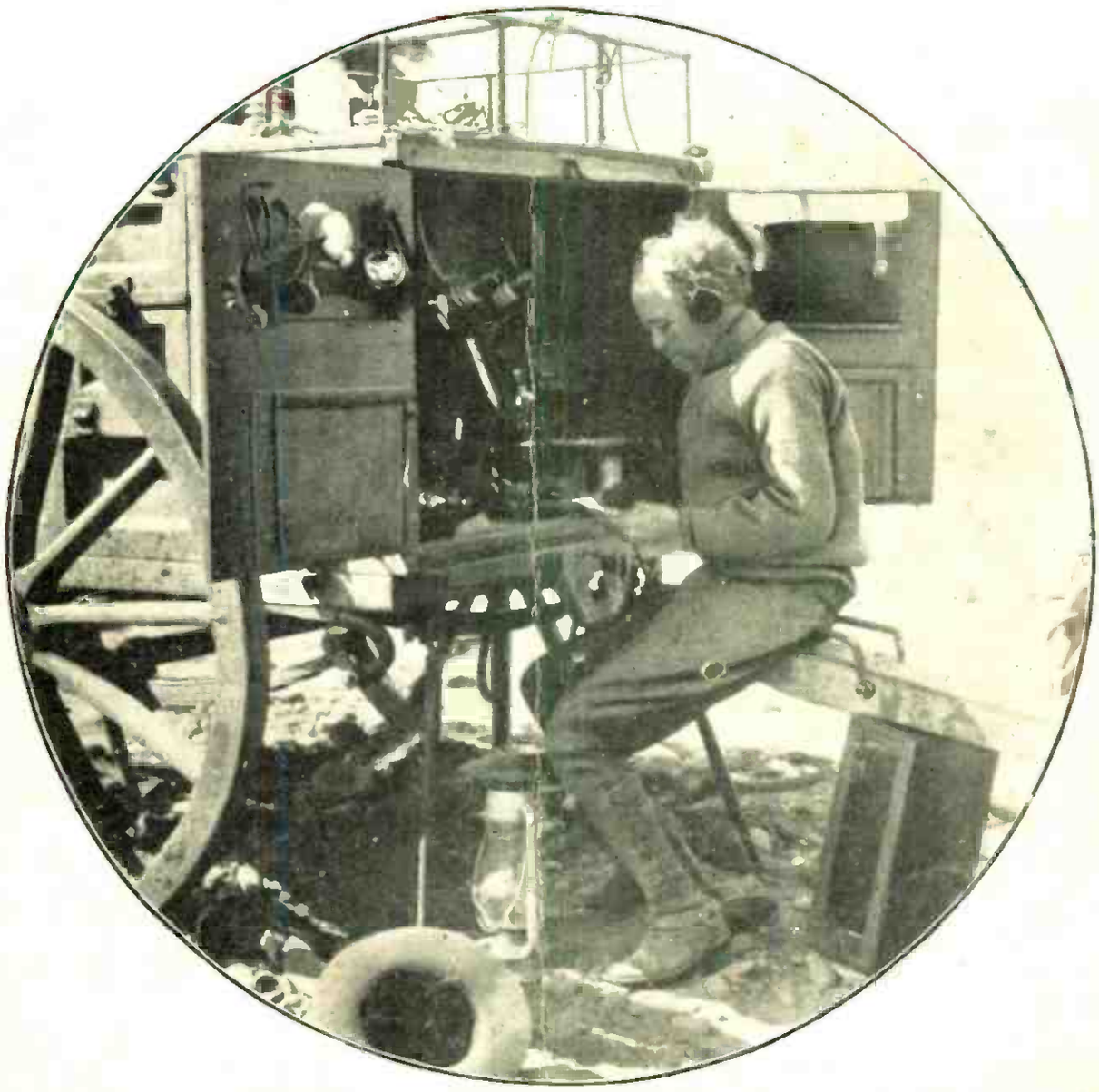
Norman Bourneau

15 Cents

August

THE WIRELESS AGE



"THE EPIC OF THE MEXICAN BORDER"

HOW WIRELESS REPORTED THE ARMY MOVEMENTS TO THE AMERICAN PUBLIC

(IN THIS ISSUE)

Books on Wireless

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.*

	Pub. Price Post-paid	With one Year's WIRELESS AGE
YEAR BOOK OF WIRELESS TELEGRAPHY (1916) pp. 1000. Contains a yearly record of the progress of wireless telegraphy; complete list of ship and shore stations throughout the world, their call letters, wave-lengths, range and hours of service, and articles by the greatest authorities on vital questions	$1.50	$2.25
HOW TO CONDUCT A RADIO CLUB, pp. 128, 116 illustrations, E. E. Bucher. Describing Parliamentary Procedure indoor and outdoor experiments. 5,000-mile Receiving Set and many other features	.50	1.75
HOW TO PASS U. S. GOV. WIRELESS EXAMINATION. 142 Actual Questions Answered. 72 pp. E. E. Bucher. The greatest wireless book ever published for amateurs and prospective wireless operators	.50	1.75
LIST OF RADIO STATIONS OF THE WORLD, 220 pp. Compiled by F. A. Hart, Chief Inspector of Marconi Wireless Telegraph Company of Am., and H. M. Short, Resident Inspector U. S. A. Marconi International Marine Com. Co. The only complete authoritative call list published	.50	1.75
THE ELEMENTARY PRINCIPLES OF WIRELESS TELEGRAPHY, new and revised edition, pp. 160. Bangay, R. D., explains in the simplest possible manner the theory and practice of wireless telegraphy. Arranged for use as a reference book for amateur students and Boy Scouts.	.50	1.75
THE BOOK OF WIRELESS, pp. 222, 219 illustrations; Collins, A. Frederick. An excellent book for amateurs, contemplating building their own stations, gives cost of installing ready built equipment and also cost of material for building your own equipment. Special chapters on amateur long distance receiving sets, with costs both ways	1.00	2.25
HAND BOOK OF TECHNICAL INSTRUCTIONS FOR WIRELESS TELEGRAPHISTS. pp. 295. Hawkhead, J. S. Covering principally the practice of the Marconi Co. abroad and elementary explanation of the underlying principles	1.50	2.50
TEXT BOOK ON WIRELESS TELEGRAPHY, pp. 352. Stanley, R. A text book covering the elements of electricity and magnetism, with details of the very latest practice in wireless telegraphy in European countries—recommended to all workers in the art of radio telegraphy	2.25	3.25
AN ELEMENTARY MANUAL OF RADIO-TELEGRAPHY AND RADIO-TELEPHONY FOR STUDENTS AND OPERATORS. pp. 360. Fleming, J. A. A splendid treatise for students and practical operators. New and revised edition (Sept., 1915). The author is at the front with the English army	3.00	3.00
WIRELESS TELEGRAPH CONSTRUCTION FOR AMATEURS. pp. 200. Morgan, A. P. The construction of a complete set of wireless telegraph apparatus for amateurs' use. Recommended to beginners	1.50	2.50
PRACTICAL USES OF THE WAVEMETER IN WIRELESS TELEGRAPHY. Mauborgne, J. O. Originally compiled for the Officers of the U. S. Signal Corps; comprises an explanation of the use of the wavemeter, the most complete publication on the subject so far produced	1.00	2.25
EXPERIMENTAL WIRELESS STATIONS, pp. 224. Edelman, Philip E. A book for amateurs. The design, construction and operation of an amateur wireless station in compliance with the new Radio Law. (Also "Experiments" by Edelman, $1.50)	1.50	2.50
MANUAL OF WIRELESS TELEGRAPHY FOR USE OF NAVAL ELECTRICIANS. Revised and enlarged, 320 pp., 120 illustrations, by Commander S. S. Robinson, U. S. Navy. Text Book and practice of wireless as used in U. S. Navy. Invaluable to prospective Navy Radio Operators and Electricians	1.50	2.75
THE WIRELESS TELEGRAPHISTS' POCKETBOOK OF NOTES, FORMULAE AND CALCULATIONS, pp. 847. Dr. J. A. Fleming. Bound in full flexible, rich blue leather, stamped in gold, with round corners and gold edges. A book of practical working formulae and calculations for the student of radio telegraphy. Bound to be considered an indispensable part of the working equipment of every wireless student	1.50	2.50
WIRELESS TELEGRAPHY, pp. 443, 461 Illustrations, by Dr. J. Zenneck. Translated from the German. The work is the most scientific and thorough that has appeared on this subject. It covers all phases from physical principles to finished commercial apparatus	4.00	5.00
PROCEEDINGS OF THE INSTITUTE OF RADIO ENGINEERS, edited by Dr. Alfred N. Goldsmith. Nos. 3 and 4—1913; Nos. 1, 2, 3, 4,—1914, and Nos. 2 and 4 for 1915 sold singly at $1.00 each. (Vols. '14-'15 Buckram bound, $5.00 each.) Sub. by yr. 6 Nos	6.00	7.00
WIRELESS TELEGRAPHY AND TELEPHONY, pp. 418, 350 illustrations. Eccles, W. H. A Handbook of Formulae, Data and Information. Also gives brief accounts of the position of modern thought and speculation, includes a number of detached essays on subjects that seem to have been neglected hitherto. Many formulae now published for the first time. A number of Abacs for facilitating the rapid application of formulae. A novel Abac for the calculation of wave-lengths of circuits. The information is classified on a simple, definite system and the scheme of cross-references is complete, a copious Index and a Glossary of the Scientific and Technical Terms, Words and Phrases used in Radio-telegraphy	3.50	4.50

Send Orders to **The Wireless Age,** **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 3 (New Series) — August, 1916 — **No. 11**

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.

Issued Monthly by Marconi Publishing Corporation, 450 Fourth Ave., N. Y. City

John Bottomley, Pres. G. S. De Sousa, Vice-Pres. G. Harold Porter, Secy. John Curtiss, Treas.

Yearly Subscription, $1.50 in U. S.; $2.00 Outside U. S.; Single Copies, 15 Cents

Entered as second class matter at the Post Office, New York

The National Association — What They Think About It

I have read all the matter and announcements concerning the whole idea very carefully and wish to say I think this proposition is a splendid one both for the amateurs individually and the Government (if the occasion should ever arise therefor) and you can figure on my most hearty approval and co-operation and help in any and all ways possible at any and all times.

RALPH SHORT.

The address of Mr. White, printed in the November issue of THE WIRELESS AGE, was a message of hope and encouragement that should meet with a hearty response. It opened a vista to me, I know, and I look to the National Association as a means of fitting myself for future advancement.

C. V. SMITH.

I received all of the Charter Members' Equipment and am much pleased with it, but the best of all is THE WIRELESS AGE. I would rather miss a meal than miss a single issue.

J. C. HOLLMANN.

I am heartily in favor of your association and think it by far the best one. I have been interested in wireless for five years, and have often wondered why some such organization was not formed before.

E. FORD.

I am more than pleased with the equipment, to be frank. It greatly exceeded my expectations, and I was unaware that there were two books on the market that covered the subject of wireless so completely.

N. B. SCHOTT.

"How to Conduct a Radio Club," is a real pippin, and the rest of the charter members' equipment is fine. I was going to ask how long the charter memberships would be held open and I found it in "How to Conduct a Radio Club." Believe me, it certainly sounded good to my ears to hear that the charter memberships would be held open until May 1st. Wishing you the best of success, I remain,

CHAS. H. BELL.

NATIONAL AMATEUR WIRELESS ASSOCIATION, 450 Fourth Ave., New York

THE WIRELESS AGE

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

AUGUST, 1916

The Place of Wireless in Preparedness

SIGNIFICANT of the rapid progress made in wireless communication which has placed that method of transmitting intelligence foremost in time of war, is the recent utterance of Brig. Gen. Scriven, Chief Signal Officer, U. S. Army, who has said "the enormous importance of radiotelegraphy in military affairs" is recognized by all army men and "great attention is and has been given recently to this method of communication." This means, in effect, that those responsible for the safety of the nation realize that both in land and sea strategy the nation with the best developed system of radio communication will possess an enormous advantage over any enemy otherwise equally equipped. Obviously, the time to prepare the system for high efficiency is before the outbreak of hostilities.

Comprehensive plans for the prompt acquisition of all coast stations have already been worked out and experienced men have been registered to serve as volunteers to man and manipulate these equipments. The value of these coast plants will be mainly dependent, however, upon the protection afforded them. This is the army's problem. Gen. Scriven observes in this connection: "It appears, should war arise, the country must be prepared to prevent throughout the vast extent of its seaboard the seizure and occupation of any one of the many important points, both fortified and unfortified, and of all its harbors and landing places useful to an enemy." A large and effective mobile force of troops placed at strategic positions of the coast has been planned for this work. "It should be evident," continues the Chief Signal Officer, "that of this force the men most needed in the preliminary work of defense will not be coast artillerymen alone, but engineers, and signal troops, since the first step in mobilization will be the establishment of lines of information." This important observation is then added: "It is hopeless to suppose that the signal corps of the regular establishment can ever supply more than a leaven for the mass of men needed, or even that the militia possessing signal troops of approved efficiency can provide more than the framework of the organization that will be required; and it follows that the signal troops mobilized for war must be filled in by volunteers, and therefore by men drawn direct from civil life." Excellent and abundant material for these troops undoubtedly exists among the men engaged in the electrical and mechanical pursuits of the country, the army's authority believes, and it appears to him quite necessary that in time of peace they should be drilled in the communication methods of the army. The sum and substance of the observations is reached in the expression: "the number of men needed for the purpose will be far larger than can be supplied by any probable increase of the regular establishment."

In a phrase, the army largly depends upon civilian experts to maintain communication by radio in time of war. There are less than 1,500 men in the signal service of the regular army today.

The navy has its own radio problems and, in time of peace, has discharged them satisfactorily; but with the outbreak of hostilities this branch of the service, too, would have direct need for skilled civilians to manipulate the shore station equipment and take over the key on transports. To this end, a reserve of prospective volunteers has been created and the names and qualifications of hundreds of Marconi operators and other skilled wireless men have been registered in the records of the Navy Department.

It is an indisputable fact, therefore, that wireless telegraphy, as an industry, is of distinct value in preparing for the country's defense. Owing to the high standard maintained in the commercial field the Americans who could be called to the colors would be found equal, if not exceeding, in efficiency, those of any hostile nation.

Bearing in mind that this efficiency of personnel is due to the progressive spirit of the commercial interests, consideration may be given to the other important factor in building up an adequate communication system—the apparatus itself.

Scientific progress must depend upon the number engaged in the art, and the possibility of reward must remain the determining factor in attracting the proper talent to the field. Wireless communication has existed but a score of years; in this infant industry much still remains to be done in increasing the efficiency of apparatus. Adequate reward for inventors and business men can come only through commercial applications of wireless in time of peace; the stimulation of competition and the opportunity for commercial gain and financial reward are essential to its rapid development. Large sums of money have been honestly invested in the business, and scientific progress has kept apace of commercial expansion.

To eliminate or hamper that commercial expansion would appreciably weaken the preparedness plans of the whole country. Placing radio communication under Government monopoly control in time of peace, for instance, would do irreparable damage to the art itself by arresting the development which naturally follows where business interests must keep abreast, and even ahead, of the times to succeed. The routine duties of Government departments, military or civil, do not permit the same care and attention that is secured in industrial organizations, nor is the money for development forthcoming from the legislature as it is when private capital is given the opportunity to participate in possible profits. Wonderful scientific achievements have been registered in the wireless field during the twelve months past; substantial increases are noted in the number of stations—which the country may sorely need some day—and everywhere the commercial hand dominates the progress of the art. For the safety of the nation, these advances should be encouraged.

Government monopoly of radio communication is the one thing the people do not want. In the past they have cried it down as a deadening influence in the maintenance of public message service; now it is being as rapidly recognized as a deterrent to the execution of broader policies of Americanism, as the one influence which would retard scientific progress, lessen the number of communication points and weaken the reserve forces so essential in time of emergency. From the preparedness viewpoint, the wireless industry is too important to be meddled with.

IOWA WANTS WIRELESS FOR NATIONAL GUARD

Adjutant General Guy Logan, of the Iowa National Guard, believes that Des Moines should have a wireless station established by government similar to that at Omaha, but as yet no steps have been taken to secure one and Uncle Sam has said nothing to show that the Iowa guard is to be thus favored. "We are," he said, "ready to organize a wireless corps aerial division or any other branch of service the war department may indicate."

N. A. W. A. SET INSTALLED IN CAMP

The wireless station of the National Amateur Wireless Association in the camp of the Interstate Military and Athletic Encampment Association, at Birchwood Lake, Monticello, N. Y., has been installed. A 2 k.w. Marconi set was loaned to the National Amateur Wireless Association through the courtesy of Edward J. Nally, vice-president and general manager of the Marconi Wireless Telegraph Company of America, for use in the camp.

National Guardsmen being instructed in wig-wagging at Camp Whitman

The Epic of the Mexican Border

How History in the Making is Being Recorded by Wireless Telegraphy

"THAT army radio service is a wonder," exclaimed an enthusiastic experimenter the other day. "I confess, I never knew what wireless telegraphy really meant until I began to read the radio messages from the Mexican border. They have all the tang of the wilderness, the mountain and the desert. What makes them so vivid and real? I suppose it's because they're written on the spur of the moment, by men on the firing line or hot on a bandit trail.

