing.

The vital part of this switch is the operating mechanism, which is attached to the back of the fibre base and is enclosed by a brass or tin case, 6 inches in diameter by 1½ inches deep. This construction also requires five electro-magnets having cores 1½ inches in length, one end of each being drilled and tapped for a fixed 32 machine screw. The core has a diameter of ¼ of an inch and is wound to a depth of ⅜ of an inch with No. 24 D.C.C. copper wire.

The center magnet (the armature magnet) is 2 inches in length and requires no tapping. The field magnets are each supported by an "L" shaped piece of brass having dimensions of ¼ of an inch by ⅛ of an inch, bent as per Fig. 5. These pieces are then attached to the fibre base with wood screws and to the magnets with machine screws. A brass bushing 5/16 of an inch in length by ⅜ of an inch in diameter, also having a 3/16 of an inch hole, is wedged into the hole in the center of the fibre top. This hole is intended to take the shaft which is made from a 3/16 inch rod of brass, 1 inch in length, threaded at one end for a distance of ¼ of an inch. The threaded end is screwed into a copper yoke (Fig. 6) that is sprung over the armature magnet and is secured to the shaft by a lock nut. By reference to

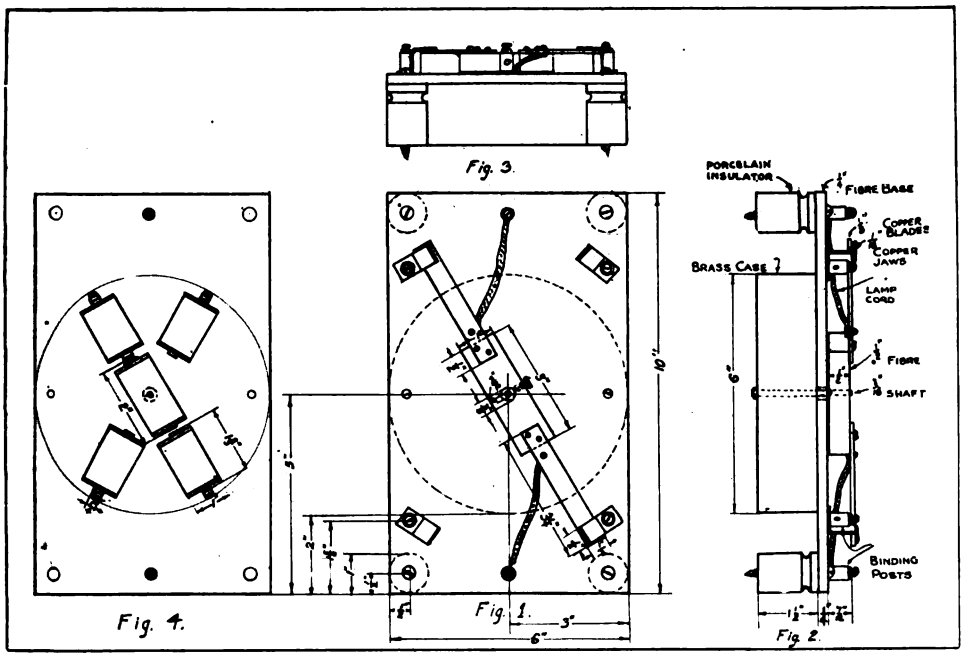




Drawing, Second Prize Article

Fig. 7 a clearer idea of the construction shown in Figs 5 and 6 will be obtained.

By referring to Fig. 1 it will be seen that the switch blades are attached to a piece of ½-inch fibre having other dimensions of 1 x 3 inches, which is in turn attached to the shaft by a set screw placed edgewise.



Drawings, Third Prize Article

The blades for the switch are 3¼ inches in length by ½ inch in width, being made from a ⅛-inch bar of copper. Each blade has two small holes in one end for screwing it to the fibre strip, and also another to take a small bolt and nut to which the flexible wires shown in the drawing are attached. Small jaws are required. These are made from 1/16-inch strips bent as shown in Fig. 8. They are then clamped under binding posts to which the switch leads are connected. The switch blades are also connected to other binding posts by means of flexible cords, these being attached, as already mentioned, to a bolt and nut on the blades.

When the field and armature magnets have been so connected that opposite field magnets will attract the armature magnet, the three leads may be brought out in any manner convenient to the builder. These leads are connected to a source of current with two push buttons in series as shown; care being taken that the potential of the source of energy is not too great for the windings of the magnet. The blades on the switch may now be used in any manner suitable to the amateur experimenter and, as generally each has different ideas in this respect, the connections have purposely been left out.

ARNO KLUGE, *Nebraska.*

FOURTH PRIZE, SUBSCRIPTION TO THE WIRELESS AGE

A Foot-Operated Switch for Amateur Purposes

When the common knife switch or aerial transfer switch is used much valuable time is lost during the receiving period in waiting for the rotary spark gap to stop. A foot-switch constructed after the design shown in the accompanying sketches is very convenient for starting and stopping a rotary gap.

When the foot-switch is employed in this manner, the extra blade on the transfer switch formerly used for the same purpose may now be utilized to short circuit the detector while sending; also the rotary spark gap may be partly stopped before the last "K" is sent.

I suggest two types of foot-switches, one where a metal pedal is used, the other in which the pedal is of wood.

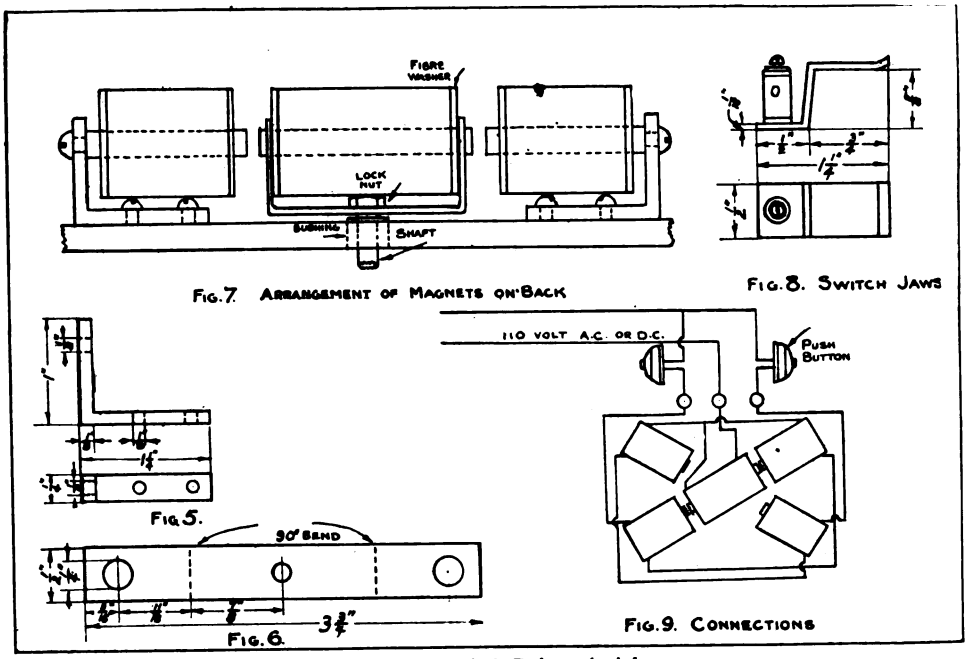
An old fan blade serves very nicely for the first named arrangement. These blades are generally of spring brass and are already cut to the correct shape as indicated, Fig. 1a being the top view, and b the side view. A covering of leather

or similar material is required for this type, otherwise the one working it is liable to experience shocks. The diagram given is more or less explanatory.

A foot-switch operated by a wooden pedal is shown in Fig. 2. A metal strip underneath the pedal is here required in order to make the contact. Two strips of spring brass, slightly bent, and fastened at one end only are placed on each side of the connecting strip which is, of course, placed in the center of the pedal.

ble with the crumbling and breaking of the porcelain and three serious defects developed: (1) they would not stand much stress; (2) they were unsightly; (3) it took a great many of them in series to afford a given amount of insulation (due to the length of the connecting wires).

I now employ these same cleats for insulators with excellent results as shown in Figure 2. They are strong, weatherproof, have a neat appearance and pos-



Drawings, Third Prize Article

These strips raise the pedal when the foot is removed. A suitable diagram of connections is shown in Fig. 3. A base should be made of either type of switch, having a screw fastened in it for a contact. Binding posts and connections should be made as per the diagram.

JOHN A. WILSON, JR., *New Jersey.*

HONORARY MENTION

An Inexpensive Aerial Insulator

I have noticed in articles published several applications of the use of glazed porcelain cleats for insulating purposes in connection with wireless telegraph aerials. I made several trials with insulating cleats as suggested in this article, but generally obtained poor results. If used as shown in Figure 1 I had trou-

sess fair insulating properties. In explanation of the drawing it should be pointed out that A is a glazed porcelain cleat; B is a brass stove bolt or machine screw, and F is a piece of fibre which has been immersed in boiling paraffin wax to make it weatherproof.

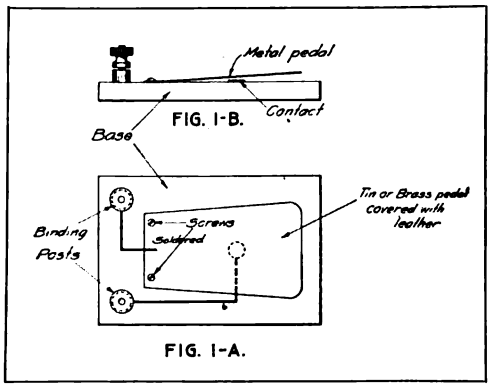
Any number of these insulators may be connected in tandem according to the aerial voltage to be handled.

WILLIAM H. SCHEER, JR., *Missouri.*

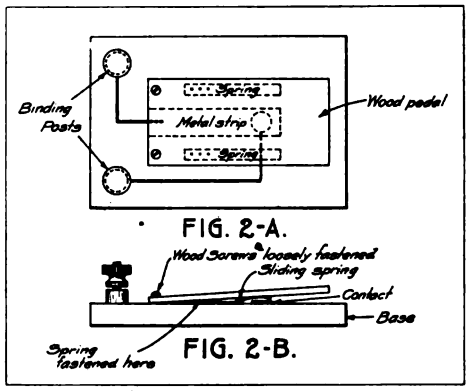
HONORARY MENTION

A Magnetic Aerial Switch

Many amateurs who desire an automatic aerial switch are perhaps not aware that one may be constructed from apparatus which can be found at the average amateur station. The one



Drawings, Fourth Prize Article



Drawings, Fourth Prize Article

I constructed is shown in Figures 1, 2, 3, 4, 5 and 6 and was made principally from the parts of an old telegraph sounder. The switch is operated by a few dry cells, and therefore may be placed at some distance from the apparatus if necessary.

In regard to the assembly of this instrument, the rod (No. 6 shown in Figure 1) should be inserted in the top of the sounder bridge in the threaded hole which formerly held the adjusting screw. No. 5 is an ordinary binding-post, the same as No. 2 (Figure 1). Rod No. 4 is passed through the hole in No. 5 and held tight by lock nuts as shown. Nos. 2 and 2a are the contact holders and are fastened to the fibre strip No. 3. Figure 2 shows a side view of the complete, also the position of the contacts, and the contact spring No. 1 (Figure 2). Figure 3 is a view of the sounder arm, No. 10, showing the position of the contact spring No. 3 and the fibre strip, No. 1.

No. 14 shows the screw which holds the contact spring to the fibre strip, and also serves as a binding screw for the aerial wire. In Figure 4 is shown the method for fastening the fibre strip which holds the contact spring. Figure 5 shows the connection when 10 volts is used; Figure 6 when the battery is used.

In order to use this switch the aerial should be connected to the contact spring, No. 3 (Figure 3); the aerial side of the receiving set to the top of binding-post No. 2 (Figure 1), and one side of the sending set to the lower binding-post, No. 2 (Figure 1).