"Why, wireless is telling us the whole of that story, and it couldn't be told better. I still remember how Villa was located by radio, and as a matter of fact, those radio messages chased the bandit for the whole 200 miles south across the desert and into the mountains of Chihuahua. But the most remarkable feat was the way in which the wireless heralded the escape of Captain Morey, the only officer to survive at Carrizal. Why we all gave him up for dead—supposed he had died in that water hole in the desert where he wrote his report of the battle on scraps of crumpled paper. Then all of a sudden comes a wireless from 'somewhere in Mexico' telling us that he's back on the line, safe."

It is a fact that from the day in early March, when the half-breed Mexican bandit, Francisco Villa, raided Columbus, New Mexico, with his men, to the time of the present writing, Mexican border history has been in the making by means of the radio service. The whole succession of events, heroic, tragic, humorous and grotesque, that has occupied the undivided attention of the two Americas for the last four months, has been detailed, elaborated and recorded by wireless telegraphy. The radio message not only told of the punitive raids on straggling bandit bands in the mountains of Chihuahua; it even directed the strategical dispositions of the American expeditionary forces.

The finest testimonial to the value to the United States Army of the wireless service was presented when Brigadier General George P. Scriven appeared be-

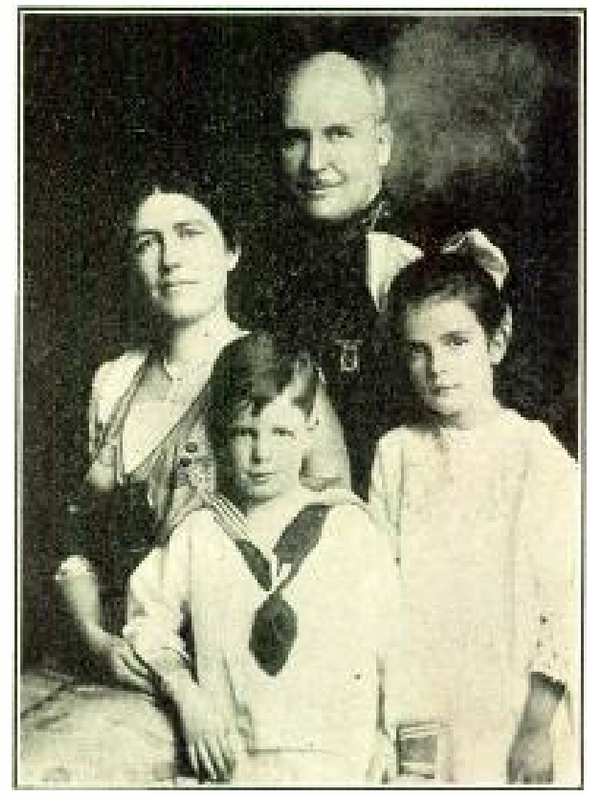
fore the House Committee in Washington, and testified to the urgent need of money for radio service and the installation of wireless plants at permanent army stations, in order that a perfect and complete wireless service might be es-

Captain Lewis Sidney Morey, the only American officer who survived the engagement at Carrizal

tablished across the Continent and along the border. In the Urgent Deficiency Appropriation Bill reported to the House, the sum of $250,000 for the Signal Service and $60,000 for radio installation on the border were included. The Senate is urging much larger sums for both purposes.

It was on March 9 that news came of the slaughter of seventeen Americans at Columbus by the Villistas, and eleven days later there arrived the first direct news by wireless from our army in Mexico, telling of the whereabouts of the bandits who had perpetrated the massacre. General Pershing was then on the way to hunt them down. The American Army, in fact, had invaded Mexico two days before, on March 18. After a march of more than 110 miles into Mexico, in the record marching time of forty-two hours, which would indicate a speed of about thirty-eight miles a day, the American punitive expedition had received information locating Francisco Villa, the object of their chase.

On the following day, March 21, it was reported from General Pershing's headquarters in Mexico that six biplanes of the First Aero Squadron, under the command of Captain B. D. Foulois, had arrived to scout in the mountains for the bandits. This despatch had been sent by wireless to Columbus, N. M. On the next day came the rather alarming intelligence that communication between the United States and General Pershing's punitive expedition in northern Chihuahua was at a standstill, due to the fact that the army wireless station at Casas Grandes had failed to operate. It was feared that if the break in the



Captain Charles T. Boyd, of Troop C, Tenth Cavalry, and his family. The Captain was killed while leading a charge on Mexicans at Carrizal

wireless could not be restored, it would be necessary to despatch mounted couriers to carry the official bulletins.

This fear was unfounded, however. They still came in, those radio messages headed "Field Headquarters, United States Punitive Expedition, Casas

Grandes, Mexico (by Wireless to Columbus, N. M.)," that were being followed with breathless interest by the country. It was reported this time that General Pershing was returning to Casas Grandes with the news that Francisco Villa was still in retreat. The bandit had abandoned eighteen wounded men, but was swelling his command by kidnapping boys. And in another wireless from Colonia Dublan to Columbus, the General took the opportunity to compliment the stamina and the spirit of the American troops composing the expeditionary force.

United States troops, with signalman in rear, climbing a sand dune in the Chihuahua desert while on a Mexican bandit trail

The radios still continued to come in as the Americans advanced mile by mile further into Chihuahua. They came "By Wireless from Colonia Dublan;" then from "Namiquipa, by aeroplane to Casas Grandes, thence by radio to Columbus;" then from the "Camp of the Commanding General at the extreme front, by aeroplane to Field Headquarters and by wireless to Columbus." And each despatch betrayed the strain, the efforts, the desperate marches and drives that the American troops were making to overtake the bandits who had reached their obscure and difficult mountain lairs:

"Preparations for closing in on Francisco Villa in a quick cavalry drive are being rushed forward rapidly at Field Headquarters."

"Since the Guerrero fight, Villa has not been found. It is not known whether he fled north or south, but probably went north. It snowed to-day."

"Hopes of the American cavalrymen under Colonel George A. Dodd, of finding Villa among the snow-clad slopes of the Continental Divide, are based on the discovery of carriage wheel tracks in a mountainous waste."

"General Pershing, fearing that Villa has fled where horses cannot follow, is

The crack Tenth Cavalry on the march. Two troops of this regiment distinguished themselves by their daring when unexpectedly attacked by Mexicans at Carrizal

training detachments of infantry for mountain work."

The American troops were confronted with as difficult a problem as ever faced determined soldiers. The bandits were now in their own native districts, used to country and climate. The Americans kept on doggedly and persistently, through the snowy blasts of mountain roads, through the stifling heat of waterless desert lands.

Still the ether waves came in from the desolate country, telling of the American Army's advance:

"Camp of General Pershing, by aeroplane to Colonia Dublan, and by radio to Columbus, April 3.—American cavalrymen encountered a fleeing force of Villa men near (deleted) early to-day and sounds of firing have been heard from that direction."

"April 5.—A squadron of the Tenth Cavalry, under the command of Colonel W. C. Brown, has attacked Villistas eighteen miles south of Bachiniva and duplicated the performance of the Seventh Cavalry at Guerrero."

"April 10.—General Pershing pushed forty-eight miles by automobile and camped outside of a squalid Mexican railroad town, not far behind the advance cavalry."

Thus ran the messages. Significant developments were impending. The fortunes of the American expedition were taking on a new and more sinister phase. The wily Aztec, after having agreed to co-operate with the American troops, had permitted them to penetrate, unopposed, more than 200 miles into the desolate and inhospitable country. Now he began to show his teeth and threaten.

And again the radio was the first to inform the country of this change in international relations. Army aviators returned to General Pershing's camp after a successful flight from Chihuahua City, where they delivered messages from General Pershing to General Gutierrez, the Mexican Governor of Chihuahua. A

contingent of 650 United States cavalrymen, the largest concentrated camp at the front in the campaign, were still holding Santa Cruz ranch, north of Parral. But army officers stated that Major Frank Tompkins had received a written threat from General Lozano, commander of the Carranza garrison at Parral, that the American troops would be attacked if they advanced to the city.

The pursuit of the bandits was not halted, however. The wireless recorded that, headed by General Pershing, the American cavalry columns had completely penetrated Chihuahua to the southern extremity of the territory, where Villa's strength was greatest. Then came the news that Carranzista soldiers were evacuating the Guerrero district and concentrating in Chihuahua, ostensibly not to hamper the Americans. In the meantime, Major Robert L. Howze, after penetrating south of the Durango line, reported that he had cumulative evidence that Villa was alone and had turned westward to the mountains south of San Boya.

The radio, on April 26, reported to Columbus that Colonel George A. Dodd's column had met a rear guard of Villistas, numbering 200 under Cervantes, Baca Rios and Dominguez, near Tomachic. The American troopers were outnumbered, but drove the enemy into the hills, scattering them in a running fight that lasted until after dark. Two of our troopers were killed and three wounded in the engagement. The shifting of the Carranza troops continued. Chihuahua merchants who reached the American headquarters verified reports that Carranzista troops were being sent back to the Guerrero district. In the meantime, Colonel Dodd's column, which had continued for six days its pursuit of the Villa bandits, under their four leaders, through the rocky defiles of the Continental Divide, returned to its base at Minaca. This ended the operations for the month of April.

The first radio message in May contained the significant statement that General Pershing was anticipating every possible future development. P. H. Holly, a wealthy American rancher of El Paso, Texas, who was serving as a scout for the American expedition, was killed by Villistas, and his body, striped of arms and ammunition and valuables, was discovered near Rubio. After this murder, the wireless reported that rumors were being mysteriously circulated in Chihuahua of a probable withdrawal of the American troops. Such reports were prevalent among the natives even in remote cattle ranches and created much nervousness among the peons inclined to be friendly, who feared that if the Americans left the country they would be punished for selling beef and other supplies to "amigos de la patria."

Another exploit of the column under Major Howze was reported on May 6, from Namiquipa to Columbus by wireless. It stated that the Major, with 240 men of the Eleventh Cavalry, engaged Villistas under Cruz Dominguez and Julio Acosta, near Ojo Azules, killing forty-two, by actual count, and driving the remainder, half-clothed, to the hills. The scene of the fight was about twenty miles southeast of Cusihuiriachic. It was also reported by radiogram from Manzanillo, Mexico, to San Diego, Cal., that Mexican bandits, believed to be followers of Villa, were very active near Colina and in the Guadalajara region.

El Paso is the home of all kinds of mischievous rumors. One of these now raised the ire of General Pershing, as recorded in a radio message from Lake Itascate to Columbus, in which the General was described as seated in front of his tent, with his jaws set and his grey eyes snapping, giving utterance to a vigorous and explicit statement regarding the campaign, aroused by one of these El Paso reports that the expeditionary forces were in a feverish state of uncertainty, fearing attack.

A desultory warfare continued, as reported from day to day by marconigrams:

"May 17, via wireless to Columbus—Francisco Villa has recovered from his wounds and has been busy for some weeks attempting to raise a new army in the State of Durango."

"May 20, near Namiquipa, via wireless to Columbus—Bandits under the command of Atezutro Dominquez and Pedro Costillo, were practically annihilated by twenty-five vaqueros from a ranch at a point forty miles southwest of Madera."

"May 22, Rancho Providencia, Chihuahua, via wireless to Columbus—Bandits are again active, though being hunted persistently by a detachment of American cavalry."

"May 27, near Namiquipa, via radio to Columbus—Candelario Cervantes, the chief Villista in northern Chihuahua was killed six miles south of Cruces near the American line of communication, in a running fight with a mixed command of a party of ten infantrymen and engineers. The fight lasted forty-five minutes."

Such was the history recorded by radiogram for the month of May. The month of June opened with efforts to renew friendly relations between the Carranzistas and the American troops. A wireless message from the temporary field headquarters to Columbus, told of a conference held between General J. J. Pershing and General Gabriel Gavira, Carranza commander in northern Chihuahua, with headquarters at Juarez. They discussed the military situation in Chihuahua. A field dinner was given to the Mexican commander by the American commander, in which toasts were drunk in Mormon wine to President Wilson and General Carranza.

The next wireless message told of another fight with Villistas. Lieutenant James A. Shannon, Eleventh Cavalry, with twenty Apache Indian scouts, a reconnoissance detail, encountered a detachment of Villa men near Las Varas Pass, forty miles south of Namiquipa, after following a week old trail. The scouts engaged the bandits, wounding one and killing one. There were no American casualties. Again, on June 12, three bandits were killed and several were wounded in an early morning fight, when Captain Otto W. Rethorst, with a detachment of the Thirteenth Cavalry after a forced march, surrounded the survivors of the Candelario Cervantes band, about twenty miles northeast of Santa Clara. Then Pedro Lujan, a Villista lieutenant, and one of the leaders in the Columbus massacre, was made captive by American troopers at the Tepehaunes Hacienda, thirty-five miles east of Namiquipa.

The arrival of June 18 saw the culmination of strained relations between the Carranza Government and the United States. Bandits had again raided the American side of the border, and another detachment of troops invaded Mexico in the region southwest of Brownsville. Carranza insisted on the withdrawal of the American expedition, and General Jacinto Trevino had warned General Pershing that he would attack the Americans if they moved in any direction except to the north.

President Wilson called out substantially all the state militia of the country in connection with the Mexican situation. A message from Colonia Dublan, via army wireless to Columbus, stated that Carranza soldiers were arming Mexican civilians in the vicinity of Casas Grandes, Pearson and Madera, in preparation for hostilities with the American troops. Another radiogram stated that an American soldier had been captured by Carranza forces of the Casas Grandes garrison and held prisoner for several hours. He was released only when General Pershing sent a demand in which he warned the Mexican commander that if the soldier were held an hour longer, American troops would attack the town.

Matters were coming to a head. General Pershing's command was on the verge of hostilities, according to wireless messages from the field. A despatch from Colonel D. C. Cabell, Pershing's Chief of Staff, said that the attitude of the Carranza soldiers was such that American motor truck supply trains were in danger of being fired upon.

Then came the engagement at Carrizal. The news of this leaked out slowly, for the Tenth Cavalry on its eighty-mile mountain trip, was not provided with a radio set. The details of the story were not even fully learned when a radiogram from Casas Grandes to Columbus, reported the arrival in camp of seven men of the Tenth Cavalry, part of the unfortunate detachment, after a heart-breaking eighty-mile mountain trip. Wireless announced the escape of one more survivor.

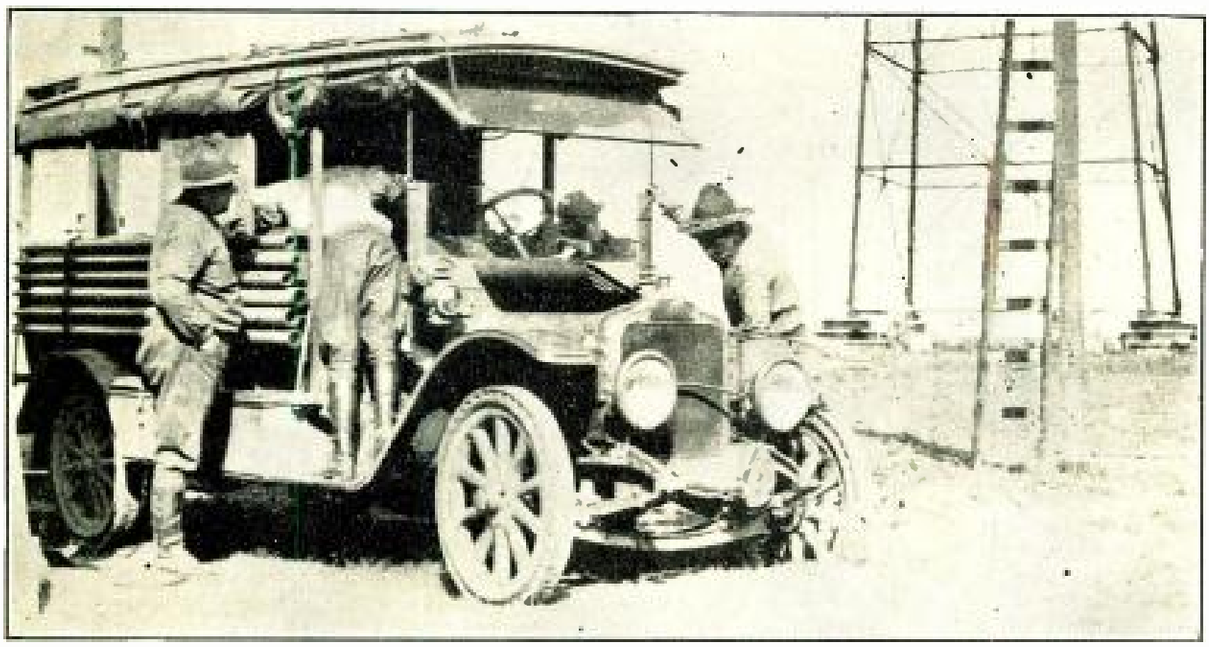
Another radiogram from Field Headquarters at Colonia Dublan then told the story of the deaths of Captain Boyd and Lieutenant Adair, and a dozen of

the cavalrymen, and the capture of two dozen more by the Mexicans. It was believed that Captain Lewis Sidney Morey, who had not been heard from, was either dead or a prisoner. Outnumbered, surrounded and leading a forlorn hope, the two troops, attacked by Carranzistas, had fought and died game. They had charged twice directly into the jaws of the ambush.