HOWARD DANNER, *Pennsylvania*

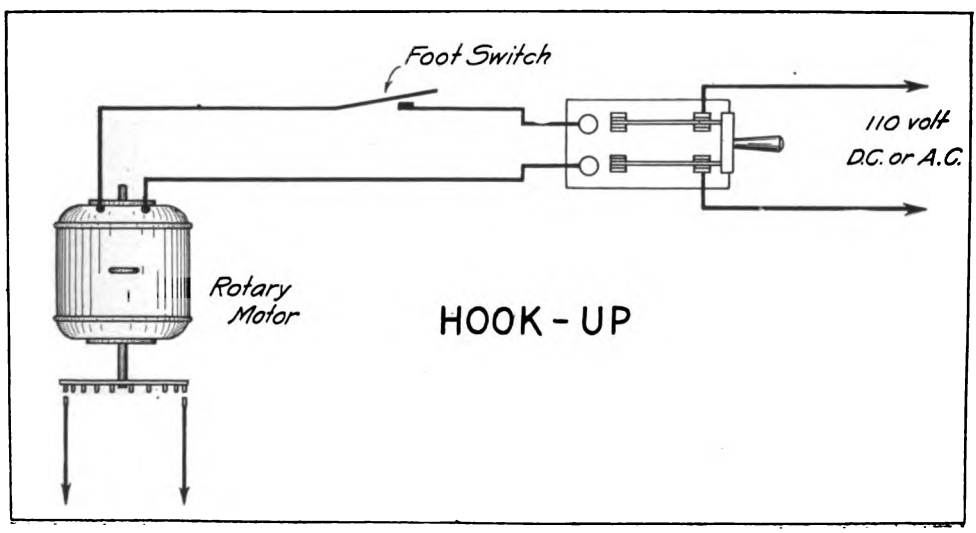


Fig. 3, Fourth Prize Article

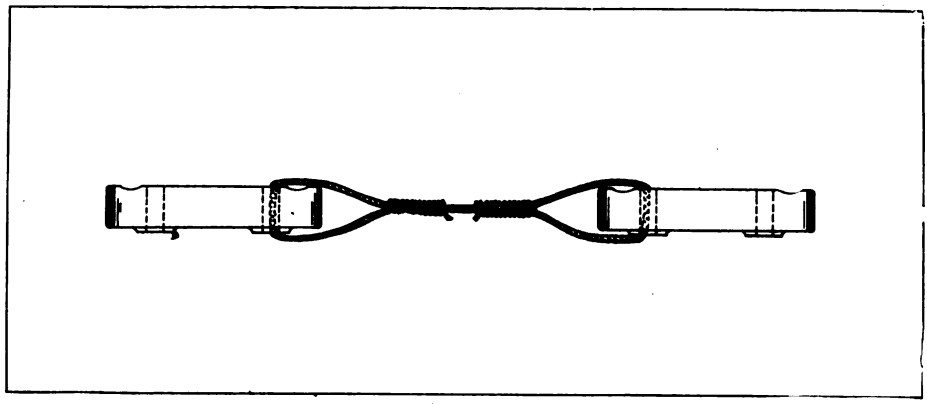


Fig. 1, Honorary Mention Article, William H. Scheer, Jr.

HONORARY MENTION

How to Prevent the Leads from Breaking Away from the Aerial

During the windy and stormy months many amateurs experience trouble with breaking wires in their aerials. Generally the two outside wires of the flat top are the first to give away. I believe this is due to the fact that the lead-ins are usually taken off these outside wires, which are thus subjected to an abnormal strain. This constant twisting and swaying finally break the lead-ins, putting the aerial for the time being out of business. I have experienced the same trouble myself and have used the idea described as follows as a remedy:

Two ordinary cleats or wireless insulators, A and B, are fastened on the under side of the center about two inches from each end, as shown in the diagram. The leads, E and F, are fastened to the cleats and brought down to the station. The wires, C and D, are now connected to E and F by the same size wire as that used in the aerial and leads proper. It can readily be seen that by this arrangement no strain will come upon the two wires, C and D.

LEANDER L. HOYT, *California*.

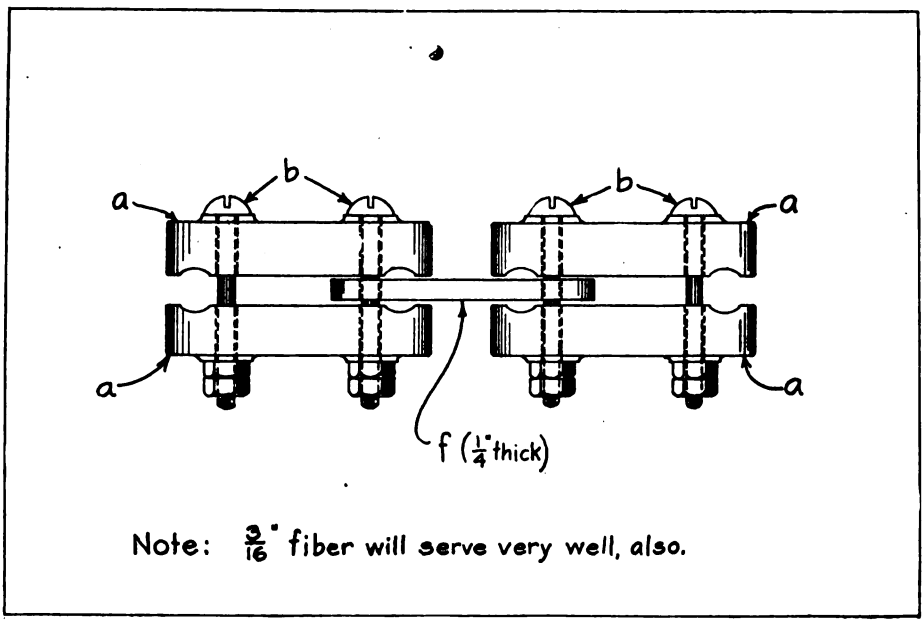


Fig. 2, Honorary Mention Article, William H. Scheer, Jr.

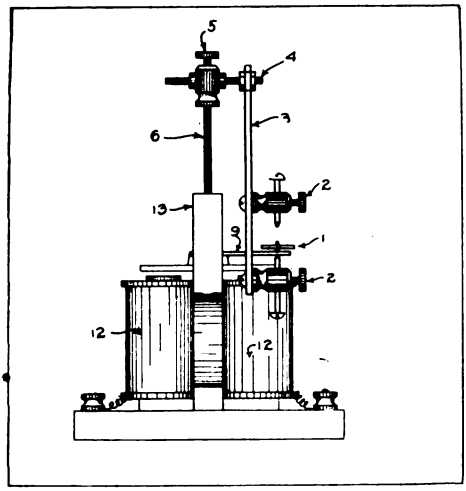


Fig. 1, Honorary Mention Article, Howard Danner

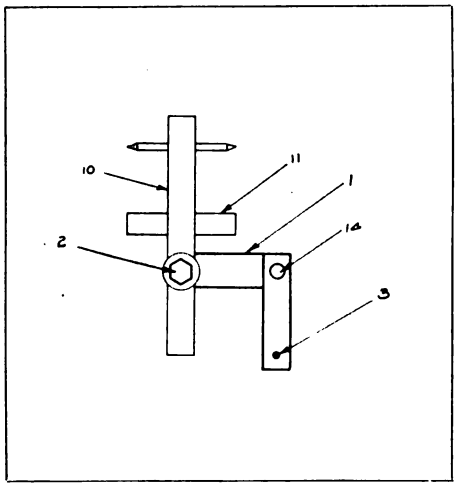


Fig. 3, Honorary Mention Article, Howard Danner

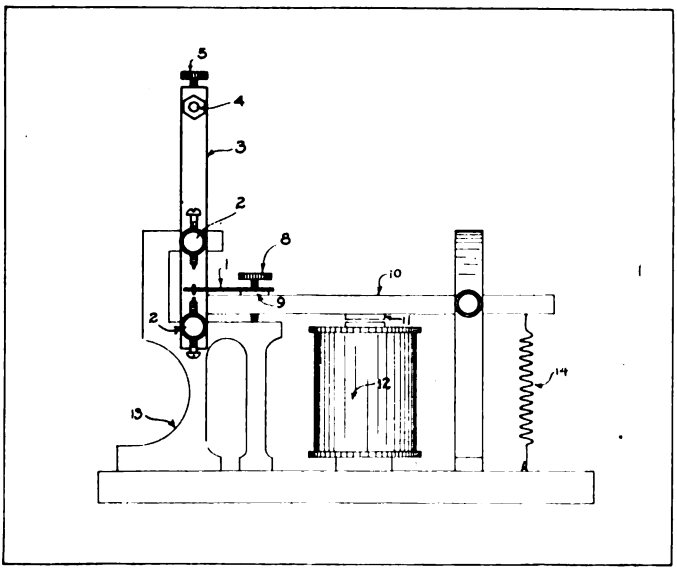


Figure 2, Honorary Mention Article, Howard Danner

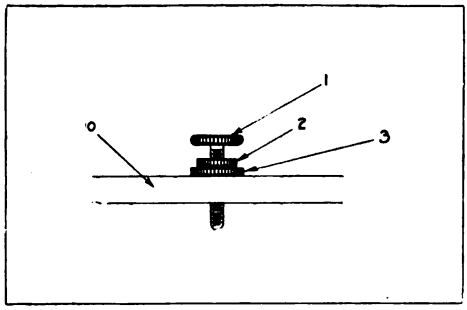


Fig. 4, Honorary Mention Article, Howard Danner

HONORARY MENTION

Keeping the Detector Adjusted

It is customary among wireless telegraphers to shunt their receiving detectors with a switch during the periods of transmission. This is not always an effective method of protection, a better one being to cut the detector from the circuit entirely. This may be accomplished quickly and readily by the use of a well-known switchboard key switch.

A general idea of the switch or the manner in which it is connected to the receiving detector is clearly indicated in Fig. 1. The lever is represented at A. When the knob X is in an upright position the detector circuit is broken. When X is thrown to the right A closes the contacts B and C. This is the receiving position. If desired, the third contact can be utilized, as shown, to place the detector on short circuit as well as out of the circuit. Throwing the lever, X, to the left accomplishes this.

Of course an ordinary D. P. D. T. switch can be used to obtain the same results, but the telephone switch can be mounted in a receiving cabinet and presents a much neater appearance. The switch need not be close to the detector unless the short-circuiting contact is employed.

IRVING FARWELL, *California.*

WIRELESS MONEY SAVERS

As lack of money is one of the principal setbacks to the majority of "radio-bugs," perhaps the following suggestions

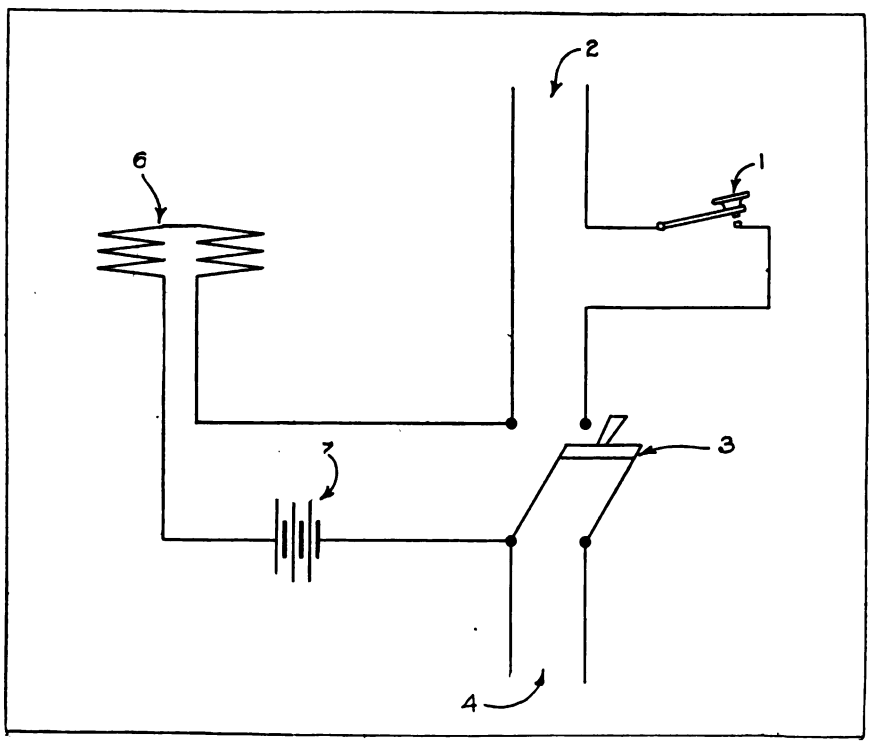


Fig. 5, Honorary Mention Article, Howard Danner

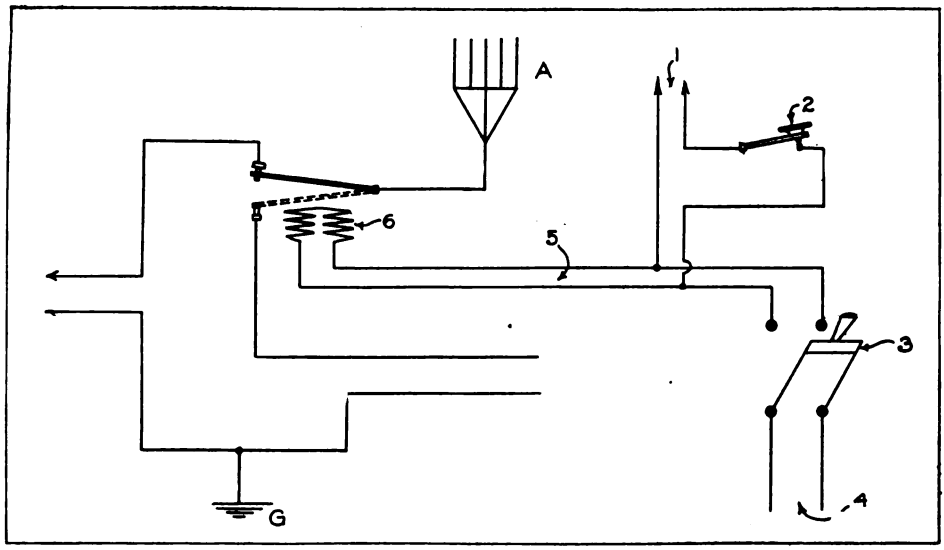


Fig. 6, Honorary Mention Article, Howard Danner

may prove useful to some fellow experimenters:

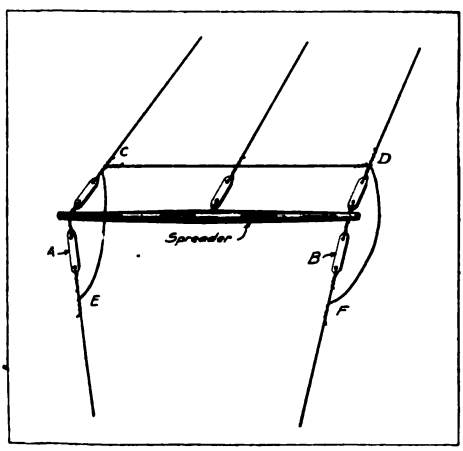
Filister head machine screws about ¾ inch long make ideal contacts if they are ground or filed level with the base of the cut. Hexagonal nuts tapped with the same thread as the screws may be used to connect the wires. The screws cost about seventy cents a gross and the nuts cost about the same.

Roof tins (like those used to fasten tar paper to roofs) and a little ingenuity make excellent heat dissipating fins for the small spark gap.

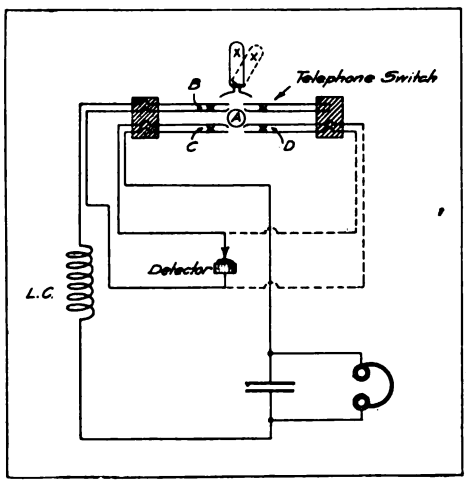
Neat nameplates for wireless instruments may be had when visiting some pleasure resort by investing a few cents in the name plates made on those machines which press names on aluminum strips.

A lightning switch is looked upon as a luxury in most amateur stations. Go to the nearest power house and see if they haven't an old 100 ampere 60-volt S. P. D. T. switch.

I got one this way for less than one dollar.—Karl Edwards.



Drawing, Honorary Mention Article, Leander L. Hoyt



Drawing, Honorary Mention Article, Irving Farwell

With the Amateurs

The second edition of the book listing the stations of The American Radio Relay League has just made its appearance and contains information on approximately six hundred amateur stations. Several stations in the previous edition have been dropped from the list through the owner's neglect to keep in continuous working order, or by reason of absences from home. The losses have been fully covered, however, by the increase in membership.

The League has recently been incorporated and plans have been made to appoint a board of control. An appeal has been made to members for financial support. Handling correspondence has been expensive and most of the money needed has been advanced by the officers personally. The Radio Club of Hartford, which appropriated $50 from its treasury, is mentioned as a supporter which should be paid back. To provide necessary funds a charge designated "station dues" has been decided upon and fifty cents a year will be charged each relay station. Upon receipt of this sum an official appointment certificate will be issued to each remitter and it is earnestly urged that the membership at large will help out with prompt remittances. The new book, a map and message blanks will be forwarded to those who order these at fifty cents additional.

Members who believe they are justified in asking for Special Licenses are advised to communicate with the League headquarters, as special arrangements have been made to expedite these applications.

It is announced that the Radio Club of America is contemplating admitting members from more distant points than New York City and vicinity, from which territory the present membership has been drawn. A paper on the present day activities along the Pacific Coast, prepared by Paul F. Godley, for the May meeting has aroused considerable interest in this organization, one of the oldest amateur clubs in the country.

Ellery W. Stone of the Department of Commerce has consented to address the members of the Inter-City Radio Association at its next meeting in Berkeley, Cal. His subject will be valve receivers, a field in which he has conducted extensive research work.

Amateurs residing within the sphere of activities of the Central Radio Association—from the Rockies to the Ohio—are invited to register their stations with Secretary H. B. Williams, Chanute, Kas.

Fifteen members are now on the roster of the Grape Belt Radio Association, organized to secure equipment collectively that would not have been possible individually. A registration fee of twenty-five cents is charged and this includes a copy of the by-laws, a list of members' stations and a certificate of membership. Herbert A. Hiller, of Silver Creek, N. Y., is president.

In Georgia, the Atlanta Radio Club has been formed with the purpose of securing members within a radius of one hundred miles of Atlanta, Ga. Max A. Herzog, 16 Faith street, Atlanta, is secretary.

Two months old, the membership of the Ohio Valley Radio Association has reached a total of sixty amateurs residing in the Ohio Valley. Semi-monthly meetings are held in Cincinnati and correspondence may be addressed to that city, 34 East Sixth street.

Many amateurs complain they can-

Station of E. R. Isaak and J. A. Gardner at Eureka, S. D.

not transmit any great distance under the restrictions placed by the Government. Howard C. Seefred and brother Lyndon, radio amateurs of Los Angeles, Cal., claim to have been in communication with Walter B. Ford, an amateur of San Diego, over one hundred miles away. These amateurs were working under 200 meters, both using about ½ k. w. power.

THE INSTITUTE OF RADIO ENGINEERS

One of the most interesting papers presented before the Institute of Radio Engineers was read by Dr. Irving Langmuir on April 7 at a meeting held in Fayerweather Hall, Columbia University, New York. It was entitled "The Pure Electron Discharge and Its Application in Radio Telegraphy and Telephony."

Dr. Langmuir introduced his subject by a careful analysis of the state of the art of manufacturing vacuum tubes when the research work commenced. He showed that in most of the tubes built for commercial work there was a considerable variation under working conditions and that it was very difficult to manufacture tubes in quantity that would have the same characteristics. The work done by several investigators was collated and by means of careful research Dr. Langmuir was able to show that a great many of the peculiarities of these tubes could be traced to a definite source; by continued research on these lines he had been able to overcome most of the difficulties and was able to state that the enormous variation in the tubes used in X-ray and other work was due to the presence of an indeterminate quantity of gas sealed up in the tube. The research showed that the tubes had certain characteristic curves which depended upon the amount of gas present in the vacuum tube and that by eliminating this gas he had been able to produce tubes which had a definite characteristic and which could be made in numbers, each of which would, within limits, have the same characteristic. This was the result of careful work done in evacuating the tube, the lecturer stating that the presence of a small amount of gas made a tremendous difference in the working properties of the tubes.

Having covered the ground thoroughly with regard to the work done by previous investigators and having shown that various results which seemed to be at variance could really be proved to be in harmony with one fundamental idea, Dr. Langmuir went on to state the research that had been necessary to enable this vacuum tube to be used in radio work. He stated that the "absolute vacuum" tube was

called by him "Kenotron" and that this form of tube was not the best for use in radio work. Further investigation had shown that in order to get the best results some amount of gas should be introduced into this vacuum; the name given the tube in which the gas had been introduced was "Pleiotron." The research carried on with a view to radio work showed that the best results were obtained if mercury vapor in definite amount was introduced into the Kenotron. This tube then behaved as a good detector of radio signals and could be used in cascade in amplifying.

The lecturer showed several slides giving the characteristic curve of the Kenotron types of tubes made and then the type of circuit which was most satisfactory for use with the Pleiotrons.

With regard to the Kenotrons he stated that the most useful fact determined about these was that owing to their positive characteristic they could be used in multiple, so that any amount of energy to be handled could be satisfactorily taken care of. By multiplication of tubes he had been able to control the output of the high frequency generator and telephone without wires between Schenectady and Pittsfield, a distance of sixty-five miles. He also stated that with the method of control used on the small units he did not see any reason why, since these tubes could be used in parallel, this method of control could not be adopted for higher powers and thus make it possible to control the output of a comparatively high powered generator by means of a telephone. The amount of power which could be used in one of these units was, in his opinion, capable of being increased and it was felt that the limit for these units had not yet been reached.

Dr. Langmuir stated that for ordinary telephone work over a short distance it had been found practicable to design a small transformer set which, in use with a condenser and the Kenotron, was extremely efficient over the short ranges. This apparatus apparently took up no more space than that required for an ordinary letter basket and any source of A. C. power from Public Service mains could be used to obtain the necessary store of energy required to start this circuit.

In discussing this paper Mr. Alexanderson amplified the information given regarding the use of these Kenotron in conjunction with high frequency circuits.

Dr. Goldsmith called attention to the fact that Dr. Langmuir glossed over the enormous amount of work that had been carried out in this research. He described the various improvements which had been made, leading up to the final improvement whereby it had been found possible to obtain the high degree of vacuum demanded by these tubes. He emphasized that a great deal of credit should be given to Dr. Langmuir and his assistants for the painstaking work and for the enormous amount of time that they had devoted to the research.

Mr. Armstrong in his remarks showed that the curves exhibited by Dr. Langmuir were in accordance with the facts and curves which had been obtained from the gas relay on which he had been working.

PROFESSOR PUPIN ON WAR WIRELESS

Professor Michael I. Pupin, of the Engineering Department of Columbia University, told of the use of wireless telegraphy in the European war at the celebration of the Columbia Alumni Day held in New York City recently. The employment of the art has transformed the method of manoeuvring, he declared. The French system has a central station which covers a large area and communicates with all points of the army. At 4 o'clock each morning the English War Office sends out its messages to the entire fleet within a radius which covers the Atlantic and goes as far as the Red Sea.

A newspaper dispatch from Petrograd says that the news of the European war was conveyed to Vilitsky, an Arctic explorer in Bering Strait, by wireless.

Prins Maurits Lost After S O S

IN the midst of the storm which swept the Atlantic on April 3, the Marconi operator on the Royal Dutch Mail liner Prins Maurits, bound from San Domingo for New York, with forty-nine persons aboard, sent a wireless appeal for aid. The commanders of the craft which received the call made haste to respond notwithstanding the difficulties of navigation in the gale, for the wireless had conveyed the information that the distressed ship was sinking. They searched the ocean about sixty miles northeast of the Cape Hatteras shoals, which had been described as the position of the Prins Maurits, for many hours without success, and it was finally decided that she had gone to the bottom.

The City of Atlanta was beating her way through the storm on the morning of April 3 at twenty-five minutes to nine o'clock when the first calls for aid from the Prins Maurits were sent. Second Operator W. E. Florence was in the wireless cabin at the time, R. G. Mackenzie, the first operator, being at breakfast. Florence immediately asked for a repetition of the message in order to make sure of the distressed vessel's position. He received no reply, however. The news of the plight of the Prins Maurits had also reached the Marconi land stations and Cape Hatteras and Cape May exchanged messages regarding the distress call.