Later three more troopers, wounded and half-famished, straggled into camp, bearing a remarkable document scribbled on a piece of crumpled paper,. which had been written by a man lying wounded in a water hole somewhere in the Chihuahua desert. It was Captain Morey's report of the battle of Carrizal. Morey said that at the time of writing, he was hiding in a hole 2,000 yards from the field. He had instructed the three men to leave him and try to reach the American camp, and they left, believing that he must die from loss of blood and lack of water.

At army headquarters in Mexico, Captain Morey had virtually been given up for dead, when the Captain's fellow officers were electrified by the receipt of a telegram from the Captain's wife, in Austin, Texas, who stated that she had just received a wireless message from her husband, transmitted through Columbus. It read laconically: "Somewhere in Mexico—am back on the line with two men safe. Sidney."

On the following day a radiogram announced the arrival of Captain Morey at Field Headquarters. The sole officer to survive the fight with the Carranzistas at Carrizal, sat on the edge of a bunk in a thatched hut at Headquarters, and told an attentive group of fellow officers, who had gathered to congratulate him as one risen from the dead, the details of the first real tragedy of the Mexican border campaign. The negro troopers, said the Captain, had met almost certain death with smiles on their lips, as they fought their grim fight against odds.



One of the United States Army field wireless motor trucks taking on a full field equipment, preparatory to joining the American expeditionary forces in the pursuit of Villa and his bandits

Such has been wireless history on the Mexican border, to date.

Since then both houses of Congress have taken steps toward appropriations for defense and the proper arming and equipment of the militia forces that are being sent to the border. Large sums are provided for the Signal Service of the Army and for wireless installation. The House reported an expenditure of $250,000 for the Signal Service, and $60,000 for radio installations. The Senate has increased these sums to $1,545,490.

Brigadier General Scriven appeared before the House Committee and said:

"We are in terrible need of money for radio tractors, trucks, field wire, telegraph poles and miscellaneous expenses."

The General then indicated on a map the lines of communication to General Pershing's position, which have been briefly reviewed in the list of radio messages published in the preceding pages. General Scriven urged the need of increased wireless installations, and intimated that the communication with General Pershing was not as complete as it should be. He said that it would take several months to install radio sets at Fort McIntosh, Fort Bliss and Fort Huachuaca (Arizona), which are intended for permanent stations. "The idea," he explained, "is to get wireless across the Continent and along the border. With the 300-mile radios they can pick up the smaller wagon sets, and it will give a pretty complete chain across the Gulf and the station at San Diego. I think that we can get the Fort Bliss set installed in two or three months. We have the material down there. I am afraid that it will take six months to install the others."

The enomous importance of radiotelegraphy in military affairs has frequently been emphasized by General Scriven. The radio tractor in the hands of the American troops has the instruments and switchboards installed in a specially designed, covered body, which is mounted on the chassis of a commercial gasoline truck. Sufficient space is available for the transportation of a crew of ten men. By means of a special clutch and gear the engine is made to drive an alternator for furnishing the necessary electrical energy. The mast and umbrella type antenna are raised by means of a shears located on top of the tractor, and the average time consumed in erecting the antenna and placing the set in operation is eight minutes.

The tractors thus far developed are of 1 and 2 kw. capacity. Under ideal conditions, the larger set has transmitted messages for distances of 300 miles. The normal range of this type under the most trying atmospheric conditions is 100 miles. The 2 kw. tractor is intended for use at field army headquarters. Its weight without crew is about 9,200 pounds. The smaller tractor, known as the divisional type, has a range of from 50 to 150 miles, varying according to atmospheric conditions. The weight of this set is about 5,700 pounds without crew.

Horse-drawn sets, specially constructed, are provided for the field companies. Two types of skid sets have been developed. These are transported in escort wagons and similar vehicles. In the smaller (1 kw.) set, the engine and the generator are mounted on skids and can be carried by two or four men. In the larger type (2 kw.) the engine and generator are mounted on separate frames, but so constructed that they can be readily bolted together. The weight of each unit does not exceed 350 pounds. The receiving and transmitting instruments and switchboard are carried in a fiber case about the size of an ordinary trunk. When not in operation, the switchboard lies flat in the case; in use its position is vertical.

The sectional masts are similar to those used with the radio tractors; that is, 60 and 80 feet long, according to the size of the set. The receiving and transmitting instruments of the latest type of radio pack set are contained in a case slightly larger than an ordinary suit case. The transmitter is supplied with energy obtained from a 500-cycle, 110-volt, self-excited alternating current generator operated manually by means of two crank handles connected with a series of gears for turning the armature at the necessary speed. The generator and gears are inclosed in a dustproof housing, so arranged that the gears continually revolve in a lubricant. The generator is mounted on a standard. A 40-foot sectional mast is used. The antenna is of the umbrella type and consists of four stranded wires, each 85 feet long, insulated at the open ends and held by guy ropes. Instead of a direct ground connection, a counterpoise, consisting of four insulated wires, each 100 feet long, is radiated from the mast along the ground. The time required to place the packset in operation is three minutes. Its range of operation under ordinary atmospheric conditions is 25 miles.

Signal Corps Activities in Brief

Recent Results of the Work of the National Amateur Wireless Association in Providing Expert Telegraphers for Home Defense

THE signaling branches of military service have, in the past few weeks, been receiving more attention than has been given in the decade which has passed since the "Service of Information" became a recognized auxiliary to modern armies in the field. Urged by the National Amateur Wireless Association, members all over the country have been organizing cadet signal corps companies for home defense, and experienced operators have heeded the call to the colors and joined with the established National Guard units.

New York members of the N. A. W. A. who first became acquainted with the local militia signal corps work and enlisted after hearing the address delivered at Columbia University last Fall by Captain (then lieutenant) Maloney, are to see service with the Mexican patrol. The First Battalion Signal Corps, N. G. N. Y., left for the border on July 5, Major William H. Hallihan commanding. The 177 officers and men left the Seventy-first Regiment Armory, Thirty-fourth street and Park avenue, at 8:15 A. M., Major Hallihan riding a fine chestnut horse, presented to him by Taylor, Bates & Co., the firm with which he is connected. The men marched to the Jersey Central ferry at West Twenty-third street, the crowds along the line applauding and several hundred relatives and friends of the men trudging behind, refusing to say good-bye this side of Jersey City, where the special train got under way at 10 o'clock.

The signal organization left New York better equipped than any unit of its kind in the Guard of this country, according to military inspectors. In addition to the members of the aviation outfit the corps also included twenty wireless operators and half a dozen complete wireless outfits. A medical staff of five men went along.

The staff officers besides Major Hallihan were Captains Robert W. Maloney, George L. Schenk, Arthur L. Howe, W. L. Kennedy, and Lieutenants Herbert L. Watson, Jerome Sullivan, Gordon Ireland, and Louis H. De Baun.

From Washington, D. C., word has been received that the sixty-five men in the Signal Corps, not mustered in with that organization because only seventy-five out of the 140 were needed to place the command on a war basis, immediately will be organized into a wireless company by J. W. Stepp, an employee in the office of the chief signal officer in the War Department.

Stepp and the men are most enthusiastic over the plans to form the wireless command and will drill and study four nights a week, so as to get to the border or into Mexico at the earliest possible moment.

Drills will be held Tuesday, Wednesday, Thursday and Friday nights in the First street armory.

Stepp is a wire and wireless operator, and also an electrical engineer. If successful, he probably will be placed in command of the company. Should this be done the District will have a signal corps battalion, and Captain Oliver Terry, of the Signal Corps, may be made a major.

It is believed that with sixty-five men already reasonably well trained in signal corps work, ten other men can be recruited within a short time and thus provide sufficient strength for muster.

Boston has reported that its most urgent call for militia volunteers, and one that carries with it an opportunity for especially interesting service, is that for 150 men who will comprise aviation and radio companies in a new battalion of the Signal Corps. General Sweetser wired back from Rochester, while on his way to the border, that the new unit would probably be accepted as a part of the militia as soon as recruited and equipped.

The call for men, which was signed by Albert J. Litchfield of 295 Pearl Street, Cambridge, asked that men interested meet at the Cambridge Armory for organization. Men who have had service in the signal corps, or who are interested in wireless telegraphy, were most desired, it said. Skilled aviators have offered their services as instructors for the new company, and one of the officers will probably be Captain Harry Metcalf of the Harvard Flying Corps.

The project has the hearty support of militia officers, and also of Congressman Dallinger, who will request for the battalion immediate recognition by the war department.

In Manchester, N. H., on June 26, an enthusiastic meeting was held at the Young Men's Christian Association with the view of recruiting for a radio company connected with the signal service. A total of fifteen men was recruited ready for call from the Radio Defense League of New Hampshire, an organization which was among the first to become active in the work outlined by the National Amateur Wireless Association. The officers of the league are looking for a total of seventy-eight men to be drilled in this important branch of service.

At the same time, it was explained that the signal corps of the First Regiment, N. H. N. G., is in need of men experienced in reading Morse and Continental codes, and an opportunity was given for those who desired to indicate their willingness to enter the service of the present corps at Camp Spaulding.

The meeting was presided over by Chief Operator William H. Hitchcock, of the league. The previous afternoon, Operator Hitchcock, Lieutenant Starkey, Sergeant Worrall and Corporal J. T. Webber went to the field headquarters of the First Regiment at Concord. There they interviewed Colonel Healy of the First Regiment, and Lieutenant Clinton McLane of the Signal Corps. It was learned that a platoon of twenty-seven men, including in its membership experienced radio men of the league, would be most acceptable, and it was indicated that several empty officers' berths would likely fall to the more experienced men of such a platoon.

Operator Hitchcock, who is physically incapacitated for service, stated the impossibility of his responding to this call, but added that, in spite of his condition, he desired to do what he could towards a sane defense of the country. He reported in detail concerning his conferences with officers of the regiment and corps in Concord, and concluded that an unusual opportunity offered itself, not only to members of the Radio League, but to any man in Manchester, between the ages of eighteen and thirty-five who is interested in telegraphic work, or to whom the duty of a signal corps appeals. The present signal corps is a wire organization, and it does not employ wireless operators. He explained these duties in brief and showed in what ways the member of a signal corps is in an advantageous position compared to that of men of the infantry or cavalry. The importance of the work in modern field operations was also emphasized. At the end of his report, four men indicated their intentions of enlisting in the present corps.

Further opportunity for allying with the proposed platoon of twenty-seven men who will go from Manchester to this corps at Concord, was given at the Y. M. C. A. the following evening, when opportunity was also provided for joining the radio company which is being formed by the Radio Defense League.

Four members of the Lynn Radio Club have answered their country's call and enlisted in the Massachusetts Volunteer Militia, three as wireless operators with the signal corps and the other as a private in D Company, 8th Infantry.

The wireless operators with the signal corps are Corporal H. W. Leighton, 25 Walnut Street; Privates E. Lipson, 30 Overlea Avenue, East Saugus, and Robert Hanscom, of 53 Allen Avenue, Lynn, Mass.

Permission has been granted to the Bushwick Battalion of the Twelfth Regiment of the United States Boy Scouts to install a wireless station and outfit at its headquarters in Public School No. 70, Patchen avenue and Macon street, Brooklyn, N. Y. The wireless apparatus will be in charge of Captain Walter C. Parker, who will be assisted by four wireless operators. The Bushwick Battalion now has 400 members.

Marconi Men In Military Service Receive Pay

FOLLOWING the culmination of the Mexican crisis, the Marconi Wireless Telegraph Company of America has announced that it will hold open the positions of its employees who wish to volunteer for service in the United States military forces, and can be spared, until January 1, 1917, allowing them half pay till that date. The matter will receive further attention on January 1. The company has already enrolled a considerable number of the men in its service as a naval reserve. Employees, temporarily transferred to Government duty, who have been in the Marconi service more than one year, will continue to b protected under the company's life insurance plan and their absence will not interrupt the continuity of their service and seniority benefits. It was also announced that the company will give instruction to pupils in its wireless school in New York City without cost until January 1, 1917, and that the school will be conducted throughout the summer without any vacation period. The announcement, which was made by Edward J. Nally, vice-president and general manager of the company, follows:

"The Marconi Wireless Telegraph Company of America considers that by reason of its nation-wide activities and its peculiar adaptability to the nation's needs—perhaps greater than that of any other civil institution—it should be considered an arm of the government and in time of national stress or peril should hold itself in reserve subject to government orders and control.

"Already it has enrolled many of its rank and file as a naval reserve, having several months ago furnished the Navy Department a complete list of its employees, segregating them according to rank and experience, with particular reference to their ability to serve the country in time of war in the manufacture, supply and operation of radio apparatus.

"Having done this for the Navy, the Marconi Company is desirous of likewise serving the Army, and to the extent that it can supply capable and expert wireless men without weakening the organization it is holding in reserve for the Navy, it will be glad to do so.

"Subject, therefore, to above conditions, the Marconi Company will give its consent to any employee who may wish to volunteer for service or who may, by reason of his membership in the National Guard, be required to heed the call to serve the country on the border or in Mexico, or wherever the Government orders; and in every case where the applicant meets the usual requirements and can be spared, the Marconi Company will keep his position open and allow him half pay until January 1, 1917. After January 1, the matter will receive further attention.

"Employees of over one year's service, temporarily transferred to Government service, will continue to be protected under the Marconi Company's life insurance plan, and such absence from the Marconi Company will not interrupt the continuity of the employees' service and seniority benefits.

"Until January 1, 1917, the Marconi Company will waive the usual fee charged students in its wireless school and will instruct them without cost. The usual summer vacation will be dispensed with and the wireless school, located in the Edison Building, Duane and Elm streets, New York, will be continued without interruption. Applications from students will be received, commencing Wednesday, July 5."

Conducts Services in Prison Camp

The mettle of the wireless man is well exemplified by a story which comes from the German prison camp at Giesson, where Albert Victor Hardwick, formerly in the service of the Canadian Marconi Company, is confined. Undaunted by his plight, Hardwick has formed a congregation among the religiously-inclined of his companions and conducts Sunday services which are looked upon by the prisoners as the brightest feature of the camp routine.

Hardwick, who was formerly sergeant of the Victoria Rifles of Montreal, was employed by the Canadian Company prior to the war as traffic accountant. At the outbreak of hostilities he joined the colors as a private in the Fourteenth Battalion, was made a corporal while the force was in England and was promoted to sergeant of bomb throwers as a reward of merit. He had previously been decorated by the late King Edward with the Albert medal of the first class for heroism in saving an aged woman's life when she fell from a railway station platform to the track below as a train drew up. Hardwick leaped from the platform, swept the woman off the tracks and threw himself on the ground a few inches from the rails a moment before the locomotive reached the spot. He was also given the medal of St. John and Jerusalem by King George, then Prince of Wales, and was known as "The Hero of 1904." The citizens of Muswell Park (England), where he then lived, presented him with an illuminated address and a gold watch and chain suitably inscribed.

He removed to Montreal nine years ago and took a prominent part in church work, being baritone soloist and a lay reader at the Church of the Ascension. Soon after reaching prison he asked permission of the military authorities to conduct religions services for the prisoners. Not having been ordained, he was informed that the permission would be granted, if he obtained a license from his bishop. Mr. Hardwick wrote to the rector of the Church of the Ascension to send him a copy of his license as lay reader and his request came to the attention of Bishop Farthing, who caused a duplicate license to be forwarded. The Bishop also wrote to the authorities requesting that Hardwick be permitted to act according to his office. The permit was granted and Hardwick secured an organ, and formed a choir. Scotch, Irish, Indians, Australians, British and Canadians join in singing the gospel hymns. Nine Bible classes have been formed and are in a flourishing condition.

Hardwick's name appeared in a list of killed several months before it was known that he was a prisoner, and a memorial service was held at the Church of the Ascension, which was largely attended, his seat in the choir being draped with the Union Jack and decorated with a wreath. Shortly afterwards a marconigram from the London office of the Marconi Company brought information that Hardwick was still living, but a prisoner of war. He is thirty-one years old, and lost a brother in the war who was killed when his aeroplane collapsed.

MILITARY RADIO SET DEVELOPED

A new wireless set for aeroplanes has just been developed successfully by Elmer A. and Lawrence B. Sperry. Aero experts pronounce the invention of great practical benefit in military operations.

Henry Woodhouse, member of the Board of Governors of the Aero Club of America and director of the American Society of Aeronautic Engineers, has given out the following statement regarding the new invention:

"The Sperry radio set is revolutionary in that it has a range of sixteen miles and weighs only seven pounds. Other sets weigh from two to four pounds per mile radius. It was considered that an ideal set would have a range of one mile for every pound of weight. The Sperry set weighing less than half a pound per mile radius and having a sixteen mile range, is ideal for reconnaissance and for directing artillery fire. It is understood the range of this set may be increased without increasing the proportion of the weight."