After a while the Prins Maurits sent out a long C Q call, followed by S O S and the position of the vessel. To this were added the words, "Come quick." The captain of the City of Atlanta was then notified of the appeal and the vessel changed her course, heading for the position which had been given.

The distress calls of the Prins Maurits had spread far and wide, several vessels reporting their positions to the Marconi Cape Hatteras station in order to receive directions regarding the rescue work. At first Mackenzie and Florence believed that they were nearest to the Prins Maurits, but a short time afterward the Algonquin reported that she was not far from the ill-starred craft. The latter sent a message at about ten past twelve o'clock noon, this being the last word which those on the City of Atlanta received from the Maurits. She arrrived at the position given by the Dutch liner at half-past three o'clock in the afternoon, but was unable to find any signs of the latter.

The Algonquin of the Clyde Line was bound from San Domingo to New York when Marconi Operator Arthur Bernhardt received the appeal for aid of the Maurits and her position as it was relayed to him by a British cruiser. At this time the Algonquin was about 250 miles off Cape Hatteras. The call said that the Maurits was in distress and sinking rapidly. It urged that aid be dispatched without delay, and Captain Archibald, commander of the Algonquin, immediately steamed for the position in which the Maurits was said to be. For hours the Algonquin cruised about in her search for the Maurits, breasting the destructive seas with considerable difficulty. In fact the rescue ship herself was in danger at one time, for the waves broke over her without cessation, smashing ports, flooding the cabins and galley and carrying away the ventilators. She finally abandoned the search and proceeded to New York.

Among the other vessels which went to the aid of the Prins Maurits besides the City of Atlanta and the Algonquin was the City of Montgomery.

IN THE SERVICE

SHORE-TO-SHIP DIVISION

Norman E. Albee, who is described as the first man born in Delaware to become a wireless operator, was called upon early in life to show his faith in the art. When the first news of the wonders of wireless reached Frankford, where he was born, considerable scepticism was expressed. But Albee did not share the views of the doubting ones and afterward became engaged in the art. He employed his energies to good purpose, too, for he is now manager of the Cape Hatteras Marconi station.

It took a somewhat extended period of time for Albee to determine that he would find his own particular niche in the wireless field. After he had completed his education he was employed for several months as school teacher. He was eighteen years old when he obtained employment with a civil engineer in the mountains of western Pennsylvania where a railroad was being built. His next venture in the working world was taken at Wilmington, where he worked in the Pullman car shops. Three months later found him again in Frankford, absorbed in the study of telegraphy in the railroad station there. He was appointed assistant station agent six months afterward, remaining in that position for a year. During this period he gained considerable knowledge of freight, passenger and express traffic.

Albee had been a tower man on the Long Island Railroad for a year when he definitely decided that his life work was in wireless, his first detail being on an oil barge. He served two years on vessels of the Standard Oil, Old Dominion, Clyde, West India, Savannah and Ward lines. At the end of that time he was appointed manager of the station which the Marconi Company at one time maintained at Wilmington. He was next detailed in charge of tests on the Juniata, which cruised about for ten weeks. Then he was detailed to shore duty at Baltimore where he assigned the operators and checked up the traffic receipts on vessels leaving the city. He was manager of the Marconi station at Norfolk for nearly a year, remaining there until it was closed and the staff had been transferred to the Virginia Beach station. He was also manager of the Tampa station for eight months. He was appointed manager of the Cape Hatteras station two years ago.

The Cape Hatteras station is located on an island about forty miles in length and has an average width of less than two miles. The nearest mainland lies thirty-five miles across Pamlico Sound in North Carolina, but the mail, merchandise and travelers are conveyed to the station from Elizabeth City, N. C., one hundred miles away. The means of transportation are provided in small launches or sailboats, one or two days being taken in making the trip from one point to the other. The station is located among the hills about a quarter of a mile from the water. It has transmitted messages to the most northern points in the United States as well as to the remote tropical waters of South America, and has been active frequently in aiding vessels which flashed the S O S.

Marconi Men

The Gossip of the Divisions

Eastern Division

R. G. Cuthbert is now on the City of Montgomery as senior. George Abbott, who spent about a year on the Maracaibo running to the tropics, has been assigned as junior.

A. E. Hapeman and C. Heinline are now senior and junior, respectively, on the Maracaibo.

Operator Reachard of the Dacia has been detailed on the newly-equipped Security. The Dacia, after a daring attempt to get through the Allies' blockade, was captured by a French cruiser and taken to Brest. Reachard did excellent work on the Dacia, communicating with land direct when 2,000 miles out.

R. J. Green has been assigned to the Saratoga as junior, relieving R. R. Robb, who goes to the Antilles as junior.

O. M. Shaw has been transferred to the Comus. I. T. Carpenter is junior on this ship.

M. O. Smith, who returned from the Pacific coast several months ago, has succeeded Shaw as senior on the Caracas.

J. F. Hughes is now attached to the Pacific Coast Division, having been appointed to the Georgian when that vessel was lying at New York recently.

A. Cruttenden has been promoted to senior of the St. Louis of the American Line. J. Edward Jones is junior.

S. J. Ellis, who recently returned to New York after having made a trip on the City of Delhi, a British vessel, to Port Said, has been assigned to the Burmese Prince.

William Miller of Obidense fame is now on the Gulfoil.

The S. Y. Zara is laid up. Operator Williams has been removed from her and assigned as junior on the St. Paul.

W. S. Scott is now on the Honolulan of the Pacific Coast Division.

Joseph Grosser, recently graduated from the Marconi School of Instruction, has been assigned to the barge Chenango, relieving D. H. Fultz, who has resigned from the service.

Henry Markoe succeeds M. O. Smith as senior on the Parima.

B. T. Elkins, recently graduated from the Marconi School of Instruction, has been assigned to the Northland, relieving H. S. Van Cott, who is now second on the Camaguey.

A. Bald and J. A. Drohan have been assigned as first and second respectively, to the Mayaro. Drohan has just entered our service. He was the second operator on the Columbian, when she was burned in midocean in the summer of last year. On that occasion Drohan and several of his ship mates were tossed about in a small boat for several days before being rescued.

H. McDonald is one of several men taken from the Marconi School of Instruction during the last few weeks and given assignments. McDonald is junior on the Arapahoe.

Harold Mack has been relieved on the Texas by John Tomlinson of the Southern Division. Mack is now on the British steamship Walton Hall, making a voyage to South Africa.

A. J. Falke, assistant operator on the El Cid, has been dismissed from the service for disobedience. K. M. Hance, formerly of the Great Lakes Division. takes his place on the El Cid.

V. H. Rand, recently of the Marconi School of Instruction, has been assigned to the El Sol as junior.

M. Beckerman and W. S. Wilson have been removed from the Northland. J. W. Harte and C. Preiss succeed them as senior and junior, respectively, Beckerman taking Harte's former post as senior on the Northland.

Frank Mayer, a new man, has been assigned to the Princess Anne as second.

J. A. Johnston has relieved R. Duna on the Alabama. Duna is on leave of absence because of illness. Johnston was formerly in the service of the Gulf Division.

H. F. Ward, a graduate of the school, has been temporarily assigned to the Stephen, a British vessel, for a voyage to Barbados.

R. J. Kingsley, formerly of the El Siglo, is now on the Medina, a one-man ship.

G. I. Gerson has been assigned to the Santa Cruz of the Pacific Coast Division.

R. H. Fleming and H. A. Lemkie have exchanged ship details. Fleming is now on the El Rio as second and Lemkie is on the El Oriente as second.

W. W. Rich, who took the S. Y. California to San Francisco, returned by rail to New York after the yacht laid up on the Pacific Coast. Rich says he enjoyed the voyage, although several severe storms were encountered on the Atlantic coast.

W. E. Bisgrove, who was temporarily assigned to the Shenandoah, returned to New York on that vessel.

W. V. Moore has been assigned to the S. Y. Alberta.

C. L. Fagan and A. J. Minners have exchanged ship details, Fagan being assigned to the City of Savannah and Minners to the City of Columbus.

L. R. Schmitt and W. F. Dillon have been removed from the Evangeline, the vessel having laid up.

E. N. Pickerill and H. Orben, senior and junior, respectively, of the Kroonland, have been detached from that vessel. The Kroonland will shortly go into the Panama-Pacific service and is to be laid up for dry docking. She has just returned from an eighty-day trip around South America, during which she stopped at every large port on both coasts.

W. J. Sweet has relieved W. E. Florence as junior on the City of Atlanta.

A. W. Mayer and W. E. Florence are now on the North Star as first and second operators. The North Star has resumed her old run between New York and Portland.

A. Steeves, a new man, has been assigned as second to the Calvin Austin.

Southern Division

C. H. Warner has been transferred from the Essex to the Dorchester as senior operator, vice J. L. Brannan.

E. P. Hough was assigned to the United States Collier Ulysses for the trial trip off the Delaware Capes, from April 4th to 15th. The Ulysses was built at the Maryland Steel Company's Shipyard, at Sparrows Point, Md., for the Panama Canal service.

J. H. McCauley, who recently made several trips to Bordeaux, France, and ports in Italy, has returned to the Southern Division. McCauley has been assigned to the Parthian as senior operator in place of L. H. Gilpin.

W. J. Phillips has returned to the Southern Division after an interesting trip to Genoa, Italy via Buenos Ayres, South America. He was assigned to the Cretan as senior operator, vice, D. Levin.

L. H. Gilpin has been assigned to the Cretan as junior operator, relieving J. F. Larrimore.

Junior Operator J. E. Bell has been transferred from the Howard to the Parthian relieving J. F. Furst.

F. F. Reb, formerly senior operator of the Parthian, has been transferred to the Gulf Division.

M. C. Morris, Marconi engineer, is at present equipping the William O'Brien and the Gulfcoast at Philadelphia with ½ k. w. panel sets.

Until recently the San Juan had a second operator who was called to the bridge early one morning to use the Morse light while passing Sand Key lighthouse. Evidently he had not heard the captain tell him to signal the San Juan's passage, so he called "C Q, who abeam S. S. San Juan, where bound?" etc. The keeper at Sand Key is evidently of a humorous turn of mind; he came back with "We are anchored OM, we haven't moved in years."

S. Cissenfeld, assistant operator at the Baltimore station, has been assigned to the Northern Pacific as senior operator. G. W. Kelley of the Persian, has been assigned as junior operator. The Northern Pacific is a sister ship to the Great Northern, being of 27,000 tons, and equipped with a 2 k. w., 500-cycle set, and a ½ k. w., 120-cycle panel set as an auxiliary. Both the Great Northern and Northern Pa-

cific will ply between San Francisco and Portland, Ore., via Astoria.

Great Lakes Division

The Harvester went into commission April 14th. Operator E. G. Streigel is in charge.

Operator C. Short has been transferred from the Lake Michigan District to the Gulf Division.

Operator A. F. Moranty, Jr., has been assigned to the Lakewood.

Operator F. Marshall has been assigned to the Lakeland.

Operator C. W. Thomas has been assigned to the Lakeport.

Operator E. L. Nelson has again been assigned as manager of the Calumet, Mich., station.

Operator J. H. Hankin has again been assigned as manager of the Buffalo, N. Y., station.

Operator Joseph Newton has been assigned to car ferry Ashtabula as operator and purser.

Car Ferry M. & B. No. 2 went into commission March 16th. Operator H. W. Walters was placed in charge as operator and purser.

Collier M. & B. No. 1 went into commission March 16th. Operator R. C. Hough was placed in charge.

Operator George Keefe, on the Iowa when she sank February 4th, has been placed in charge of the Georgia.

Operator H. M. Junker has been placed in charge of the Alabama.

Operator J. E. McDonald has been placed in charge of the Arizona.

Operator H. F. Neiheisel has been transferred from the Georgia to the Carolina.

Operator C. R. Barker resumed his duties as night operator of the Cleveland, Ohio, station on March 16th, when the station resumed operations.

Pacific Coast Division

N. D. Talbot has been assigned to the Adeline Smith.

K. Peterson joined the Asuncion at Eureka, March 26th, vice E. R. Fairly.

L. W. Sturdevant left San Francisco on April 8th aboard the sailing vessel Star-of-Alaska for Chignik, where he will be stationed during the summer.

C. A. R. Lindh, formerly connected with the Mutual Telephone Company, Ltd., of the Hawaiian Islands, left San Francisco, April 9th, on the Tacoma to fill in for the Alaska Packers in emergency cases.

Sig Gaskey, who has been on the tug Kadiak since April 10th, will be stationed at Nak Nek for the A. P. A.

W. J. Erich and P. M. Proudfoot are scheduled for positions with the A. P. A. and expect to leave here about April 29th.

I. W. Hubbard has been appointed assistant on the Aroline.

R. Camp joined the Beaver as assistant on April 10th.

H. Grundell was assigned as operator in charge of the Cabrillo on a recent excursion trip.

T. Lambert was transferred to the Nann Smith as assistant on April 1st.

H. C. Hax, formerly operator in charge of the Great Northern, is now acting assistant aboard the Congress.

W. R. Lindsay and B. Farrington are acting as first and assistant respectively aboard the Celilo.

F. Harper and J. C. Mitchell recently departed on the City of Para, bound for Panama, as chief and assistant.

A. E. Werner was recently assigned to the J. A. Chanslor.

K. E. Soderstrom is now in charge of the Col. E. L. Drake, vice P. C. Millard, resigned.

F. Mousley recently joined the Francis Hanify.

J. F. Hughes was recently assigned to the Georgian at New York, relieving R. E. Smiley, resigned.

H. Hatton was temporarily assigned to the Governor, March 20th.

M. H. Mears, assistant on the George W. Elder, was relieved on April 6th by Operator H. Oxsen. Mr. Mears will remain at his home in Coos Bay for the present on account of ill-health.

W. S. Scott, a former member of this division, relieved Assistant Operator A. F. Pendleton aboard the Steamer Honolulan at New York on March 24th.

J. Echlin was temporarily assigned to the tug Iaqua on March 27th, returning April 4th. The disabled steamer O. M. Clark, to the assistance of which the tug

was dispatched, has arrived safely at San Diego.

B. C. Springer was temporarily assigned to the Lurline as assistant on March 29th.

P. S. Finnell joined the Mongolia as assistant on March 23rd, B. McLean acting as chief. The Mongolia, with McLean and Howard, holds the trans-Pacific record of 1,504 newspapers sold.

T. D. Bryant, of the Hillcrest station, is now on the Manoa plying between San Francisco and Honolulu.

L. E. Grogan, formerly of the Construction Department, is now on the new Standard Oil steamer J. A. Moffett.

A. E. Evans recently relieved P. E. Weymouth as operator in charge of the Norwood.

H. Dickow was recently placed in charge aboard the Newport.

S. Cissenfeld and G. W. Kelley have been assigned as chief and assistant on the Northern Pacific.

W. Ruddock and E. Livesey left on the Persia for the Orient as chief and assistant respectively, April 10th.

F. M. Roy and W. J. Manahan left for Seattle on the President, April 10th. Manahan will be relieved in Seattle by the regular assistant, B. H. Linden.

W. G. Ludgate, of the Willamette, was transferred to the W. S. Porter on March 25th. Ludgate has to his credit eighteen months of good work aboard the Willamette.

A. Konigstein of the General Y. Pesquiera is spending a few days at Los Angeles.

A. M. Quasdorf, third trick man at the KPH (Hillcrest) station, was married to Miss Aeileen R. Wienboldt at the residence of the Rev. Powers on April 5th at half-past seven o'clock in the evening.

T. J. Welch has joined the San Juan as operator in charge.

A. Pattison was assigned to the Henry T. Scott on April 7th.

F. Wiese and K. D. Noble left recently on the Willamette as first and assistant respectively.

Seattle Staff Changes

H. F. Wiehr, who has been detailed on the tug Wallula, is now first operator on the S. S. Paraiso.

P. M. Jacobson has been transferred from the fishing schooner Zapora to the Wallula.

J. F. Hammill made one round trip on the Pavlof as second and resigned, being relieved by G. W. Woodbury, late of the Dora.

A. G. Simson, after completing a round trip on the Spokane, has been transferred to the Admiral Evans as second.

A. Boots, who has been detailed on the Chicago, has been appointed first on the Spokane, H. W. Barker making the trip with him as second operator.

W. J. Manahan, of the Seattle Construction Department, has gone to San Francisco on a short vacation. He has been relieved in the Engineering Department by H. W. Barker.

A. E. Marr, second on the Admiral Evans, has been detailed to take charge of the bark Berlin which is scheduled to sail in a few days for the Northern cannery.

J. E. Johnson, first operator of the Admiral Evans, and O. Treadway of the Queen have exchanged ship details.

J. A. Sterling of the Y. M. C. A. School has been assigned as assistant on the Admiral Evans.

A. A. Isbell, superintendent of construction, having completed the Ketchikan semi-high-power station, is now conducting tests at Juneau. Active construction of the new 10 k. w. plant at Juneau will begin immediately.

The 25-k. w. station at Astoria is rapidly nearing completion and the first link in the Alaskan system is expected to be in working order not later than May 1.

Roy Wood, second operator and freight clerk of the Despatch, was married during his last visit in port to Miss Jefferies, of Friday Harbor.

R. F. Harvey, formerly second operator on the Admiral Farragut, made a round trip on the Admiral Evans and has now been appointed first operator on the City of Seattle.

E. C. Nelson, of the Admiral Farragut, has resigned.

H. L. Edling of the Paraiso, has resigned.

Vessels Equipped With Marconi Apparatus Since the April Issue

Names	Owners	Call Letters
Parisian	Leyland Line	MCR
Nicosian	Leyland Line	MCG
Wyvisbrook	Brook Steamship Co.	MCT
Nakomis	H. E. Dodge	
Jim Butler	Compagnie Du Boleo	WIL
Wapama	Charles R. McCormick	
Gulfcoast	Gulf Refining Co.	KUE
Southerner	Walker, Armstrong & Co.	KJF
Sultana	Mrs. Mary W. Harriman	KZH

THE HANDLING OF OFFICIAL RADIOGRAMS

The Superintendent, U. S. Naval Radio Service, under date of April 5, requests publication of the following information:

When radiograms from ships other than naval vessels relating to official business of the United States (those having the word "Govt." preceding the address) are forwarded through Naval radio shore stations, they will be transferred to forwarding lines without any further attempt to relay. These "Govt." messages include those addressed to the Weather Bureau or Observer.

In the case of all "Govt." messages originating on ships, Government or otherwise, in Alaskan waters, forwarded through Naval radio shore stations, destined to points in the United States, they will be relayed by Navy radio to North Head if for points outside of California, or to Eureka if for points in California, and there transferred to forwarding lines. The preceding applies where no routing instructions are given, but messages will be routed otherwise if so directed by the station of origin.

No charge will be made by the Naval Radio Service for the transmission of these "Govt." messages, but it will in *all* cases look to the station of origin for all forwarding charges at Government rates.

LAG IN NAVAL TIME SIGNALS

The U. S. Naval Observatory has determined the lag of the Arlington signal to be about eight hundredths of a second (.08) and that of the Key West signal to be about thirty-three hundredths of a second (.33), this lag being due to the various relays in the telegraph lines over which the signal passes from the Naval Observatory. The error of the time signal is generally less than one-tenth of a second (.1).

INSTITUTE OF ELECTRICAL ENGINEERS MEETING

"Continuous Waves in Long-Distance Radio Telegraphy" was the title of a paper read by L. F. Fuller at the meeting of the American Institute of Electrical Engineers held in New York on April 9. Mr. Fuller said that the ability to predetermine the probable normal daylight sending radius of high-powered wireless stations is of prime importance in their design. The final conclusions drawn from a comparison of empirical transmission, formulated for continuous and damped waves, are that the transmission efficiency of continuous waves is somewhat higher than that of damped waves on wave-lengths of approximately 3,000 meters or above.

SERVICE ITEMS

George S. De Sousa, traffic manager of the Marconi Wireless Telegraph Company of America, has returned to New York after a trip to Chicago, Cleveland, Detroit and other cities in the Great Lakes Division of the Marconi Company.

* * *

F. M. Sammis, chief engineer of the Marconi Wireless Telegraph Company of America, is on a tour of inspection of the stations in the Northern District.

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MARCONI WIRELESS TELEGRAPH COMPANY

OF AMERICA

WOOLWORTH BUILDING

233 BROADWAY, NEW YORK

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J. Andrew White....*Editor of Publications*
Wheeler N. Soper.....*Assistant Editor*

Pacific Coast Division

Merchants Exchange Bldg., San Francisco

A. H. Ginman.....*General Superintendent*
John R. Irwin.....*Supt. Northern District*
George J. Jessop....*Supt. Southern District*

Eastern Division

Operating Department, 29 Cliff St., New York

Ernest T. Edwards.....*Superintendent*
G. W. Nicholls.....*District Superintendent*

Southern Division

American Building, Baltimore, Md.

T. M. Stevens.....*Superintendent*

Gulf Division

917 Decatur St., New Orleans, La.

E. C. Newton.....*Superintendent*

Great Lakes Division

Schofield Bldg., Cleveland, Ohio

F. H. Mason.....*Superintendent*

Comment and Criticism

A correspondent writes as follows:

I notice with considerable interest the articles appearing in "Comment and Criticism" regarding the "swinging" of radio signals. This frequently occurs at my station. Some examples are WCC (Cape Cod, Mass.), WCY (Cape May, N. J.) who comes in very loud for certain periods and then dies out so I can scarcely hear him; WCX (Cleveland, O.), WBL (Buffalo, N. Y.) and others which have the same spark characteristics. This swinging does not seem to occur in the case of very distant stations. I am surprised at the case of WCC, which station is located within my normal daylight range. I also note that certain adjustments of the galena detector make the wave flatter or sharper than other adjustments, even though the signals are of the same intensity.—A. S., Jr., *New York.*

* * *

In the first place, how does our correspondent know that he is within the daylight range of WCC (Cape Cod, Mass.)? This station does not operate in the daylight and therefore he is unable to make tests. We should say that unless he employs an extremely sensitive detector that his station is located considerably outside the daylight range of Cape Cod. In fact, none of the stations he mentions are within the daylight range.

Therefore we reiterate our original statement that these effects (of swinging signals) are most noticeable from those stations which are situated outside of the daylight range of the receiving station.

* * *

Regarding the effect of the galena detector we quite agree with our contributor. A crystal of galena does not possess a particularly high value of resistance and, therefore, at certain adjustments may have such a low value as to seriously affect the constants of the local detector circuit (the secondary winding and the variable condenser in shunt). This would have the effect of increasing or decreasing the "sharpness" of tune, depending upon the adjustment at any particular moment.

* * *

Another reader, whose letter is signed A. S., Jr., writes:

In nearly every number of The Wireless Age somebody talks about using an "E" violin string for a cat whisker detector. This is impossible as these strings are made of gut. The metallic "E" string belongs to the mandolin.—A. S., Jr., *New York.*

* * *

The editor of this department offers his humble apologies to the entire amateur field for having allowed such an obvious error to escape his notice. Incidentally he has exposed his complete ignorance regarding musical instruments.

* * *

The following suggestion from one of our readers is worthy of consideration:

In the device for the elimination of dead-end losses described by Mr. Orth in your February, 1915, issue, page 366, a switch is shown which automatically disconnects all unused coils from the receiving circuit. Now, in order to reduce to a minimum, the absorption of energy by the unused coils, it may be of advantage to sub-divide these coils by opening the circuit between each one and its neighbor. The only case when this might be objectionable would be when the received wave had a period approximately equal to the natural period of one or more of the coils. With any given depth this point can easily be tested.

The object of this communication is to point out a simple addition to Mr. Orth's device whereby the sub-division referred to may be effected. It is only necessary to have the piece of insulating material on the blade of Mr. Orth's switch broadened out into the shape of a fan, so as to hold open the contacts of all coils except those that are in use. It is better not to let the insulating piece rub over that part of the surface of the metal

which is used in making contacts, as the metal may become fouled. Where there are so many spring contacts in series, it is highly important that each contact be as perfect as possible.—W. G. C., *Connecticut.*

Our contributor is quite correct, and in many instances it may be highly desirable to break up the continuity of the unused turns to prevent the flow of energy which might exist under certain conditions of resonance between the unused turns and the oscillatory circuit proper.