Key Manipulation

By Carl Dreher

Chairman of Technical Committee, City College Radio Club, New York

IT is rather difficult to impress on young operators who are desirous of cultivating a clear, even style of sending, the necessity of following certain definite rules. One reason for this tendency to learn telegraphing in a slipshod manner lies in the fact that many good operators habitually violate all the rules of sending, and "get away with it." I know a station agent on the Ulster & Delaware Railroad upstate who sends remarkably good Morse while in a standing position before the instrument table, with his back half turned to the key, at the same time exchanging sprightly repartee with the summer girls from nearby hotels. I suppose that any amateurs who happen to witness this method of transmission are eager to go and do likewise. It is much wiser, however, first to acquire a slow, steady send without sensational characteristics; the frills may be tacked on afterwards.

All operators learning to manipulate a key appear to have certain tendencies in common. Prominent among these are, first, a desire to literally "tap" the key, that is, to exert a force on it only during the downstroke, letting the spring send it up again; second, the habit of sending almost entirely with the fingers, hardly any use being made of the muscles of the wrist and forearm. The first of these faults is not very serious, because every operator discards it automatically as soon as he begins to get up speed and discovers that the only way to do so is to keep hold of the key knob lightly all the time. The habit of finger-sending is less easily detected and is much more harmful in its results. Finger-sending is almost always choppy and labored. This is bad enough, but as a matter of fact the "knuckle-sender" is lucky if he can transmit at all. He is reasonably certain, sooner or later, to fall a victim to the affliction known as a "glass arm"—a paralysis of the finger and hand muscles which compels the sufferer to turn to some other field of endeavor, such as bricklaying or piano moving, for a living.

The correct method of sending is with the forearm, the elbow being used as a fulcrum, with a small amount of wrist motion, and a very little finger work for delicate touches. This throws the heavy part of the work on the muscles of the forearm, which are obviously much better adapted for continued strains than the lighter muscles in the wrist and fingers. Club members will now understand why the operators in charge insist on the wrist-up-in-the-air method of transmission. It is, indeed, impossible to place too much stress on this point, for a cramped style of sending, once it is well fixed, is almost permanent. If anyone is not yet convinced on this score, let him go to an operator who has learned to send with a finger motion and ask him to make sixty fast v's without a break, or to shoot press at twenty words a minute for a half hour. The results will convince any impartial observer.

I shall quote some data from T. Jarrard Smith's pamphlet on the Philosophy and Practice of Morse Telegraphy:

"Work is the most easily done when the key sets so far back on the table that the elbow has a rest on the same bed. When sufficient depth of desk cannot be secured, the forearm should rest on the edge of the desk, but under no circumstances should the wrist be allowed to lie or rest upon the table; on the contrary, it should be raised therefrom a couple of inches, and move up and down in harmony with the hand, allowing the elbow or forearm, as the case may be, to act as the axis or hinge of the movement, assisted by flexibility at the wrist.

"The nature of the 'grip' upon the key should be similar to that in seizing a pen. It should be light, gentle, but even and sure. It must be firm enough to secure unquestioning obedi-

ence of the lever, but must not be rigid. Indeed, when we say handle a telegraph key as you would a pen, we have said everything. There must be no skipping, hopping, or timidity; neither is any especial vigor required. In the downward pressure do not continue the downward motion of the hand after the lever comes to rest, in order to secure what is called firmness of contact. Such a habit, when it is attempted in rapid work, will handicap the writer. There is no time for any surplus movement. It will be found that the upholstery of flesh at the finger point is a cushion sufficiently elastic to secure this result without any laborious effort on the writer's part, if he is cool, concise and even in his pressure, avoiding convulsive impulses."

The worst thing that an experienced operator can do is to attempt premature high speed transmission. Quite a number of men have acquired permanently jerky, convulsive, ragged "fists" (the popular term for a style of sending) by efforts made to ignite the gutta-percha along the line while they were yet at a tender age. On this account, ambitions on the part of the operators who are qualified to exceed a speed of ten words a minute will, until further notice, be sternly squelched. Mention may also be made of irregularities in speed, poor spacing, etc. Nothing disconcerts a receiving operator as much as constant variations and jumps in the speed of transmission. Good spacing is largely a matter of experience and ear training.

We shall now throw over the aerial switch and discuss the matter of receiving. This is where our troubles begin. But, while I am not going to pretend that learning to "copy" is the easiest task in the world, I think I shall be able to show that it is not nearly as difficult as it appears during the first few weeks of practice.

There are really two methods of receiving signals in a dot and dash code, which we will call, for convenience, the visual and auricular methods, respectively. The visual method is the one which we use before we have become familiar with the sounds of the various letters; after this point has been passed the ear system is used. Before we proceed to an analysis of these methods, I must state that the names applied to them are more for the purpose of ready distinction than accurate description, and must not be taken literally. Furthermore, the opinions to be expressed are my own, and have no particular authority behind them; they should, therefore, be heard reservedly and with a view to criticism.

An operator receiving by the visual method has the following experience in receiving a signal:

1. He hears the sound, and memorizes it, either by ear, or, if the signal is sent very slowly, by dots and dashes.

2. The sound is resolved into visual elements; that is, the subject sees an image of the dots and dashes, and he may actually write them down.

3. The visual dots and dashes are associated with a certain letter, by the process of memory.

4. The letter is written down.

Thus we see that the visual method involves four, and possibly five, distinct mental processes.

In the auricular method only three processes are involved, as follows:

1. The operator hears the sound.

2. He makes a direct association of the sound with the letter to which it belongs.

3. He writes the letter.

Now let us see how all this psychology connects up with the experience of the operator who is learning how to receive. He is given a card and told to memorize the dot and dash symbols thereon. Inasmuch as he *sees* these dots and dashes, the association which connects them with their respective letters is going to be a visual association, even aside from the fact that most people's mental concepts are in the form of images anyhow. Then, when he *hears* the dots and dashes as sent by the buzzer, he is under the necessity of translating the sound into images before he can associate it with a letter, and as a result of this laborious and time-wasting process he is unable to copy at any considerable speeds. Until this method of copying is outgrown, therefore, progress is necessarily slow. With continued practice the operator begins

to become familiar with the sounds of the letters, and unconsciously he begins to use the auricular method in his receiving. The transition is a gradual one. It proceeds in steps, letter by letter. The point to be noted here is that the operator can hasten the change by making conscious efforts to familiarize himself with the sounds of the letters, and by trying to copy at speeds above his normal capacity. There is nothing which improves an operator's receiving as much as the attempt to receive on circuits which are a little too fast for him. Conversely, copying on slow circuits on which no difficulty is experienced does not result in improvement. The student who realizes these facts is not the one who, when the pace becomes too hot for him, throws up his hands with a bellow of despair and breaks in with a QRS; on the contrary, he makes redoubled efforts to keep up, because he knows that improvement results only when one is pressed to the limit. Of course this principle must be kept within reasonable bounds. It is in no way a justification for sending twenty words a minute to a man who accounts himself lucky when he can copy ten. But it is a justification for tearing a man out of a five-word-a-minute rut when the chief operator is certain that he can take ten words per minute with a little increased effort.

It must not be imagined that all of the experimenter's troubles are over once he has hit on the right method of copying. We know that this is not so because frequently an operator who can copy at a moderate speed, say 15 words, is unable to do anything at all on a 20 word circuit. The difficulty in this case is caused by a slow-time reaction. The reaction time is the interval between the instant when the symbol is heard and the instant when the corresponding letter pops into the operator's mind. In general, it may be stated that, other conditions being favorable, an operator can copy at a speed for which the intervals between letters are equal to, or greater than, the said operator's reaction time to the signals. Sometimes an operator has trouble in copying because his attention is not properly fixed on each word as the distant transmitter makes it. A special case of this occurs when a receiver is so disconcerted by the fact that he has missed a letter or two that he loses the next few sentences into the bargain. All operators who work at good speeds experience this inability to keep on copying after a word has been missed, and it is only by the exercise of considerable will power that the fault can be corrected.

In theory at least all good operators are supposed to copy two or three words behind the sender. The advantage of this lies in the fact the receiver does not in that case copy the sender's errors, and has time to capitalize proper names, etc. I have heard that there are some operators who copy only at the end of every sentence, but I have never seen it done. As for the feat of reading signals without copying at all, which seems such a difficult achievement to the beginner, it is, with a little practice, much easier than formal copying. The student who intends to work on fast amateur circuits should accustom himself to this practice, first, because the conversation is seldom worth recording; secondly, because one is expected to answer as soon as the sender has finished transmitting, and the operator who copies must generally look over his notes before he knows the content of the message; thirdly, because the sending of some prominent amateurs, whose names I would mention if I dared, cannot be taken down on paper by any known means.

PHILADELPHIA POLICE SET PROPOSED

Chief McLaughlin, of the Philadelphia Electrical Bureau, announced recently that he planned to take up with Mayor Smith and Director of Public Safety Wilson the question of equipping the City Hall tower with wireless. The idea was suggested by the installation of a wireless set in police headquarters at New York, through the efforts of the Home Defence League of that city.

Explanation of Weather Reports and Time Signals

The Radio Service Bulletin recently published the following regarding the transmission of weather reports and time signals by naval stations:

Through co-operation with local offices of the United States Weather Bureau, weather forecasts are sent broadcast to sea through naval coast radio stations at certain times, varying with the locality. Coast stations are generally prepared to give local forecasts to passing vessels without charge, on request. Storm warnings are sent whenever received and the daily weather bulletins are distributed by the naval radio stations at Arlington, Va., and Key West, Fla., a few minutes after the 10 p. m. time signal. These bulletins consist of two parts.

The first part contains code letters and figures which express the actual weather conditions at 8 p. m., seventy-fifth meridian time, on the day of distribution, at certain points along the eastern coast of North America, one point along the Gulf of Mexico, and one at Bermuda.

The second part of the bulletin contains a special forecast of the probable winds to be experienced a hundred miles or so off shore, made by the United States Weather Bureau, for distribution to shipmasters. The second part of the bulletin also contains warnings of severe storms along the coasts, as occasions for such warnings may arise.

Immediately following this bulletin, a weather bulletin for certain points along the Great Lakes is sent broadcast by the naval radio station at Arlington, Va., consisting of two parts. The first part contains code letters and figures which express the actual weather conditions at 8 p. m., seventy-fifth meridian time, on the day of distribution, at certain points along the Lakes. The second part of the bulletin contains a special forecast of the probable winds to be experienced on the Lakes during the season of navigation—about April 15 to December 10.

The points for which weather reports are furnished are designated as follows: For Atlantic coast and Gulf points: S=Sydney, T=Nantucket, DB=Delaware Breakwater, H=Hatteras, C=Charleston, K=Key West, P=Pensacola, and B=Bermuda; for points on the Great Lakes: Du=Duluth, M=Marquete, U=Sault Ste. Marie, G=Green Bay, Ch=

BEAUFORT SCALE OF WIND FORCE

Number and designation	Statute miles per hour.	Nautical miles per hour.
0 Calm	0 to 3	0 to 2.6
1 Light air	8	6.9
2 Light breeze	13	11.3
3 Gentle breeze	18	15.6
4 Moderate breeze	23	20.0
5 Fresh breeze	28	24.3
6 Strong breeze	34	29.5
7 Moderate gale	40	34.7
8 Fresh gale	48	41.6
9 Strong gale	56	48.6
10 Whole gale	65	56.4
11 Storm	75	65.1
12 Hurricane	90 and over.	78.1 and over

Chicago, L=Alpena, D=Detroit, V=Cleveland, and F=Buffalo.

All bulletins begin with the letters U. S. W. B. (United States Weather Bureau) and the weather conditions follow. The first three figures of a report represent the barometric pressure in inches (002=30.02); the next figure, the fourth in sequence, represents the direction of the wind to the eight points of the compass: 1=north, 2=northeast, 3=east, 4=southeast, 5=south, 6=southwest, 7=west, 8=northwest, and 0=calm. The fifth figure represents the force of the wind on the Beaufort scale, on preceding page.

In order to simplify the code, no provision has been made for wind force greater than 9 strong gale, on the Beaufort Scale. Whenever winds of force greater than 9 occur, the number representing them is given in words instead of figures, thus: Ten, eleven, etc.

EXAMPLES OF CODE

U S W B S 96465 T 91674 DB 94686 H 99886 C 01214 K 02622 P 03613 B 00065.

The transmission of time signals to vessels at sea by means of radiotelegraphy was first accomplished in the United States in 1905, and this service, enlarged and extended, has continued to the present time. This service is of the greatest value to mariners, as it furnishes a means by which the time, as given by the transmitted signals, may be compared with a ship's chronometer and the error of the chronometer found. Similar comparisons over a number of days enable data to be obtained by which not only the error may be found, but also the chronometer rate; that is, the rate at which it is gaining or losing.

The noontime signals on the Atlantic Coast are sent out through the coast radio stations by connection with Western Union telegraph lines from the United States Naval Observatory at Washington, D. C. By the operation of proper relays in electrical circuits, the beats of the seconds of a standard clock in the observatory are sent out broadcast as a series of radio dots, commencing five minutes before the time of the final

TRANSLATION, UNITED STATES WEATHER BUREAU

Station.	Pressure.	Wind. Direction.	Force.[1]
Sydney	29.64	SW	5
Nantucket	29.16	W	4
Delaware Breakwater	29.46	NW	6
Hatteras	29.98	NW	6
Charleston	30.12	N	4
Key West	30.26	NE	2
Pensacola	30.36	N	3
Bermuda	30.00	SW	5

[1] See Beaufort Scale.

U S W B Du 95826 M 97635 U 00443 G 96046 Ch 95667 L 00644 D 00842 V 01054 F 01656.

TRANSLATION, UNITED STATES WEATHER BUREAU

Station.	Pressure.	Wind. Direction.	Force.[1]
Duluth	29.58	NE	6
Marquette	29.76	E	5
Sault Ste. Marie	30.04	SE	3
Green Bay	29.60	SE	6
Chicago	29.56	SW	7
Alpena	30.06	SE	4
Detroit	30.08	SE	2
Cleveland	30.10	S	4
Buffalo	30.16	S	6

[1] See Beaufort Scale.

signal. By omitting certain dots in a series, the comparison between the dots and the beats of the chronometer seconds can be checked until the instant of local noon (seventy-fifth meridian time) is reached. This is marked by a longer dot, which gives the time of exact noon. A comparison with the chronometer time at that instant gives its error referred to the seventy-fifth meridian time. Applying the difference in longitude, namely, five hours, between the seventy-fifth meridian and Greenwich, which is the standard meridian (or 0° longitude), the error of the chronometer referred to Greenwich time is determined.

Time signals are now sent out on the Atlantic Coast only through the radio stations at Arlington, Key West, and New Orleans. Signals from Arlington, which reach a zone formerly served by other coast stations, are sent out every day in the year twice a day, viz., at noon and 10 p. m., seventy-fifth meridian time. Time signals from Key West and New Orleans are sent out daily, including Sundays and holidays, commencing at 11:55 a. m., seventy-fifth meridian time, and ending at local noon.

In case of failure of the Arlington high-power station, the signals are sent out by the small set in the same station, and the stations at Boston, Newport, Norfolk and Charleston are notified, and they each send the signals broadcast.

On the Pacific Coast the time signals are sent broadcast to sea through the naval radio stations at Mare Island, Eureka, Point Arguello, and San Diego, Cal., and at North Head, Wash. The controlling clock for each station is in the naval observatory at the Mare Island Navy Yard. Signals from Mare Island are sent out every day from 11:55 to noon, and from 9:55 to 10 p. m., one hundred and twentieth meridian standard time. Those from North Head, Eureka, and San Diego are sent out daily, excluding Sundays and holidays, from 11:55 to noon, one hundred and twentieth meridian standard time.

To get the maximum clearness of signals, the receiving circuit should be tuned to that of the sending station. Arlington and Mare Island send on a 2,500-meter wave length, North Head and San Diego on a 2,000-meter wave length, Eureka on a 1,400-meter wave length, and Key West and New Orleans on a 1,000-meter wave length. With the completion of the new radio station at the training station, Great Lakes, time signals will be transmitted from that station for the benefit of shipping on the Great Lakes, as well as the weather reports for that region, now transmitted by Arlington after the Atlantic Coast weather bulletin, following the 10 p. m. time signals.

REMEDIES FOR DISTURBING EFFECTS

Methods of minimizing the disturbing effect that wireless equipment and antennæ may have on electric service lines were referred to by A. J. Wagner at a recent meeting of the Empire State Gas & Electric Association. One remedy mentioned was to insert air-core reactors, each consisting of a 6-inch coil of about 100 turns in the service circuits on the wireless user's side of the meter. This equipment, the speaker explained, will eliminate high inductive effects which result when wireless aerials and distribution lines are parallel and close together. Conditions may be still further improved by connecting a non-inductive resistance, such as a carbon rod, of about 20,000 ohms resistance across the service circuit inside the reactors and grounding the middle point.

The United States Bureau of Navigation has been informed by the Chilean Administration, through the Bureau of the International Telegraphic Union, Radiotelegraphic Service, Berne, Switzerland, of the opening to public service of the radiotelegraphic stations Valparaiso, Llanquihue, Frutillar and Punta Arenas.

How to Conduct a Radio Club

(Especially Prepared for the National Amateur Wireless Association.)

Receiving Detectors for Wireless Telegraphy

By Elmer E. Bucher

ARTICLE XXVI

IN the article of this series published in the June issue of THE WIRELESS AGE various types of crystalline detectors and their circuits were described. In this article the description of detectors in which the mechanical feature predominates, and which are suitable for the reception of damped and undamped oscillations, is continued.

Marconi Magnetic Detector—One of the most reliable and fool-proof of all detectors in commercial use to-day is the Marconi magnetic, widely in use aboard ships. It consists essentially (Fig. 10) of the iron wire band, B (several strands of No. 36 iron wire twisted in the form of a cable), having a total length of from 18 to 24 inches which is slowly drawn through the glass tube, P, by the ebonite or wooden pulleys, W-1 and W-2, which, in turn, are set in rotation by clock work or by a small direct or alternating current motor. The glass tube, P, is wound with from 6 to 10 feet of No. 36 single silk covered wire and directly around it is placed another winding, S, of No. 36 single silk covered wire having a resistance value of about 180 ohms. The head telephones are joined across the terminals of S and they should have a value of close to 150 ohms. Immediately above the two bobbins of wire are placed two horseshoe magnets with like poles adjacent. These magnets generally have a separation between the poles of about 1¼ inches and are placed at a distance of approximately ¾ of an inch to 1 inch from the band, B.

The glass tube, P, is usually about 2 inches in length and 3-16 of an inch in diameter. The bobbin of wire for the head telephone circuit has a diameter of 1½ inches and an overall width of ½ inch.

Operation—When the band, B, is set into movement by the clock-work some parts of it are magnetized as they approach the south pole of the magnet and accordingly are demagnetized when approaching the north pole of the magnet; however, owing to the well-known effect of hysteresis, the change of flux does not take place immediately any part of the band is directly under a magnetic pole, but is effected at a point beyond, the final result being that the iron band is in a magnetic state which is extremely susceptible to outside changes of magnetic flux which may be caused to act upon it. When high frequency electrical oscillations from a transmitting radio station flow through the winding, P, for each group of oscillations, a momentary change in the position of the magnetic lines of force of the band takes place, which, in turn, causes a variation of movement of the flux threading through the coil, S, creating a single sound for the entire group. Thus impulses of current in accordance with the note of the distant transmitting station will be produced in the circuit of the head telephones.

Adjustment—No preliminary instructions for the adjustment of the magnetic detector are required, since it is only necessary that the band, B, move at a very low rate per second, usually making a complete turn in

about two seconds. The circuit, however, in which this detector is connected is important, as the device is one of

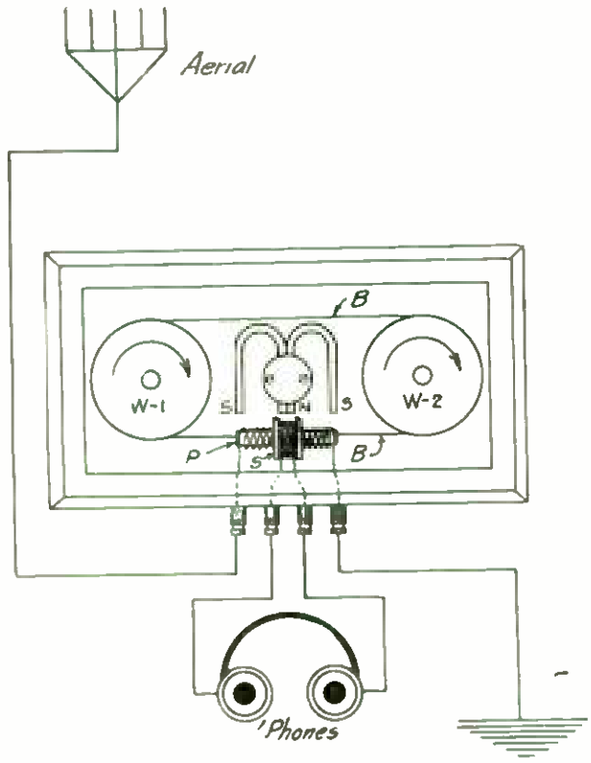


Fig. 10

low resistance and therefore may be, if so desired, connected directly in series with the aerial circuit. A satisfactory circuit for the detector is indicated in Fig. 11, in which an aerial tuning inductance, L-1, is joined in series with the primary winding of the detector, P, and thence extended to the earth connection, E. As indicated by the dotted lines, a variable condenser, C-1, is sometimes connected in shunt to the glass tube winding. It is then only necessary to tune the antenna to the distant transmitting station, whereupon audible response is secured.

In order to obtain the full benefit of the phenomenon of resonance, the magnetic detector is sometims connected in the circuit indicated in Fig. 12, which is a duplicate of the well-known Marconi multiple tuner. The intermediate circuit of this tuner comprises the winding, S, in inductive relation to the primary winding, P, the variable condenser in shunt, C-2, and the second inductance coil, P-1, which is in inductive relation to S-1. The secondary winding then continues through the variable condenser, C-1, to the demagnetizing winding, P, of the magnetic detector. Since, as mentioned before, this detector is considered to be a current-operated device, the secondary winding, S-1, must have rather low values of inductance and be made up of coarse wire. For example, No. 18 or No. 20 single silk covered, or Litzendraht wire, is preferred. It should be remembered in this circuit that the variable condenser, C-1, is an important part of the oscillatory circuit and changes of wave-length can be effected by very close variation of it. Usually a condenser of about .005 or .01 microfarad is employed at this point; consequently, even for wave-lengths inclusive of 3,000 or 4,000 meters, the winding, S-1, may have a very few turns of coarse wire.

It has been found by experiment that the signals from 500-cycle spark transmitters are better received when the iron band, B, is set into rotation at a

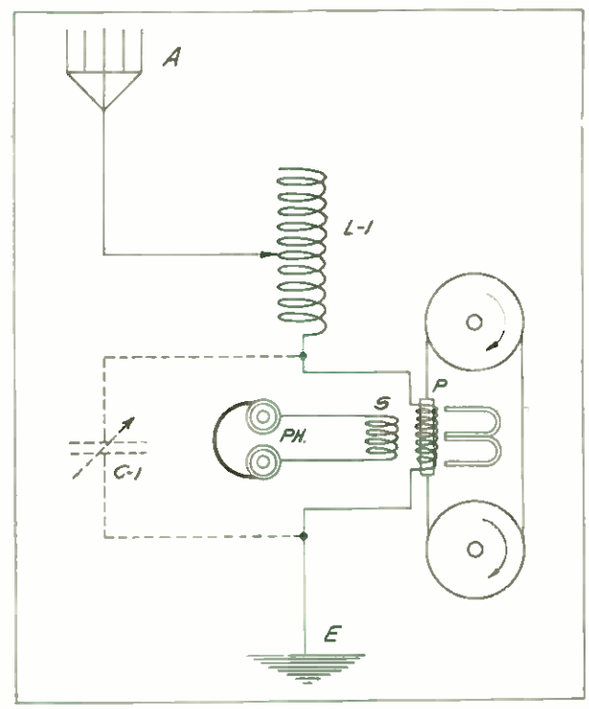


Fig. 11

greater speed than that ordinarily employed for spark transmitters of lower frequency. Increased results frequently can be obtained by variation of the position of the horseshoe magnet, but

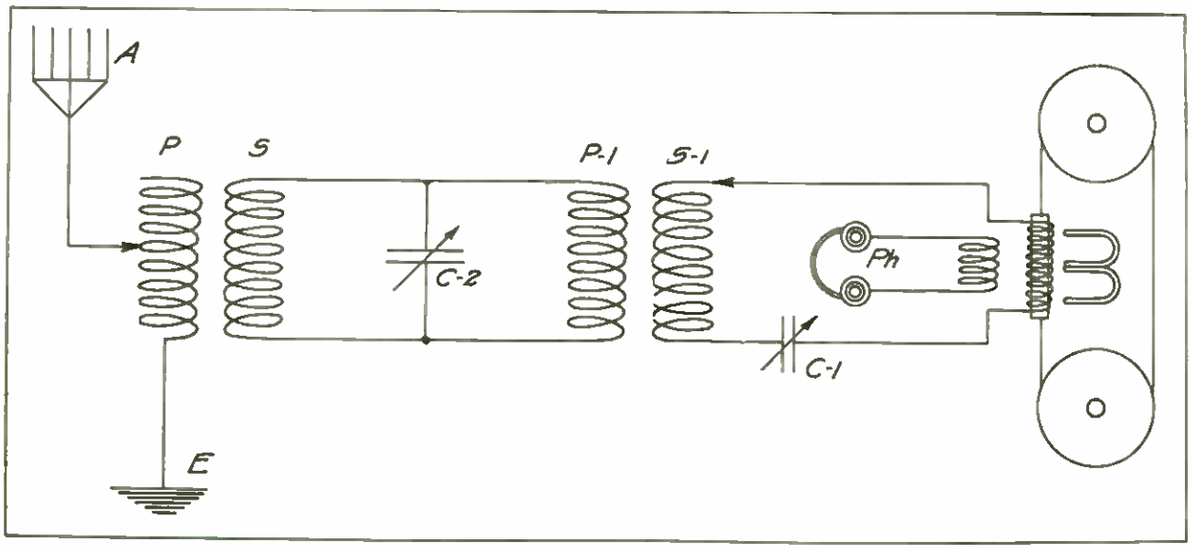


Fig. 12

for general commercial working they need not be moved.

An interesting point in connection with these detectors is the fact that they are more responsive to the lower oscillation frequencies, in fact the best results are obtained at wave-lengths between 2,000 and 3,500 meters.

In commercial practice the revolving band is fitted with two sets of wire bobbins placed on opposite sides of the band so that in case one set of windings is by any means injured, the second set of windings may be immediately brought into use.

The Tikker Detector—By reason of the fact that there are no discontinuities in the wave train of an undamped oscillation radio transmitter, it is necessary to provide means at either the transmitting or receiving apparatus to break these oscillations up into groups

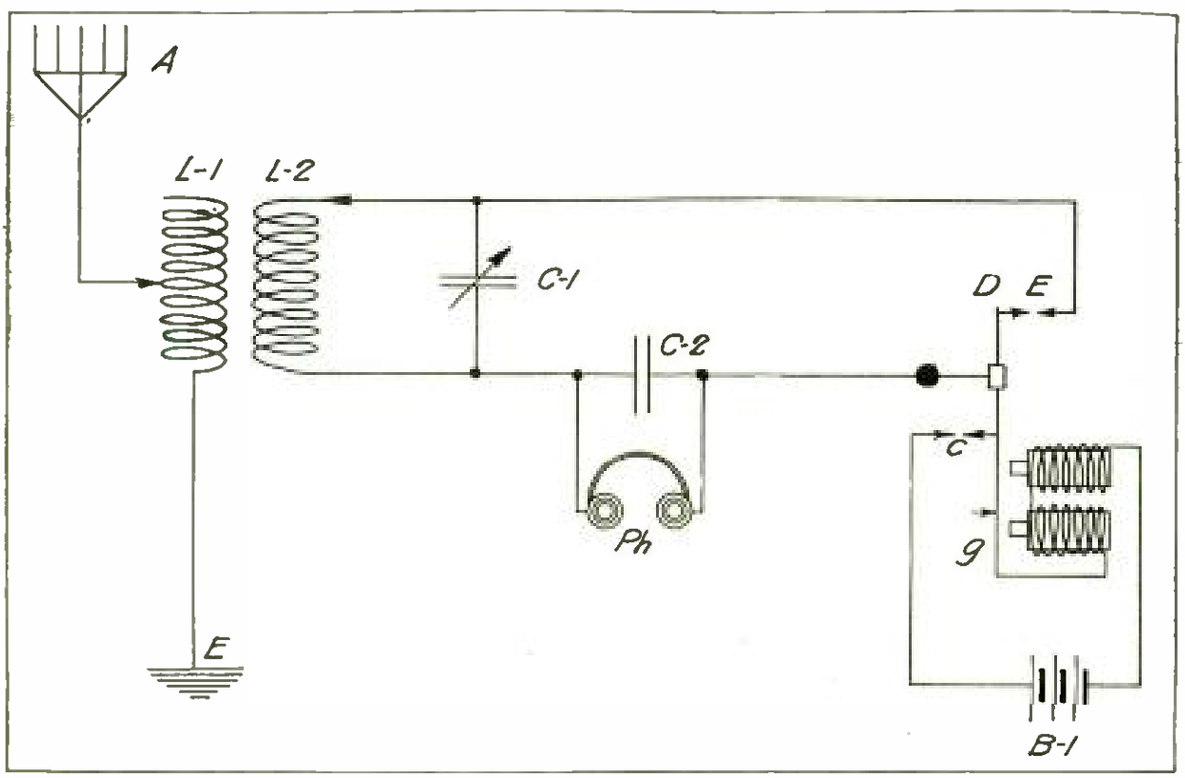


Fig. 13

suitable for response in the head telephone receiver. When an ordinary crystalline detector is used in the receiving system which is in resonance with the continuous wave transmitter, no sounds are produced in the head telephones except at the opening and closing of the telegraph key, due to the fact that the continuous alternating current flowing in the transmitting antenna circuit is converted into a pulsating direct current at the receiving station. The latter merely draws the diaphragm to the receiver magnets and does not release it until the key of the transmitting station is raised.

The original tikker receiver is nothing more than a circuit interrupter mounted on a common bell buzzer. Referring to Fig. 13, the magnets of the buzzer are energized by the battery, B-1, the armature being set into vibration at the contacts. By careful design of the weight of the armature and the rigidity of the spring a very high rate of interruption per second of time can be obtained. At the end of the armature, G, is mounted the contact, D, which makes contact with the stationary point, E. As will be further observed, the last two contacts are connected in series with the secondary winding of the receiving tuner and thus periodically open and close the circuit to the telephone condenser, C-2.

When undamped oscillations traverse the receiving antenna the secondary circuits are interrupted at a rate of from 300 to 800 times per second, producing a semi-musical tone in the telephone receivers, Ph. The effect is that the energy which accumulates in the secondary condenser, C-1, is discharged at regular intervals into the condenser, C-2, which in turn discharges into the head telephones, creating an audible sound. Owing to the fact that the circuit interrupter does not break the circuit immediately at the peak of each alternation of current in the closed oscillatory circuit, a uniform note is not produced; consequently the resultant note is apt to be more or less "hissy" and not of the pure tone that could be expected from modern heterodyne circuits. A detector of this type, however, is effectual and by careful adjustment will give the desired results at any receiving station. In the original form, instead of having platinum contacts at the points, D and E, two light gold wires were placed in contact and the circuit is thus interrupted.

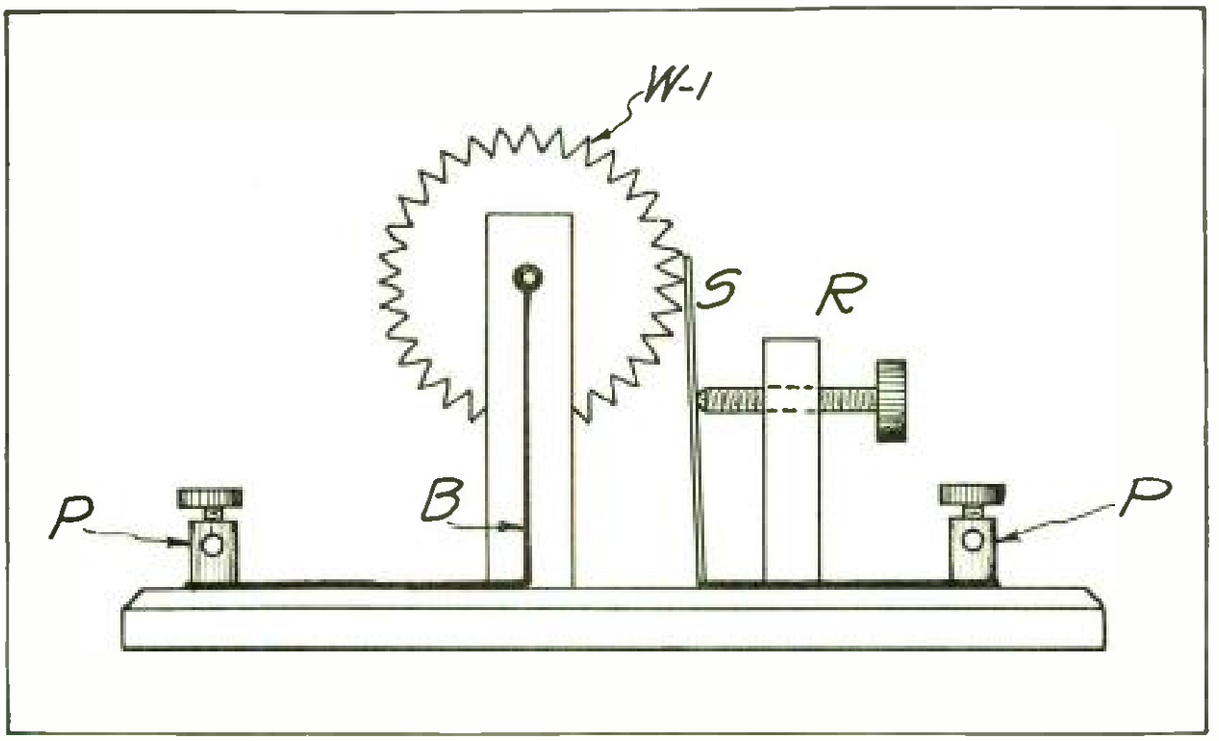


Fig. 14

A modified form of the tikker is indicated in Fig. 14, wherein a toothed wheel is revolved at a certain rate per second. One side of the secondary system is connected to the brush, B, which makes contact with the wheel, W-1. The second terminal of the secondary system is connected to the brush, S, which is placed in light contact with the teeth of the wheel by means of the set screw, R. If the wheel is revolved to interrupt the circuit at a rate of, say, 600 per second, a fairly uniform note is produced. A more satisfactory arrangement is to construct a commutator interrupter of the well-known type, one side of the circuit being connected to all the bars of the commutator and the other side of the secondary circuit being connected to a brush which is in electrical contact with the bars.

tact of variable resistance is obtained, which has the effect of varying the energy which accumulates in the telephone condenser. Usually with this type of detector a more uniform note is secured than with either of the foregoing described tikkers, but still a musical note is not obtained, the resultant note being somewhat similar to that of steam escaping from a radiator.