* * *.

This suggestion is recommended to amateur experimenters:

I have noticed in the "Queries Answered" department of THE WIRELESS AGE several inquiries requesting information which will enable the experimenter to eliminate the humming noises in the head telephone circuit of an audion set where the aerial is within the field of influence of alternating current power wires.

I have experienced the same difficulty, but find that it can be entirely eliminated by attaching a thin, flexible cord to the head band of my telephone, connecting it to earth. This, of course, is only feasible with head telephones having metallic bands. If this wire is wrapped neatly around the telephone cord it will not have a bad appearance.

I had previously noted the effect of touching an earth connection with the finger as your correspondent of last month had, and the series of experiments finally led me to employ the method mentioned.

I trust that this information will be of some help to amateurs who have experienced similar difficulties.—W. K. M., *New York.*

The metallic band of the ordinary head telephone is connected to the core of the electro-magnet. When this band is connected to earth it affords a slight capacity effect between the windings and the earth of just sufficient value to eliminate the objectionable noises due to electrostatic induction. In a previous issue we advised the use of a small "postage stamp" condenser to be connected to one terminal of the telephone windings to earth; the connection as described by our correspondent gives similar values of capacity effecting the same purpose in a more simple manner.

AUSTRIAN MEDAL FOR AMATEUR

Master Eugene Dynner, of Guttenberg, N. J., will be decorated with a medal by the Austrian Ambassador at Washington, in behalf of the aged Emperor Franz Josef, as soon as it reaches Washington.

Both the medal, and a hand written letter are now on their way, being sent in response to a wireless message of good-will that Dynner sent to the Emperor under his own name while he was operating the wireless station at the recent Charity Bazaar for the widows and orphans of the German, Austrian and Hungarian soldiers, held at the Seventy-first Regiment Armory, New York.

A special fifteen-day license was issued by the government at Washington to Master Dynner, and the apparatus used was his own.

The message to Emperor Joseph stated that the sender was taking the liberty, as a member of an Austro-Hungarian family, 14 years old, of sending to him the first message from the fair, over apparatus which he had himself patented, to give to the Emperor of his country his best wishes for his Fatherland.

A wireless reply was received from Count Lichtenstein, chief of the cabinet,

Eugene Dynner

in the name of the Emperor, thanking him, and stating that a hand written reply had been sent. A notice from Washington soon followed, advising him that a medal had been sent from Austria, with which he would be decorated upon its arrival.

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

C. A. B., Ocean Grove, N. J., asks:

Ques.—(1) I have read a number of times in THE WIRELESS AGE that only the outside wires count in a flat top aerial. Would an aerial be more efficient if the wires were placed one above the other, the spreaders being in a perpendicular position?

Ans.—(1) We have no definite data regarding this, nor can we possibly see how there could be an advantage in so disposing the receiving aerial.

Ques.—(2) In the Marconi "Instructions to Operators" the wave-meter is shown with the head telephones connected in series with the detector and both shunted across the condenser. In a recent article in THE WIRELESS AGE the detector is connected to but one side of the variable condenser and the telephones shunted across it. Is this a misprint?

Ans.—(2) This is not a misprint. Either method may be employed. There is a slight advantage in the unipolar connection, however. Inasmuch as the head telephones and crystals are not connected in shunt to the wave-meter circuit they do not affect the constants of the instrument.

Ques.—(3) Please give me a full explanation of undamped waves.

Ans.—(3) Undamped waves are sent from a transmitting station when the antenna is traversed by undamped oscillations. A simple explanation may be offered as per the sketch (Fig. 1) where damped oscillations are represented as a series of decaying jigs. The undamped oscillations are represented by the continuous jigs which, as long as the apparatus producing them is in operation, flow continuously and without a break.

It should now become self-evident why undamped oscillations cannot be heard on the ordinary receiving apparatus; due to the fact that there are no discontinuities in the wave train there will be no variation of current in the telephone receiver to cause an audible sound, except at the opening and closing of the transmitting key. Undamped oscillations may be generated either by the Poulsen arc, by the Goldschmidt high frequency alternator (a low speed dynamo giving a frequency of 80,000 cycles per second) or by the Marconi method of producing continuous oscillations by overlapping discharges of a condenser through a series of properly adjusted spark dischargers.

W. F. E., Pittsburg, Pa., inquires:

Ques.—(1) Is the "popular variable condenser of the Murdock type" mentioned in the article "How to Conduct a Radio Club," in the February, 1915, issue of your magazine, the variable shown in the clipping which I enclose? You will note that the advertisement states that this condenser has a capacity of .0005 microfarads, maximum capacity, while the article referred to states that the capacity is .0098 microfarads.

Ans.—(1) The condenser referred to is the next larger size which is supposed to have a capacity value of .001 microfarads.

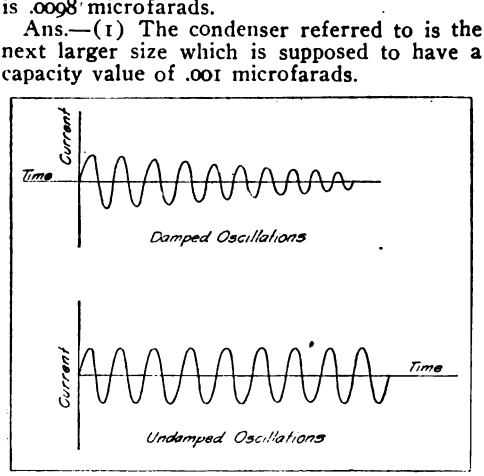


Fig. 1

Ques.—(2) Could you suggest a way to make a coil from 3 to 3¼ inches in diameter which would be equivalent to the coil on page 380 (the same article) under the subhead, "An Amateur's Wave-Meter"? I wish to use this coil as the secondary winding of my loose-coupler to test the waves of some of the stations in my vicinity.

Ans.—(2) Forty-two turns of No. 26 S. S. C. wire, wound on a form three inches in diameter, will cover the same range of wave-length as the coil described in the February issue.

* * *

J. W. T., Ossining, N. Y., asks:

Ques.—(1) I have an aerial composed of two copper-clad wires 85 feet in length by 35 feet in height, spaced two feet apart. The lead-in has a length of 10 feet. What is the wave-length and the capacity of my aerial?

Ans.—(1) The wave-length of your aerial is approximately 210 meters and the capacity about .0002 microfarads.

Ques.—(2) In connection with the aerial referred to I use an Adams-Morgan loose coupler, a large loading coil, variometer, fixed condenser, galena and silicon detectors, potentiometer and 75 ohm phones. What is my approximate day and night range?

Ans.—(2) Your day range is in the vicinity of 100 miles and your night range 600 miles.

Ques.—(3) Is the enclosed hook-up correct for the set referred to?

Ans.—(3) Yes.

Ques.—(4) Where can I obtain information regarding the construction of an instrument for measuring the wave-lengths of incoming signals and for finding the wave-lengths of my coils?

Ans.—(4) You should note carefully in the February, 1915, issue of THE WIRELESS AGE the article, "How to Conduct a Radio Club," which gives complete data for the construction of an amateur's wave-meter; also read carefully Chapter VII of "Operators' Instruction" appearing in the February, 1914, issue of THE WIRELESS AGE. Full instructions are given for determining the wave-length of the receiving circuit.

Ques.—(5) Do two 1-inch spark coils connected up in series give as much satisfaction as a 2-inch coil?

Ans.—(5) When two coils are used in this manner the primary windings should be connected in series, also the secondary windings. The interrupter of one coil should be screwed up tight and the circuit interrupted for both coils by a single interrupter. A single spark coil which gives a 2-inch spark is preferable.

* * *

G. H. B., Stanbridge, East, P. Q., Canada, asks:

Ques.—(1) Is there any practical apparatus or system for producing an electric arc at 500 volts and from 1/10 to ¼ ampere for wireless telegraph and telephone transmission to distances up to about 1,000 feet? This is to be used for experimental purposes.

Ans.—(1) It is extremely difficult to maintain a satisfactory working arc with such small current consumption. On page 296 of the January, 1915, issue of THE WIRELESS AGE there appeared a complete description of a small arc generator suitable for your purposes, but you will find that for satisfactory working, a consumption of from 2 to 5 amperes is required.

Ques.—(2) Where can a small direct current generator of 500 volts and 1/10 to ¼ ampere be purchased? If such a machine could be made at home, please give specifications.

Ans.—(2) You will find it difficult to purchase such a machine from the stock on the market. It would have to be specially constructed. Specifications for the construction of a generator are outside the scope of this department.

Ques.—(3) Has there been any instrument or device invented which is selective to frequency (in a wireless receiving set) or that may be adjusted to respond to a given spark frequency and to be inoperative to any other frequency?

Ans.—(3) Several devices for this purpose have been produced by the Marconi Company. They are known as "group frequency" tuners and enable the receiving operator to separate distant transmitting stations having different spark frequencies, even when operating on identical wave-lengths. The circuits and construction of this apparatus are not available for publication at present.

Ques.—(4) Please give a list of colleges in the United States where wireless engineering is taught.

Ans.—(4) The College of the City of New York, New York City, and Columbia University, New York City. We have no knowledge that wireless engineering is being taught outside of these two institutions.

* * *

J. C. L., Jr., Baltimore, Md., asks:

Ques.—(1) What is the wave-length of my aerial which is made up of three strands of bare aluminum wire, spaced 18 inches apart? The aerial is 75 feet long by 30 feet in height at one end and 10 feet at the other end. The lead-in is taken off from the highest end. The ground lead is 30 feet long.

Ans.—(2) This aerial has a natural wave-length of about 190 meters.

Ques.—(2) What should be the dimensions of a 3-slide tuner to receive a wave-length of 1,600 meters and to be used in connection with my present aerial?

Ans.—(2) A coil 3 inches in diameter by 10 inches in length, wound closely with No. 26 single silk covered wire, will give the range desired.

Ques.—(3) Is a tikker connected to the receiving set in the same manner that a crystal detector is?

Ans.—(3) Yes, but owing to the fact that the tikker is a low resistance device, the fixed stopping condenser of the local detector circuit becomes active as an element of the closed oscillatory circuit and the wave-length of that circuit is considerably increased over the value which is attained when a high resistance crystal is used.

Ques.—(4) How is the wave-length of a receiving tuner (straight) ascertained?

Ans.—(4) Preferably by direct measurement with the wave-meter.

Ques.—(5) How can I find the wave-length of any aerial in meters?

Ans.—(5) This is also preferably done by means of a wave-meter. It is possible to calculate the capacity and inductance and therefore, the wave-length of the antenna by complicated formula. You should study the article on "How to Conduct a Radio Club" in the February, 1915, issue of THE WIRELESS AGE, where the construction of an amateur's wave-meter is fully described. Previous issues of THE WIRELESS AGE have contained complete information for the tuning of a transmitting set or determining the wave-length of the receiving set.

H. L. Z., New York, N. Y., writes:

Ques.—(1) I find I can hear Sayville when I tune to 700 meters, although the operators are at that time sending at 2,800 meters. Is this because my wave-length is a factor of that used by WSL? Would the signals come in louder if I could tune to 1,400 meters?

Ans.—(1) This phenomenon has been noticed at many receiving stations located within 100 miles of Sayville. It is very probable that the 700-meter wave which we all hear is due to reradiated energy from the mast stays at the Sayville station. These short wave-length signals are generally heard on a wave-length of about 600 meters instead of 700 as you state. No increase in the strength of these signals may be expected by tuning to 1,400 meters which, of course, should be very loud on the fundamental wave-length, 2,800 meters. At the present time the Sayville station operates on a wave-length of 4,800 meters.

Ques.—(2) Kindly give the best hook up for the following instruments: double slide tuning coil, galena detector, silicon detector, fixed and variable condensers and a 2,000-ohm head telephone set.

Ans.—(2) A complete diagram of connections is given in Fig. 2. This is the most efficient hook-up that could be employed.

* * *

J. G. K., Chicago, Ill.:

The Fleming oscillation valve may be purchased from the Sales Department of the Marconi Wireless Telegraph Company of America, 233 Broadway; price $5 each. The purchaser assumes all risk of breakage during transportation.

* * *

R. W. P., South Framingham, Mass., inquires:

Ques.—(1) Why was the wireless station at Brant Rock, Mass., abandoned?