When the transmitting station employs damped oscillations of a rather high spark frequency, any of the tikkers or a slipping contact detector may be used for receiving purposes, but of course the effect is to break up the note of the spark station, the resultant note being lower in pitch and of unstable and irregular characteristics. Certain tests made by the United States Naval Radio Telegraphic Laboratory indicate that this detector is from three to ten

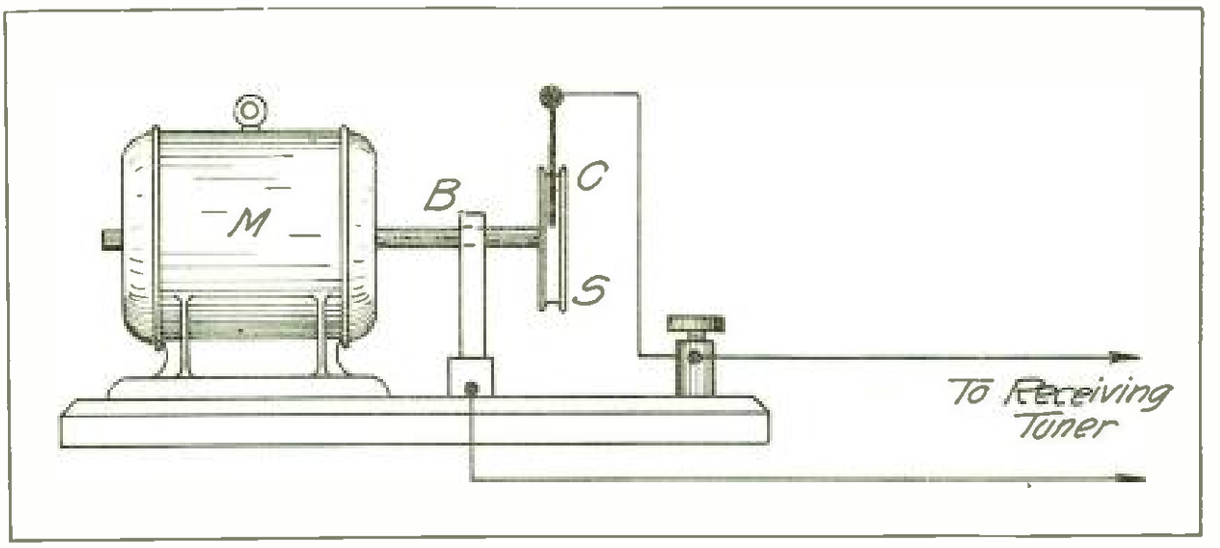


Fig. 15

At a later date another form of detector, known as the slipping contact detector, was devised, the essentials of which are shown in Fig. 15. In this case a small motor, M, has mounted on its shaft the wheel, S, which is about 1 inch in diameter. This wheel has a small groove in which is placed the light elastic contact, C. The other terminal of the secondary receiving tuner is connected to the brush, B, which is in contact with the shaft of the motor. Owing to the constant slipping and gripping to the contact, C, a contimes as sensitive as the ordinary minerals.

Adjustment—Perhaps the most difficult to adjust of all the tikkers just described is the one indicated in Fig. 13, which requires extremely fine adjustment of the contacts, D and E, in order that a fairly uniform note may be obtained. The detectors in Figs. 14 and 15 are perhaps the most easy to adjust, the only requirement being in the slipping detector that the contact, C, be given a light pressure.

Circuits for Operation—The diagram of connections indicated in Fig. 13 is suitable for any of the tikker detectors. Any receiving tuner designed for crystalline detectors will respond with the tikker. It is, however, the usual practice with these detectors to supply a secondary winding of relatively low resistance made up of Litzendraht wire or of coarse copper wire. Good results have been obtained with wires ranging in gauge from No. 20 to 24 and by means of the data given in the book "How To Conduct A Radio Club" it is easy to calculate the dimensions of a coil for a given value of inductance.

It is sometimes the practice to connect a rectifying detector in series with the tikker. It is found by experiment that it has the effect of smoothing out the note, but it decreases the sensibility of the system as a whole.

The Goldschmidt Tone Wheel—It was mentioned in connection with the previous types of circuit interruptors that the note was irregular, due to the fact that successive alternations of current were not broken or interrupted at the same point on the cycle. Hence means have been found by which a pure musical note can be obtained with a mechanical circuit interruptor which adds considerably to the efficiency of the device.

To understand the operation of a Goldschmidt tone wheel we must begin by assuming the following problem: Suppose, for example, that a distant transmitting station employed an alternating current to charge the antenna circuit, having a frequency of 50,000 cycles per second, corresponding to a wave-length of 6,000 meters, and assume, further, that a circuit interrupter (tikker) is devised which gives 50,000 breaks per second and is revolved at such speed so that the peak of every other alternation in the wave train is interrupted; then it is plainly evident that only one-half of each cycle of alternating current will be received in the head telephones, which will not create an audible response. Suppose, however, that the disc is run at a slightly lesser or greater speed than that necessary to obtain synchrony, the circuit being interrupted at the rate of 49,000 times per second; then every thousandth alternation of current in the aerial system is interrupted directly at the peak (in the case of a 50,000 cycle alternator at the transmitting station) and all intervening alternations are interrupted at different points on the complete cycle. The final result of this action is to produce in the telephones a beat note, or, in other words, a nearly sinusoidal alternating current of a frequency of 1,000 cycles per second. Keeping these facts in mind in order to obtain similar results with an ordinary tikker, it is only necessary to construct a tikker device with a great number of points of contact in order that from 30,000 to 55,000 interruptions of the circuit can be obtained per second of time. Of course the number of interruptions necessary depends upon the wave-length of the distant transmitting station and on the shorter wave-length, say 3,000 meters, an interruptor giving 100,000 breaks per second is required. It is found difficult to attain this speed of interruption with a mechanical device, however, and consequently the apparatus functions best on the longer wave-length corresponding to the lower frequencies.

Contrary to expectations, it is not difficult to find a satisfactory adjustment of the tone wheel, but it is highly important that the motor revolve at a constant speed, and that it be fitted with a regulating rheostat which will allow the speed of the motor to be accurately adjusted over considerable range. Then, by listening in on the head telephones when the distant transmitting station is in operation, variation is made in the speed of the motor until a musical note of the desired pitch is secured.

(To be continued)

AUSTRALIAN WIRELESS

All of the Australian wireless telegraph stations will be placed under the control of the Navy Department, it has been announced. The new service will be called the Royal Australian Navy Radio Service.

MARCONI MEN NATION'S DEFENDERS

Wireless men throughout the country are among those who have answered the nation's call to arms as a result of the trouble on the Mexican border. Several employees of the Marconi Wireless Telegraph Company of America obtained leave of absence from the service in order to join military companies. They include William Howard, of the Marconi Factory, at Aldine, N. J.; C. F. Enders, of the Maintenance, Repair and Inspection Department, New York, who is with the Twenty-third Regiment, New York; Richard Douglas, of the Publishing Department staff, New York, who joined the First Corps Cadets of Boston; Charles S. Gould, of the Eastern Division, operator on the Arapahoe, who took his place as a first class private with the Signal Corps of Jersey City, and Lee Lloyd, of the Gulf Division, who is with the Texas National Guard.

JEFF. W. HAYES' BOOK

Jeff W. Hayes, the well-known old-timer and author, has just brought out an interesting and unique volume of telegraphic stories, which no doubt will meet with a hearty reception in the ranks.

It is some years since a book of this character made its appearance, and the fact that such books do appear once in a great while is evidence that operators have not yet lost their appreciation of telegraphic literature of the lighter vein.

It has the unique distinction of being at once personal and impersonal. There are many pages containing facsimile reproductions of the signatures of officials, managers, operators and other employees in many of the large offices in the country and of other persons who were formerly in the telegraph service. This feature of the book gives it a distinctive and personal character, and it is certainly interesting and "catching." Throughout the pages are scattered half tone portraits of many well-known old-timers.

The stories are, in the main, new and relate to Western life and experiences, many of the contributors being well known to the telegraph fraternity and acknowledged reputation as writ- and having acknowledged reputation as writers. Interspersed throughout the book are several poems which will appeal to those of a poetic nature.

The autographs fasten the attention of the reader and recall many pleasant memories and experiences over the wire in years gone by. Many of the names are familiar and make a character study of deep interest.

The price of the book is $1.50 per copy and copies may be obtained by addressing J. W. Hayes, 95 West Maumee Street, St. Adrian, Mich.

SENATE DELAYS PURCHASE OF HAMMOND TORPEDO

The Senate adopted on June 30 the House provision in the fortification appropriations bill authorizing the acquisition of the system of radio control of torpedoes and vessels invented by John Hays Hammond, Jr. The House bill authorized the expenditure of $750,000 to acquire the patents and property rights in the system after an investigation by an expert board has proved the efficacy of it.

A limit of $30,000 is fixed as the amount that may be expended for the Government tests and if these prove successful the President shall decide upon the report of the board whether the system shall be acquired.

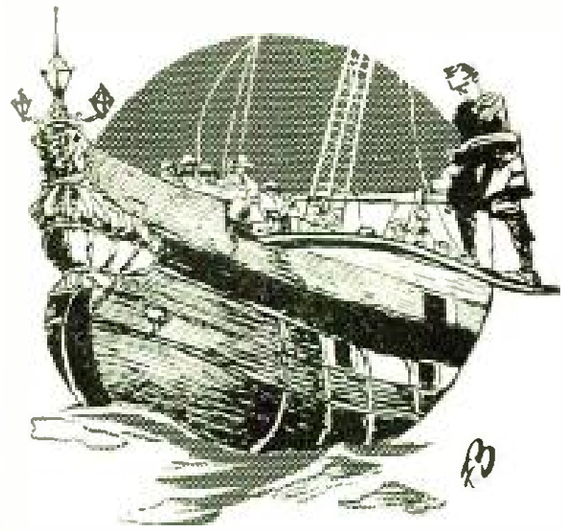
NEW RULE FOR SHIP MESSAGES

The superintendent of Naval Radio Service has announced that effective on and after July 1, 1916, it will be obligatory on the part of senders of radiograms to be handled by the Naval Radio Service to indicate in the address of the message the class of vessel it is desired to reach by this service, such as SS (steamship), or USS (United States ship), as the case may be. Example:—John Doe, USS New Hampshire, Charleston, S. C.

This order becomes necessary owing to the confusion in proper handling of such traffic because of a large number of names of ships being the same as cities, towns, etc. The extra word will be charged for and counted in the check.

OLD SEA ROVERS & RADIO

THE EVOLUTION OF SWAN ISLAND



IF you sail far enough and look closely enough you will find in the western end of the Caribbean Sea a coral speck dignified by the name of Swan Island. Quite peaceful is the aspect it presents. A multitude of cocoanut trees dot its surface; in the day time the sun radiates good cheer; at night a tropical moon throws a soft light over the island and the surrounding waters, providing the finishing touch to what has been aptly termed a bit of slumbering wonderland. Tranquility did not always prevail on the island, however, for at one time it was the home of roystering pirates and the hiding place for their loot. Hardly a spot, with its glamour of buccaneer lore and out-of-the-world atmosphere, in which one would expect to find a principal earmark of progress—wireless. Yet here a station stands, its aerial and masts in striking contrast to the surrounding scenic objects.

Swan Island is 873 miles from New Orleans almost as the crow flies. Properly described, geographically, the island is 250 miles north of Colon—to be exact in lat. 17 deg. 25 min. N., long. 83 deg. 56 min. W. It is usually spoken of as one body of land—an island—although the twin sections of coral limestone and coral debris are separated by shallow water hardly 400 yards in width. Nature, however, is steadily building a connection between the tracts. The island, which was named after Captain Swan, a famous freebooter, is about three and one-half miles in length and one-half mile in width.

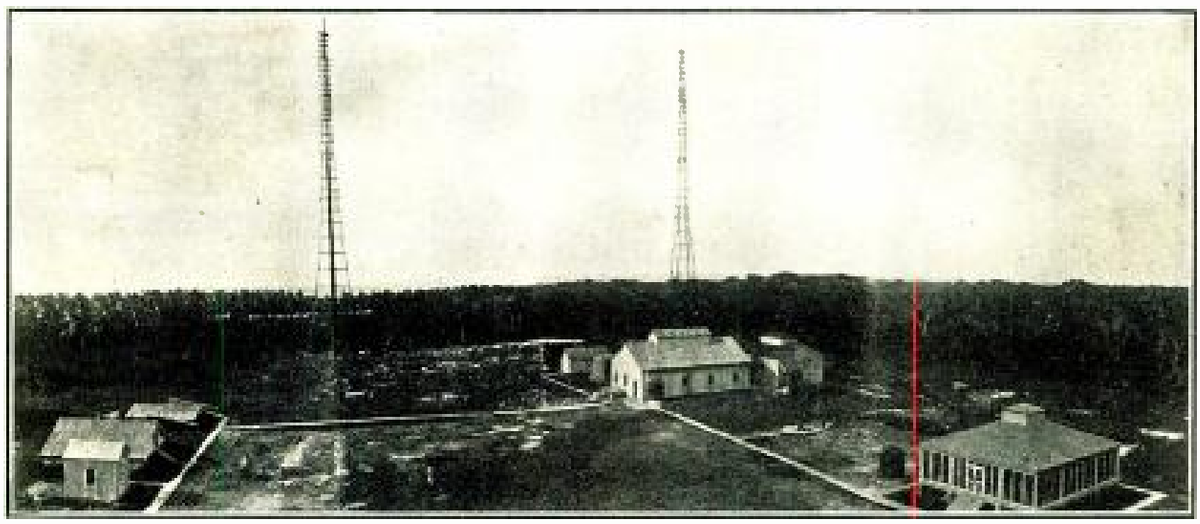
As the modern history of the island is linked closely to that of the Caribbean wireless service, so is its ancient history bound up with that of the old buccaneers who roamed the Spanish Main. Two hundred and fifty years ago the Spaniards had considerable difficulty in navigating their ships safely back to Europe from that part of the Caribbean adjoining the northeastern coast of South America. Far-sighted skippers would not attempt to beat eastwards against the trade winds and out across the Atlantic with the wind against them. Therefore it was the custom for masters of craft clearing from Carthagena, the Panama Isthmus and Boco del Toro to take advantage of the current and set their course northward with the Yucatan Straits as their destination. The Straits once astern, they would put in at Havana, give the crew a run ashore, take in fresh provisions, perhaps, and make their way to their home ports with the aid of the Gulf Stream and the westerly winds which are found farther north.

This was playing fairly into the hands of the pirates who lay in wait on Swan Island. For a large submarine bank

projected from the coast of Honduras extending half way over to Jamaica—a somewhat formidable peril to navigators in those days when charts were crudely drawn and good navigating instruments were at a premium. So the skippers were compelled to pass through a comparatively narrow passage, giving the gentlemen adventurers an excellent opportunity to pillage and plunder. And if the prospective victim escaped in voyaging through the passageway it is likely that he found Captain Swan, or others of his kind, waiting for him after he had cleared the bank. There was no wireless then to summon aid, and after the sea rovers had collected their loot they made their way, so the story goes, to Swan Island, where they buried it, celebrating their success by broaching many barrels of rum.

At the northeast corner of the island the buccaneers erected a fort and in the waters off these breastworks they anchored their ships. Strangely enough, this is the weather side of the island and at first thought it seemed an error of judgment to choose it as a haven. Investigation shows, however, that there is a bight at this point in the coast, across which extends a reef. Behind this ridge of rocks there is an expanse of smooth water and in the reef was a gap large enough to permit the pirates' vessels to pass through. Conditions have changed since the sea rovers had possession of the island, however, and recent reports declared that there was hardly enough water to float a small fishing boat. In explanation for this geological transformation it is said that the waves on the weather shore have been piling up sand and debris which tended to make for shallow water, or that the island has risen considerably during the last 250 years.

Doubtless the men of the black flag looked upon the island as a veritable "find" when they came upon it. Here was an excellent anchorage for their ships and a comparatively safe retreat for their crews, all within easy distance of the treasure-laden galleons plying the Spanish Main. Moreover, the piratical craft needed overhauling from time to time and Swan Island afforded a quiet, secluded harbor in which to scrape the bottoms of the vessels free from barnacles and seaweeds without fear of a surprise attack from foes. It is likely, too, that the buccaneers were given an added feeling of security by the knowledge that as the ships lay tilted up on their sides the guns taken from their decks were planted behind the breastworks, ready to be fired at the first sign of a hostile sail.



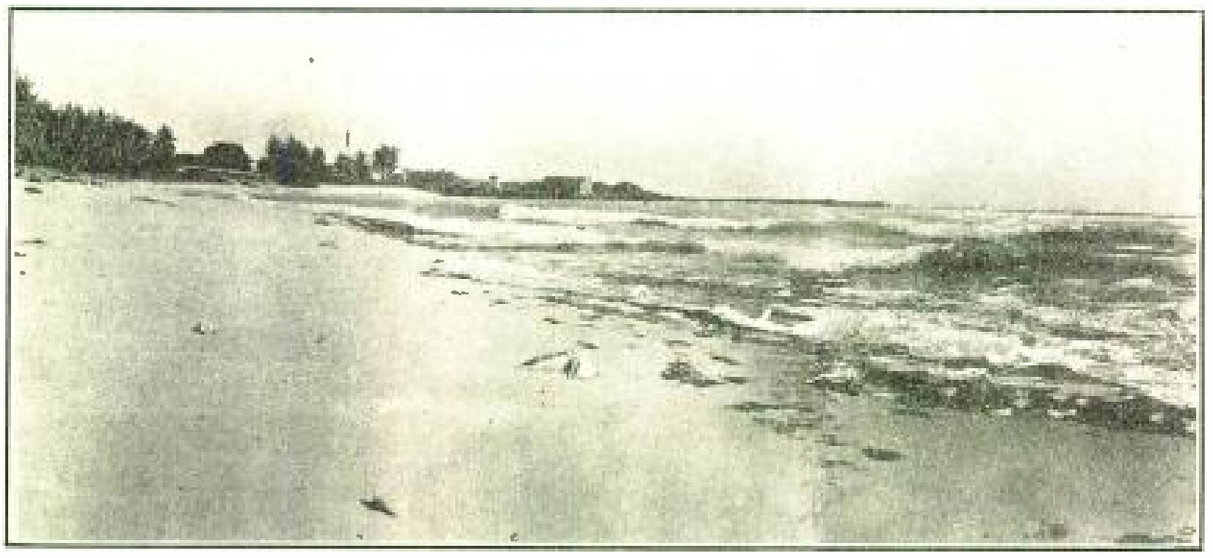
A general view of the station buildings and towers

Picture the amazement of Captain Swan and his men if they could visit Swan Island to-day. What would have been the measure of their astonishment as their vessels approached the land to sight the tall towers of the United Fruit Company's 50 k.w. wireless station.

The station, which was built in 1913 by the Marconi Wireless Telegraph Com-

pany of America, is located about half way between New Orleans and Santa Marta, Colombia. It is an important link in the wireless service of the Caribbean and the communication between the United States and South and Central America. In fact, it was built primarily as a relay point for messages between New Orleans and Santa Marta.

Attached to the station are three operators who make their home in a one-story steel frame bungalow built of concrete and corrugated asbestos. A screened veranda with comfortable rocking chairs provides an attractive lounging place. Each operator has an individual room, supplemented with the comforts of the "States," including shower baths.



This photograph conveys an excellent idea of the smooth beaches of the island

The wireless men look upon Swan Island as a desirable post, and only those who have shown that they are capable of performing excellent work are detailed to this Caribbean station. They receive six weeks' vacation every year and transportation to the United States —a feature of the detail which perhaps adds considerably to its popularity. In addition to their duties as operators they also act as deputy weather observers, making their reports to the United States Weather Bureau. For this work they receive extra remuneration, and because of these advantageous working conditions George S. Davis, general superintendent of the United Fruit Company's wireless service, receives many applications from operators in the employ of that company to be assigned to Swan Island.

S O S calls frequently reach the operators and the station has proved of considerable value in relaying the appeals and obtaining aid. The island is located in the paths of steamships voyaging through the Yucatan Channel en route to the Panama Canal, and consequently has more than ordinary interest to captains of vessels. A beacon light sends its rays far over the sea to guide mariners, flashing white four seconds at six-second intervals. It can be seen 23½ nautical miles from the average ship.

Outdoor life, of course, predominates on the island. For the operator who cares for bathing there is clear water and a sandy beach in front of the station. Motor boating is another diversion of the Swan Island men, one of their favorite pastimes consisting of short cruises in these craft about the waters adjacent to their home. When they tire of these forms of relaxation they can turn to shooting, for snipe, ducks and wild pigeons abound. Baseball and tennis are also included among the diversions. There are no snakes on the island, although iguanas are frequently seen. These creatures, however, as the Swan Islander comes to know, are inoffensive unless attacked.

In addition to the operators there are on the island a number of West Indians who are employed in gathering and making ready for shipment to market the 15,000 to 25,000 cocoanuts which are pro-

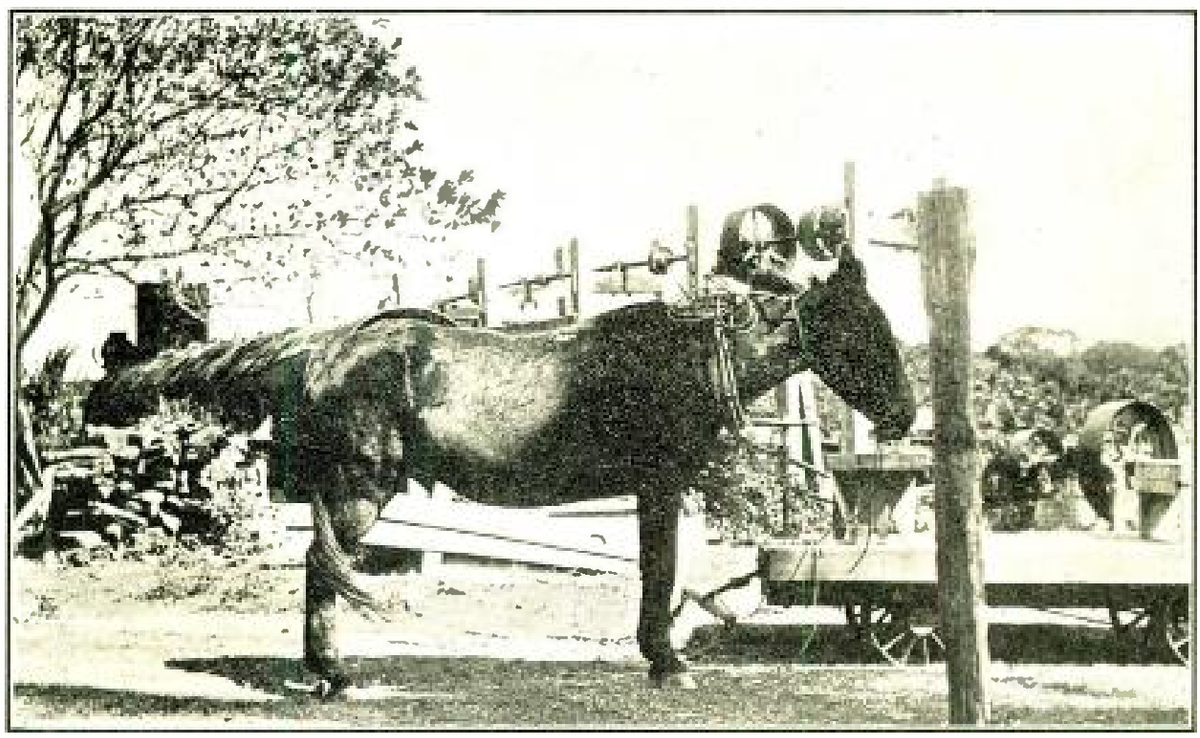
duced monthly. Visitors from Grand Cayman Island frequently land on the island and sometimes a sightseeing party from a yacht comes ashore.

The Caribbean in the vicinity of Swan Island swarms with interesting specimens of fish. On the southern side of the island is a small bay and on various occasions devil fish have appeared in this haven, coming at high speed from the open sea and swimming straight for the opening in the reef.

Some hair-raising stories of the deeds of these dwellers of the ocean have been related. One of them is to the effect that when pearl divers are at the bottom of the ocean the fish hover over them so as to prevent them from rising, causing their death by drowning.

A habit of these creatures, according to Swan Island tradition, is the deliberate destruction of the cables of fishing boats when at anchor. So firm is the belief of some fishermen in this tale that they make it a rule to put two anchors over the sides of their craft. These stories, improbable as they perhaps seem, stick persistently in the minds of ignorant fishermen of the Caribbean, inducing them to look upon the devil-fish with infinite dread. They make excellent yarns, however, for old residents of the island to spin for the entertainment of the newly-arrived operators.

In the event that the operator is an angler he will find himself in a sort of Izak Walton land of opportunities, for there are at least half a dozen different species of fish to be caught within a mile or two of the island. Among them is the queen fish which is distinguished by its speed and agility. Barracudas, which provide highly exciting sport for the fishermen, swim in the waters by the dozen, and there are amberjacks, groupers and snappers as well.



Swan Island is nothing if not quaint. The motive-power of the railroad is here pictured

Thick woods and open clearings abound, large numbers of birds being found in the exposed sections. Most of them are migratory, however, making their winter homes only on the island. Perhaps about ten of the species remain permanently. Among these are the baldpate pigeon, the Swan Island thrush, the larger frigate-bird, the cat bird and the black cuckoo. These, with their strange cries and call notes, accentuate the tropical atmosphere of the island in no small measure.

The pirates, as nearly as can be determined, were the first white men to inhabit the island, because there is apparently

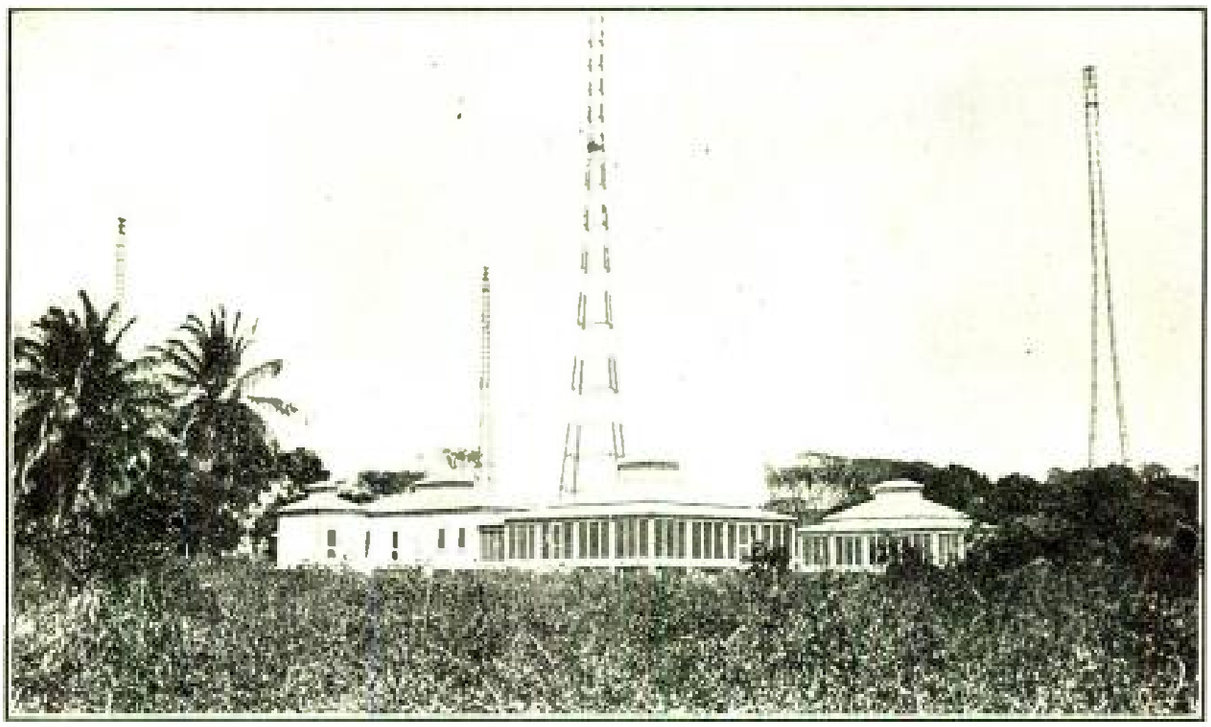
nothing to show that the Mosquito Indians who had their homes on the shore of the nearest mainland, ever visited the little tract. These Indians, history relates, were expert canoeists, but in order for them to reach the island, it would have been necessary to paddle and sail ninety-eight miles in the open sea—an undertaking calculated to make the hardiest hesitate.

South of this treasure ground of the buccaneers is Old Providence Island, which in 1664 was taken by a well-known buccaneer, Mansfeld by name, who probably had it in mind to use as a headquarters and anchorage for his fleet of fifteen vessels and 500 men. It is likely that Mansfeld's men were visitors to Swan Island and perhaps used it as an adjunct to their Old Providence station.

The interest centering about Swan Island is perhaps added to by the dearth of written narrative concerning the place. It is said that the first men identified with the history of the island since the buccaneers held sway there were two Englishmen, Alley and Page, who set out from Grand Cayman Island, where they lived, and landed on Swan Island. An account of their visit says that they felled enough trees to build a rough boat in which they returned to Grand Cayman Island. It does not appear, however, that they ever again visited Swan Island, although they called it their property.

Samuel Parsons, an ancestor of a resident of the Grand Cayman, was apparently the next self-appointed king of Swan Island. One of his first acts upon taking possession was to place on the island a considerable number of goats which multiplied rapidly, resulting in a few years in the formation of a large herd. However, the claim which Parsons established had little of permanence in it for, either misled as to the security of his rights, or careless in maintaining them, he found on one of his visits another claimant in possession.

This was Captain Alonzo Adams, an American sea captain. There are several stories regarding the manner in which he came to take possession of the island. One is that the captain was bound in his little schooner, the Polly Ann, for a South American port when Swan Island, uncharted and seemingly without good claim on the part of any one, loomed up invitingly over the horizon. The captain landed on the island and made a cursory examination. What he saw delighted him, but his business in hand did not per-



In the foreground of this photograph are shown the one-story steel bungalows in which the operators live

mit him to remain long and he continued his voyage. When it had been concluded, however, he returned to Swan Island and took possession. There were about 100 natives on the island at that time and the place was quite primitive. Captain Adams changed living conditions somewhat in so far as he was concerned and erected a house in which he, his wife and his family, consisting of two sons and two daughters, dwelt. A lighthouse was also erected and in time Swan Island became an unofficial port of call for skippers, responding to Captain Adams' flag station signals. It was not unusual for passing craft to slow down and take aboard members of the Adams family or orders for supplies. To marine folk, however, the island became known principally as a port where cocoanuts in large quantities were taken aboard. Captain Adams abandoned his tropical home eventually to reside on a farm he purchased at Easthampton, Conn. His death, incongruous as it may seem after his life on the romantic little island, occurred amid conventional surroundings in a hospital in Boston.

So runs the story of Swan Island. A page from a Robert Louis Stevenson romance: a bit of coral in the ocean where poetic fancy can riot; a built-to-order place for a make-believe Robinson Crusoe. Such are the impressions gained by the visitor.

A glimpse of the island as seen from one of the radio towers is shown in this picture

Swan Island on a calm day, picturing the waters as smooth as the proverbial mill pond

Photo Courtesy Edison Storage Battery Co.

OPERATOR WRITES OF SAN DOMINGO WAR EXPERIENCES

Simon Murphy, a wireless operator on the United States ship Memphis, which has been in the waters of San Domingo, has written to his mother, Mrs. Lucy Murphy, of 211 Second Street, Jeannette, Pa., telling of trouble with the Dominicans and the demolition of forts in Puerto Plata. The letter, which is dated on board the Memphis, at Monte Cristo, San Domingo, June 7, follows:

Here we are in Santo Domingo waters amidst great excitement, but I am in no danger, so don't worry. On June 1 we fired 25 four-inch shells, demolished two forts and took both trenches in Puerto Plata. Our marines were fighting 300 rebels ashore, and we were bombarding the town with the guns from the ship. One marine officer got killed by being shot by a rebel, but no others were injured. The battle lasted about two hours. It was exciting. We killed 35 rebels, and the rest left the city for the mountains and haven't been heard of since.