Ans.—(1) This station has not been abandoned, but experiments have temporarily ceased.

Ques.—(2) Does the "Humner" transformer come up to the wireless requirements?

Ans.—(2) We are not at all familiar with this type of apparatus and therefore cannot answer.

Ques.—(3) What is the wave-length of an aerial 75 feet in length, 40 feet from the earth, consisting of 4 wires placed 5 feet apart?

Ans.—(3) The wave-length of this aerial is about 210 meters.

* * *

S. B., Xenia, Ohio, writes:

Ques.—(1) I am a student in the Telegraph Department of the Ohio Soldiers' and Sailors' Orphan Home School. I am constructing a small wireless set and want instructions on how to make a good sending condenser. I do not understand the construction of a condenser of the right capacity to be used with a 1 inch spark coil. I expect to use heavy tin foil on 6 x 7 inch photographic plates.

Ans.—(1) It is rather difficult to give definite advice for the construction of a condenser suitable to these small coils, due to the differences in construction of the vibrator and the constants of the windings. A condenser of proper dimensions for a 1 inch spark coil has an exceedingly small value of capacity. It is possible that a single plate of glass having the size you suggest will be quite sufficient. A greater distance will be attained if you connect the spark gap directly in series with the antenna, using neither oscillation transformer nor condenser. An amateur supply house located in New York City manufactures a small test tube condenser for use with these coils. The article appearing in the November, 1913, issue of THE WIRELESS AGE entitled "An Amateur's Set," may aid you in the construction of a satisfactory condenser.

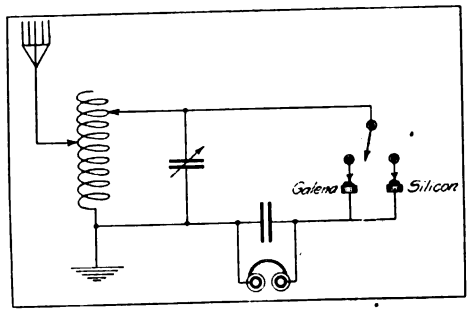


Fig. 2

* * *

G. C. C., Pittsburg, Pa., asks.

Ques.—(1) What is the wave-length of my aerial, which consists of 2 wires 8 feet apart, 200 feet in length by 75 feet in height?

Ans.—(1) Approximately 425 meters.

Ques.—(2) How far can I send with a ¼ k. w. set consisting of a transformer, condenser, helix, rotary spark gap, anchor gap, all of which are connected with No. 4 standard copper wire?

Ans.—(2) The actual distance you may cover depends largely upon the local conditions surrounding your station. Your maximum range is from 40 to 60 miles, depending upon the type of apparatus used at the receiving station.

Ques.—(3) How far can I receive with a loose coupler, loading coil, two Murdock variable condensers, RJ4 vacuum valve detector, and 2,000 ohm head telephone?

Ans.—(3) 1,000 miles by night, 150 miles by day, from stations of smaller power. You should be able to hear the Key West naval station at Key West, Fla.

Ques.—(4) What is the capacity of my condenser, which consists of 8 x 16 inch plates, ⅛ inch in thickness, covered with tinfoil 6 x 12 inches?

Ans.—(4) Each plate of your condenser has a capacity of about .001 microfarads.

Ques.—(5) What size series condenser must I use to reduce the wave-length of my aerial to 200 meters?

Ans.—(5) This aerial is too long for satisfactory operation on a 200-meter wave. It cannot be reduced by a series condenser.

* * *

G. N. H., Scranton, N. J., inquires:

Ques.—(1) Please classify the enclosed list of detectors.

Ans.—(1) Electrolytic, galena, carborundum, Fleming valve, perikon, silicon.

Ques.—(2) Is the Fleming valve detector as sensitive as any mineral or electrolytic for distance and loudness?

Ans.—(2) When used in a special circuit the Fleming valve detector is more sensitive than carborundum, but for the present the details of this circuit cannot be published. The Fleming valve as used in the ordinary manner will give, from near-by stations, considerably louder signals than any other type of detector.

Ques.—(3) Will two Fleming valves make a set more sensitive? If so, how would you connect them? Please publish a diagram.

Ans.—(3) The circuits for this arrangement are not available for publication.

Ques.—(4) What is the wave-length of an aerial 425 feet in length by 50 feet in height, the lead-in being 75 feet in length? The aerial consists of 7 strands of No. 22 B. & S. copper wire. What is the capacity?

Ans.—(4) The natural wave-length of this aerial is about 770 meters, and the capacity about .0015 microfarads.

Ques.—(5) With this aerial, the Fleming valve and accessory instrument as shown in the September, 1914, issue of this magazine, how far should I be able to receive day and night?

Ans.—(5) Night range 1,000 miles, day range 200 miles. With the silicon detector the distance will be considerably increased. You should hear the Arlington station in daylight.

* * *

A. W. S., Hudson Falls, N. Y., writes:

Ques.—(1) In the January, 1914, issue of THE WIRELESS AGE E. E. Bucher, in his article, "How to Conduct A Radio Club," places a monetary cost in his estimate on the cost of a vacuum valve set of $2.10 for 15 No. 503 ever-ready cells, giving approximately 60 volts. My effort to find this particular cell in the "American Ever Ready" catalogue, at a cost of about 14c.—Mr. Bucher's estimate—has proven fruitless. In the catalogue is listed, however, battery No. 703, consisting of three cells, giving a total of about 3.5 volts, costing approximately 30c. at wholesale. On this basis it would require 17 batteries to produce the 60 volts necessary for the head phone circuit at a cost of about $5, an increase of $3 over his estimate. Please tell me where I can secure the ever-ready cells stipulated in the article cited at his estimated cost. I contemplate conducting some experiments in which I will use several vacuum valve detectors, but it is essential to keep the cost down to the lowest possible minimum.

Ans.—(1) At the time the article in the series on "How to Conduct A Radio Club" was written it was possible to purchase ever-ready cells at a supply house in New York City at the price named. Since that time, however, such offers have not been advanced, but the cells can now be purchased from the E. I. Company, New York, at a price of 25c. per unit.

* * *

D. W. D., Tracy, Cal., writes:

Ques.—(1) On certain loose coupled tuners, two wires are apparently wound in parallel. What is the idea of using the two? Are both wires brought on to the same taps on the switch, or is one used only and the other as a safety wire?

Ans.—(1) We have never seen a tuning coil of this construction. Perhaps you have misunderstood the design of such coils. Generally when multiple point switches are used to vary the values of inductance, a loop of wire is brought out from some portion of the tuning coil winding to a point on the multiple point switch and then returned to the winding and continued.

Ques.—(2) I would like to use stranded wire for winding my tuner. No. 18 lamp cord is almost too heavy. What would be appropriate?

Ans.—(2) It is not necessary that receiving tuners be wound with stranded wire. There is a type of wire known as "Litzendraht" which consists of a very great number of fine wires, made in a cable, each wire being insulated from its neighbor. We believe it will be difficult to purchase this wire during the European war.

* * *

W. K. W., Toledo, Ohio:

The fact that your new aerial, since the storm, is 20 feet less in height than the one formerly employed, will make little difference on your long distance work; in fact, not sufficient to worry about it.

Regarding your second query: The Marconi School, formerly located at Cleveland, has been permanently closed and the instruction work transferred to Dodges Institute at Valparaiso, Ind.

For an interpretation of the list of calls given in your third query, we suggest that you secure a copy of the International Call List from the Berne Bureau at Berne, Switzerland. Some of the abbreviations which you enclose and believe to be call letters of vessels, are well known abbreviations in commercial working.

Regarding your fourth query: A transformer with a secondary voltage of 5,000 or 6,000 is too low to give satisfactory operation in connection with a rotary gap. Please observe carefully that when you employ a non-synchronous rotary spark gap in connection with a 60-cycle source of current supply, that the note when listened to at the spark gap, may seem very irregular and rough; when listened to at a distant receiving station, however, it may have pleasing musical characteristics. We are inclined to believe that you did not listen in on your

receiving apparatus. If you had done so the note might have been considerably smoother than it appeared to be when listening to the rotary direct.

The condenser as described is too small for the purpose. You require 20 plates of 5 x 7 glass covered with foil and all connected in parallel. Perhaps the spark electrodes were too large and therefore caused a rough note. These should not be more than 3-16 of an inch in diameter with a set of the dimensions referred to.

Ques.—(5) I recently asked an operator to give me a good design for an oscillation transformer. He said to make the primary on a form about 8 inches in diameter, placing the turns about ¾ inch; furthermore, to slide the secondary inside it; secondary to have 8 turns, placed ¾ inch on a form 6 inches in diameter. The primary to be wound with No. 2 aluminum wire, 6 turns; the secondary 8 turns of No. 7 stranded copper aerial wire. He advised me to make a loading coil for the aerial circuit. He figured that rarely more than 3 turns were used in the primary and not many more than 8 in the secondary, so there is no necessity for making it larger. Is he right? Can you suggest any improvement?

Ans.—(5) In the main, your friend's statements are quite correct and there is no advantage in using more than 8 turns in the secondary winding. Of course the number of turns required in either the primary or secondary windings would depend upon the size of the set and the range of wave-length over which it is expected to work. As far as an amateur set is concerned, however, your friend's advice is good and the oscillation transformer of the dimensions given should work satisfactorily. With the average amateur ¼ k. w. transmitting set, we have found by experiment that the secondary winding may consist of a few turns of very heavy rubber covered wire, wound closely, the insulation being quite sufficient to hold the potential.

* * *

J. A. C., Brooklyn, N. Y.:

We have read carefully your communication in reference to the apparent poor working of your receiving station and can see nothing wrong with the design of your apparatus. You should be able to reach a wave-length of 3,500 meters with little difficulty. Your aerial seems to be of fair proportions and you should therefore receive certain of the stations named in your communication. We are led to believe that your aerial is in some manner unfavorably located for the reception of long distance signals and for this reason cannot give specific advice which will enable you to solve your difficulties. There is a possibility that your apparatus is improperly connected. There may be an open circuit in some of your windings or perhaps a loose connection to the earth. Your aerial may easily be loaded to obtain a wave-length adjustment of 3,500 meters without loss. Data for coils of definite wave-lengths are given in the February 1915, issue of THE WIRELESS AGE in one of the series of articles on "How to Conduct A Radio Club." * * *

D. M., Amboy, Ind.:

Ques.—(1) What is the proper spacing of the turns for ½ k. w. helix? The coil is 10 inches in diameter and is wound with No. 6 aluminum wire.

Ans.—(1) The spacing depends upon the voltage employed. In this case ½ inch between the turns is quite sufficient.

Ques.—(2) Please tell me why it is that a telephone receiver with the diaphragm removed and connected across the vibrator of a high frequency buzzer will reproduce the sound?

Ans.—(2) This is due to the molecular vibration of the core of the receiver magnets.

Ques.—(3) I have a 3,000-meter, double slide tuning coil, a variable condenser, one small and one large fixed condenser, two galena detectors and 2,000-ohm Brandes and E. I. Company's professional receivers. My aerial is 100 feet in length and about 70 feet in height. What change must I make to tune into the new stations using 10,000 to 17,000 meters?

Ans.—(3) In the first place there are no stations working on 10,000 meters or 17,000 meters at the present time within your range. You should re-design your entire equipment. You will find the single coil as described even when "loaded" with an aerial tuning inductance and an additional loading coil in the secondary winding, an unsatisfactory arrangement for this purpose. Note the article on "How To Conduct A Radio Club" in the February, 1915, issue in which a 10,000 meter secondary winding suitable for your purposes is fully described.

* * *

J. W. D., Peekskill, N. Y., inquires:

Ques.—(1) Who has been using the wireless telephone that I have been hearing recently? The signals come in fine, but the station does not give any sign. I hear only music.

Ans.—(1) This is the Marconi experimental wireless telephone station at the Wanamaker station, New York City.

Ques.—(2) Please tell me the wave length of an aerial 100 feet in length, the lead-in being 40 feet taken from the center, and the aerial consisting of 6 wires.

Ans.—(2) The wave-length of this aerial is about 275 meters.

Ques.—(3) Is an oscillation transformer with a primary winding, comprising 3 turns of No. 8 wire, 15 inches in diameter, and a secondary winding of 8 turns, made of No. 6 wire, suitable for a 1 k. w. set?

Ans.—(3) Whether or not this oscillation transformer has proper dimensions for your purposes depends upon the size of the aerial with which it is to be used or the wave-length with which the set is to be worked and the condenser capacity to be employed in the closed oscillatory circuit. If it is to be used in connection with a condenser for a 200-meter set, the design as described is quite satisfactory.

Ques.—(4) How much more efficient is

the quenched gap than the rotary gap? Can you give me definite data on a quenched gap?

Ans.—(4) For small power, the quenched gap ordinarily gives a higher value of efficiency, but this type of spark discharger cannot be employed to best advantage with the ordinary types of transmitting apparatus. For maximum efficiency a properly designed quenched spark gap should comprise correlated apparatus from the generator up to the quenched gap itself; that is to say, the generator-transformer, condensers and gap should be specially designed to meet the requirements. If an amateur employs a quenched gap on a set of ordinary construction, the oscillation transformer should be so constructed that a continuously variable value of inductance may be obtained, and the coupling features of the coil should be so constructed that the coupling may be quickly and easily adjusted to any value desired within reasonable limits. For very large powers such as are used at the high power Marconi stations, the rotary spark gap is preferable, because the amount of energy that may be handled with it is practically unlimited.

Ques.—(5) Is a lightning switch an absolute necessity to the safety of a house having a tin roof?

Ans.—(5) Do you desire to ground the tin roof through a lightning switch, or do you refer to the aerial? It is not a bad idea to have a lightning switch on the antenna or at any wireless station although you are perhaps aware that the antenna is always earthed when the aerial lead is connected to the secondary winding of the transmitting oscillation transformer.

* * *

C. H. P., Waukesha, Wis.:

Ques.—(1) I have an aerial consisting of 4 No. 12 copper wires, spaced 1½ feet apart. It is 60 feet in length, 40 feet in height and has 2 wires leading down from the flat top, as shown in the accompanying diagram. All of the dimensions are indicated thereon. Please tell me what the wave-length of the aerial is.

Ans.—(1) The natural wave-length of your aerial is approximately 175 meters.

Answer to third query:

The first described receiving set needs a loading coil of fair dimensions, while the second set has insufficient turns in either primary or the secondary windings. The primary winding of the second set should have at least 240 turns of No. 26 wire, while the secondary winding may have 300 turns. The secondary winding should be shunted by a condenser of .001 microfarads.

Ques.—(3) My aerial is not parallel to any A. C. power line, but I can tell when the generator at the power house is being started and generally after this I have to suspend operations until morning when the induction stops. I have tried all the numerous ways described in THE WIRELESS AGE, but to no avail.

Ans.—(3) Inasmuch as you have tried practically every possible means to eliminate this induction we fear that it can only be overcome by moving your station. It is a fact that at certain locations it is absolutely impossible to overcome the induction from nearby alternating current power lines. It is not necessary that your aerial should lay parallel to alternating current wires, although the effects are at a minimum when the antenna is so disposed. You might try as a remedy two 1-microfarad condensers connected in series and earthed at the middle point. This may reduce the inductive noises to some extent.

Regarding your fourth query:

Complete instructions were given for an amateur's wave-meter in the article on "How To Conduct A Radio Club" in the February, 1915, issue of THE WIRELESS AGE.

* * *

F. G. B., Greensburg, Pa., asks:

Ques.—(1) Please tell me the natural wave-length of a 6-wire aerial, 169 feet span, spread 10 feet at one end, 50 feet at the other; lead-in wires, 40 feet in length, consisting of No. 14 stranded copper.

Ans.—(1) The natural wave-length of your antenna is approximately 420 meters.

Ques.—(2) To reduce the wave-length of this aerial to 200 meters would it be practical to use a series condenser? If so, please state the size.

Ans.—(2) The natural wave-length of this aerial is too great to be operated satisfactorily on a wave-length of 200 meters.

Ques.—(3) Would it be better to use the two outside wires of the aerial referred to and take the other four down?

Ans.—(3) Not necessarily. There is little advantage either way.

Ques.—(4) What would be the natural period of a 2-wire aerial and what size condensers should be connected in series to reduce the wave to 200 meters?

Ans.—(4) The natural period of a 2-wire aerial having similar all around dimensions will be a little less, possibly about 390 meters, and it is still rather lengthy to be operated on a wave-length of 200 meters. If you desire to transmit on a wave-length of 200 meters, we suggest that you reduce the size of the aerial. You will find data on this subject in previous issues of THE WIRELESS AGE in the "Queries Answered" Department.

* * *

J. F., Unioncourse, N. Y.:

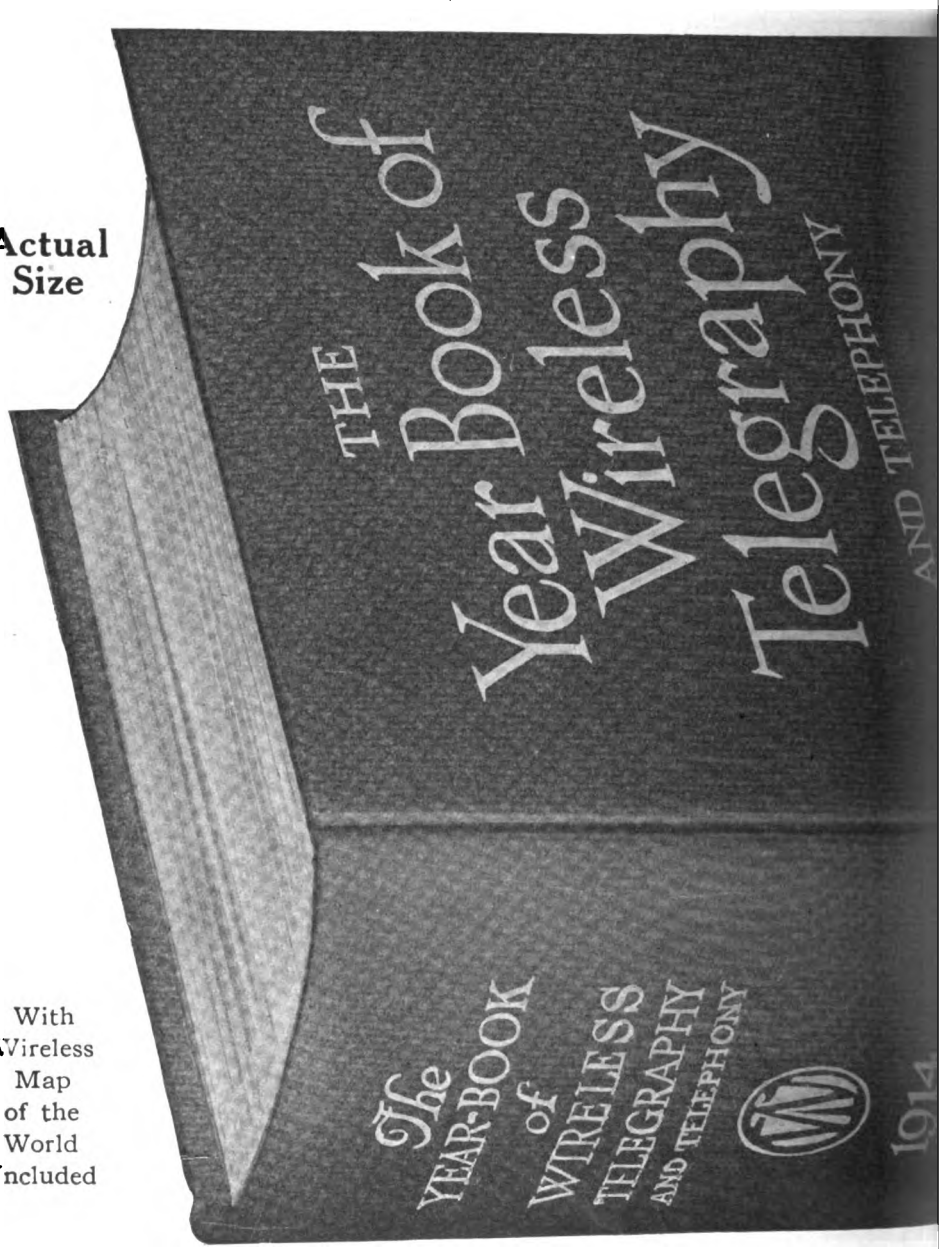
We cannot give data for the construction of the loading coil unless we know the size of the aerial and the general construction of the receiving tuner with which it is to be employed. The data which you gave in connection with your receiving tuner is not sufficient for calculation, and we therefore do not know whether you will be able to receive signals from Arlington.

Concerning your third query:

It is advisable if possible to erect a larger aerial; certainly you will receive better signals from Arlington than with the smaller one.

THE BOOK

Actual Size



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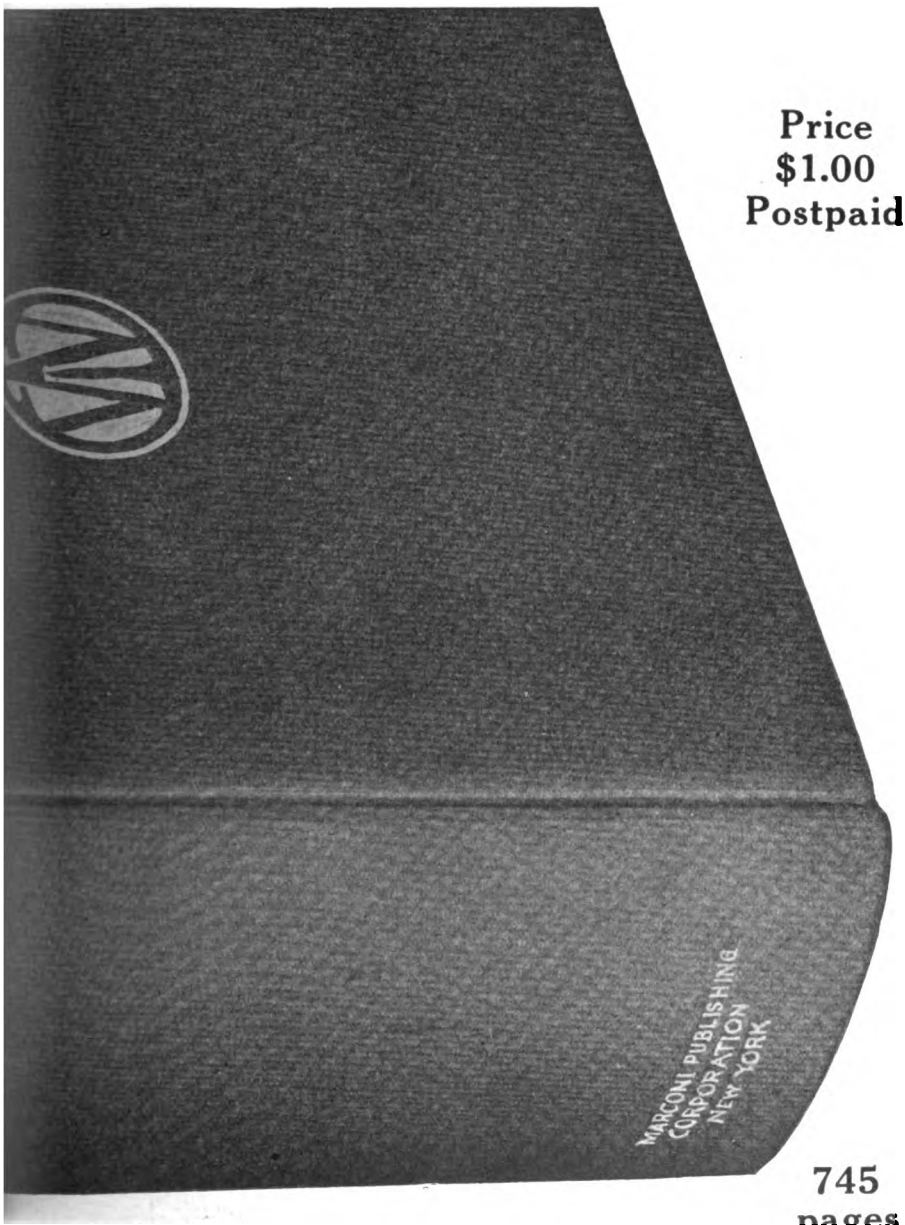

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