We handle all the radio for all the ships down here, and are kept busy.

BULLARD NOW BATTLESHIP COMMANDER

Captain W. H. G. Bullard, superintendent of the naval radio service, has been assigned to command the battleship Arkansas, succeeding Captain W. R. Shoemaker, relieved for shore duty. Captain Bullard has been succeeded by Commander David W. Todd, recently in command of the second destroyer flotilla of the Atlantic fleet.

English Marconi Company's Earnings Large

Annual Report Shows Gross Profit of Nearly Three Millions—Ten per cent. Dividends Declared for the Year With Possible Bonus in Sight for Shareholders

THE annual report for the year ending December 31, 1915, shows that the profit of Marconi's Wireless Telegraph Company, Ltd., amounted to $2,830,080.74. The net earnings for the year were $1,839,971.73, an increase of more than $725,000 over the profits of the preceding year. At the annual meeting, held in London on June 30, the Directors recommended a final 5 per cent. dividend on ordinary shares, bringing the year's total dividend up to 10 per cent. on ordinary shares; the regular 7 per cent. dividend was declared on preference shares.

Early press reports state that Godfrey Isaacs, presiding at the annual meeting said Marconi's invention to put an end to the danger of collision at sea in darkness or fog represented but part of his latest work. His new inventions would prove as epoch-making in the progress of the art of wireless as was in 1900 the now world-famous patent known as "the four sevens."

Since informing him that his research work in Italy as regarded the future practice of the entire science of wireless telegraphy and wireless telephony over both long and short distances would give results hitherto impossible. Marconi had visited England and described to him the nature of his new work. Mr. Isaacs expressed the hope it would be a long time before details of the inventions were made public.

"The longer it remains where it is," he added, "the better for us and the worse for Germany."

The report of the Directors does not include in the accounts any sum for remuneration and compensation from the British Government for use of the company's stations and services rendered since the beginning of the war. There are four heads under which the company will receive a remuneration from the Government, which has been rather slow in settlement, but which is expected at almost any time now. The Postoffice Department of England will be called on for the settlement in two instances: One for the use of the company's stations, and the other for the withdrawal of contracts which were made for the establishment of an Imperial chain of wireless stations. The War Department will also make a settlement with the company for the use of the company's patents during the present conflict. The same is true of the Admiralty.

It is intimated that a substantial bonus will be given to the shareholders when payment is received from the Government. Meanwhile the company is husbanding its resources and carrying forward to 1916 the sum of $1,497,750.13, together with $338,452.46 remaining from the 1914 profit and loss account. The general reserve account now stands at $4,711,871.22.

It is reported in El Imparcial, one of the leading dailies of Madrid, that the minister of public works, after examination and report by the Centro Tecinco de Aeronauticos, has approved a radio signal receiver of a type that does away with the usual ear pieces.

The lecture delivered at Columbia University on May 12, by Dr. John Stone Stone, as reported in the July issue of the WIRELESS AGE, was delivered under the auspices of the Radio Club of America.

Cruising Through Troubled Waters

In Which the Unusual and the Thrilling, as Seen From the Decks of the Philadelphia, are Pictured

By O. M. Shaw

SHIPS are very much like human beings in some respects. One man for example, will go through life without even chasing his wind-propelled hat through a city street; on the other hand his neighbor's career may be crowded with exciting and unusual incidents. The history of the Philadelphia seems to be similar in a measure to that of the latter man—at least that was the impression I gained during the course of six voyages across the Atlantic I took on her as wireless operator.

Operator Shaw, who took six memorable voyages on the Philadelphia

I'll begin with an incident which occurred on September 4, while the Philadelphia was off the south coast of Ireland. My associate was in the dining saloon, and I was curbing with some impatience a ravenous appetite when a distress call came from the British steamship Hesperian (MSN), which said that she had just been torpedoed by a German submarine. Did you ever receive word directly from a sinking steamship with 500 persons on board, asking for aid? If you haven't it will be somewhat difficult for you to realize my sensations.

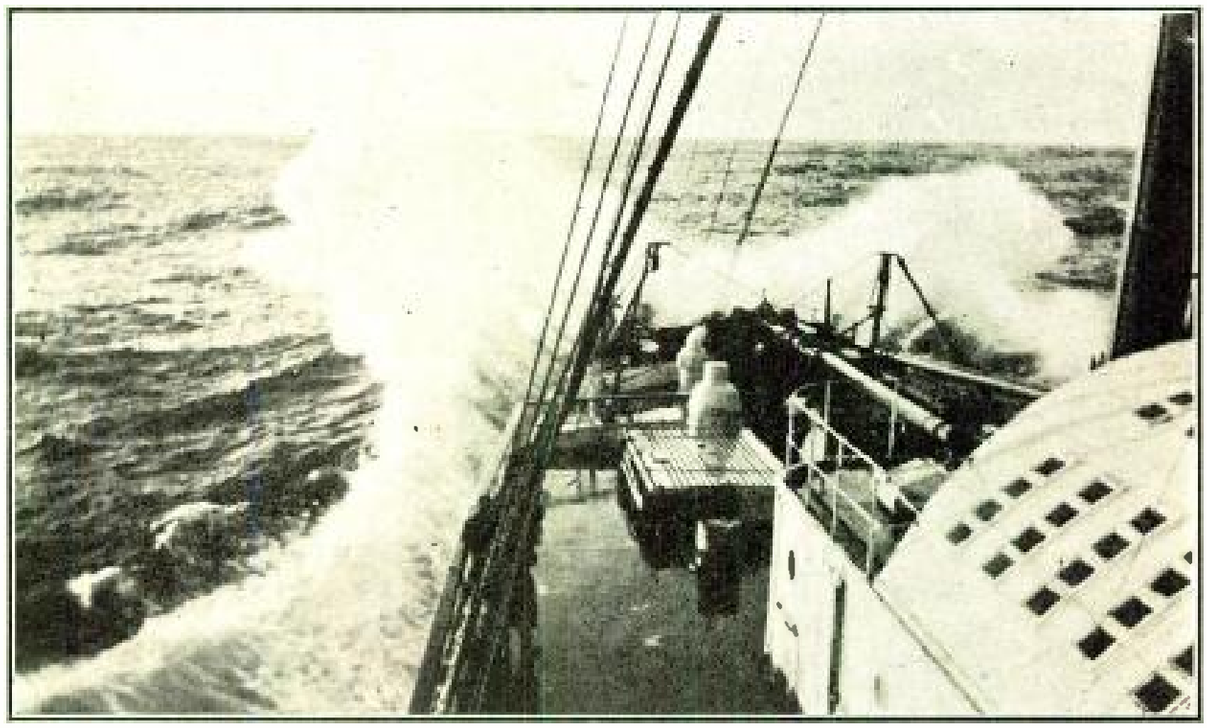
After the Hesperian's position had been taken it was found that she was sixty miles away from us. A British patrol boat (ZAAW), said that she was thirty-two miles from the wounded ship. The Philadelphia did not go to the aid of the Hesperian, however, because the patrol boat said that she was able to render all necessary assistance to the persons on the torpedoed craft. Later we learned that the Hesperian had remained afloat until the following day, but had gone to the bottom while being towed to Queenstown.

Christmas Day in the war zone brought forth the story via wireless of the running fight and final destruction of the British steamship Vansterum by two submarines. This is how it happened: At twenty minutes to two o'clock in the afternoon of Christmas Day the Vansterum flashed an S O S, saying that she was being chased by submarines twenty miles south of The Smalls and needed help at once. To quote from my log book: "Twenty-five minutes later the Vansterum still calling for help. Lands End wireless station (GCK), calling patrol boats to help Vansterum which now sends out: 'Help, please, quick!' Two minutes later, at 2.05 P. M., Vansterum says: 'Done for, position five miles south of The Smalls. Please pick us up.'" Then the operator on the Vansterum suddenly stopped sending. I learned later that the American steamship Georgiana (KJE) was steaming to the assistance of the distressed vessel, and that no loss of life resulted.

One of the unsolved mysteries of the sea came to my notice on March 4 while the Philadelphia was in mid-Atlantic. The weather was clear and the expanses

of the ocean lay before my eyes with not a blot to break the combination of blue sky, sparkling waters and bright sunshine. Suddenly, however, as if it issued from the depths of the ocean, a column of smoke formed in the distance. It was not like the black vapor that usually pours from the funnels of a steamship. Coal smoke is dark brown, but this seeming sooty exhalation was jet black. Then, too, the size of the column was too large to come from a steamship's funnels.

While I was watching this phenomenon the hull of a vessel came into view, stood out plainly before my eyes, and



The Philadelphia plunging through after-storm swells

disappeared as quickly as it had emerged. The smoke began to dwindle and in a few minutes it had also passed from sight. The Philadelphia pointed her nose toward the place where the smoke had been seen and arrived there about three-quarters of an hour afterward. But nothing was found to throw full light on what had been observed. Floating on the water were two empty lifeboats without anything to identify them and a small area of the surface of the sea was covered with oil. An odor of burning oil added to the mystery which shrouded the scene.

So the Philadelphia steamed away with her people in doubt regarding this tragedy of the ocean. For such it undoubtedly was, although what specific disaster the black smudge, the disappearing hull and the empty lifeboats told a story of, could not be determined. Even the wireless, which was employed to sweep the ocean far and wide with inquiries, could not break down the barrier surrounding the mysterious circumstances. Most of us on the Philadelphia, however, at length came to the conclusion that an oil tank steamship had been torpedoed and her cargo set ablaze by the explosion, the empty lifeboats being accounted for by the fact that the destroyed vessel's crew had met death in the flames while preparing to escape.

Somewhat different was the event which occurred on January 19 while a terrific gale was whipping the waters of the Atlantic into mountain-like waves. At the height of the storm the steamship Pollentia appealed by wireless for help. For many hours she had been buffeted by the seas until, with her engine room flooded, and the water pouring through her leaky sides, she flashed the S O S.

We of the Philadelphia could well understand the peril of the Pollentia—a little 3,000-ton tramp, waterlogged and broadside to the seas—for the big Philadelphia herself was being pounded se-

verely by the waves. When the operator on the Pollentia was asked how long the vessel could keep afloat he tersely replied: "We can float until morning—if we don't roll over."

My narrative now brings me to the time when the Philadelphia herself figured in a collision at sea. We had left Liverpool on January 29 at five o'clock in the afternoon, and about five hours later, when off Carnarvon Bay light, came into collision with the sailing ship Ben Lee, bound from Liverpool to Australia. I was making ready to turn in when there was a terrific crashing and bumping, the racket beginning forward and making its way along the port side toward the stern. The ship quivered—just as if she had been shocked into a nervous tremor—and lurched heavily to starboard.

Hurrying on deck I found that the force of the collision had knocked one port lifeboat over the side and wrecked two others. The aftermast was broken off at the cross tree and had fallen on deck, the top having landed on another lifeboat which it demolished. Preparation were already being made to give aid to the Ben Lee's people. The mast having been broken, our aerial could not of course be used. A temporary aerial was rigged up, however, and we were able to communicate with Liverpool.

The Ben Lee and the Philadelphia in the meantime sent up rockets to summon aid to the former vessel, and she was towed into the harbor of Hollyhead where she sank in shallow water.

Although our ship did not fare as badly as the Ben Lee she was compelled to turn about and head for Liverpool, where she went into drydock for repairs. Then began some small events—paltry in themselves, but involving delay notwithstanding. The first occurred when, on leaving drydock, we came into collision with a small barge in the Mersey River. A three weeks' stay in Liverpool followed, but at length we prepared to steam for New York. When making her way out of the dock, however, the vessel was forced violently against the gates of the structure. Soon afterward occurred a strike among the firemen which resulted in a battle with fists in the forecastle. That night we remained in the Mersey; and in the morning we made another attempt to steam for New York, and this time we were successful.

It was quite appropriate, it seemed to me, that the last leg of the last of a series of eventful voyages should be marked by rough weather. How severely the seas dealt with the vessel may be determined by the fact that a wave struck us with enough force to break off five feet of the foremast mast at the top. Then, too, our voyage took eleven days instead of eight.

So runs the history of the Philadelphia as far as my experience on her went. It may not hold thrills without number, it may not be intensely interesting, but nevertheless it contains a true picture of an operator's life on an ocean steamship today.

GETTING PRESS TO THE SANTA CRUZ ISLANDS

What is said to be the only wireless plant in existence operated to keep a motion picture company in communication with the mainland, is that on the Santa Cruz Islands in the Pacific, where a company is making a new photoplay.

Arrangements were made for a daily wireless news service during the stay of the company on the islands. There is no other means of communication except a launch, which makes the forty-mile trip to the mainland once a week.

NEWPORT PLANT TO BE MOVED

The naval radio station at Newport, R. I., is to be moved, according to a newspaper report. It is at present located at the naval torpedo depot.

One of the chief reasons for the change of location is to place the plant on a higher point of land, thus increasing the range. At the same time it will be removing the apparatus from the zone of possible gun fire, and the torpedo quarters will gain additional land needed for building purposes.

Members of the Amateur Marconi Radio Association of Troy, N. Y.

With the Amateurs

THE final meeting of the season was held by the Wireless Association of Pennsylvania on July 14. It was announced by the secretary that the past year was one of the most successful in the history of the organization, and credit for the progress made was largely due to the excellent work of the technical committee and the interest displayed by members in its report. The recent work of this committee consisted mainly of the study of the vacuum valve detector and instruction for members in the requirements for securing a commercial operator's license. Plans for the coming year were formulated at the most recent meeting of the board of directors and special provisions in the program have been made for a large increase in membership; one of the inducements to be offered is the services of the technical committee to inspect and tune the apparatus of members and instruct them in the construction and use of the various parts of their sets.

It is claimed for the Wireless Association of Pennsylvania that the majority of the members possess sets of high efficiency and have several records for long distance work to their credit. Men of high standing in the field of radio activities are associated with this organization, as well as a large number of commercial operators, who leaven with experience the training of the main body of wide-awake amateurs.

The wonders of wireless telegraphy were explained by amateur radio operators on June 23, to the members of the Engineers' and Architects' Club, of Louisville, Ky.

Members of the Louisville Radio Club, embracing all the amateur wireless operators in the city, were guests of the engineers and architects at a meeting

held in their offices in the Starks Building.

C. C. Gall, a professional operator, made the point that wireless telegraphy was a great moral force. "The amateurs send their messages and perfect their work at night," he said, "and you can always find them at home when they ought to be there. Lots of men I know would be better men, and their wives would be happier, if they became amateur wireless operators."

In the monster demonstration held in June in Washington, D. C., the preparedness parade featured the spirit of amateur workers who are making a concerted effort for adequate defense of the country. The amateur radio operators furnished one of the unusual features of the big procession.

In the lead was a twenty-foot truck, decorated with bunting, on which an aerial had been erected and an amateur wireless station installed. This was operated all along the line of march by F. N. Signor, W. A. Parks, who recently delivered an amateur radiogram to the president, and F. T. Reynolds, president of the Washington Suburban Club. There was eighty amateur operators in the parade, wearing their receivers on their heads instead of hats. This feature was in charge of and had been organized by F. N. Signor.

There are now over 250 amateur wireless telegraph stations in Iowa, according to Professor C. A. Wright, of the department of electrical engineering of Iowa State College, and practically all of these are now receiving the weather and news reports that are sent out twice daily from the big wireless station at Ames. Many of those receiving the messages have written to Professor Wright since the service was instituted, thanking him for it, and inquiring if it is to be continued through the summer. In some towns the reports are being posted daily in drug stores and places of business.

"It is our intention to continue our news service right on through the summer," is the answer Professor Wright has been giving. The service is to be improved as soon as feasible and blanks will be furnished to those who want them for bulletining the news sent out. The idea of adding several news items to the college news furnished is being considered favorably.

Richard Burke, son of Rev. A. R. B. Burke, will erect a wireless station on the roof of the Chenango Street M. E. Church in Binghamton, N. Y. He has had a complete wireless set in Norwich with which he experimented successfully. He expects to carry on his experiments in Binghamton as soon as the apparatus has been placed.

Class of girls at the National Service Schools studying wireless with the aid of a naval expert

Henry Geils is rapidly becoming known as one of the most active experimenters in the amateur ranks in New York City. Mr. Geils has offered the suggestion to the National Amateur Wireless Association that all its members convert their sets into portable field equipment, which in time of need could be turned over to the Government. To illustrate how this can be done, photographs have been forwarded of these converted sets made into field equipment by himself and his associates. In the illustrations reproduced, set No. 1 is that of G. Campbell, of Yonkers, an equipment which has been used in camp with considerable success. No. 2 is owned by F. G. Gregory, of New York, who conducted some interesting field work with it last summer at City Island. No. 3 is equipment owned by F. Bryant, of Westchester, and No. 4 is Mr. Geils's own set. In the illustration of the latter a small radio 'phone may be seen at the right hand; this, with a ½ inch coil and 10 volts, it is claimed can transmit eight miles. On the left hand lower corner is a ¼ inch spark coil; which, with an aerial 200 feet long, a series condenser to bring it down to 200 meters, and a 10 volt storage battery and quenched gap without helix connection, has worked more than 15 miles.

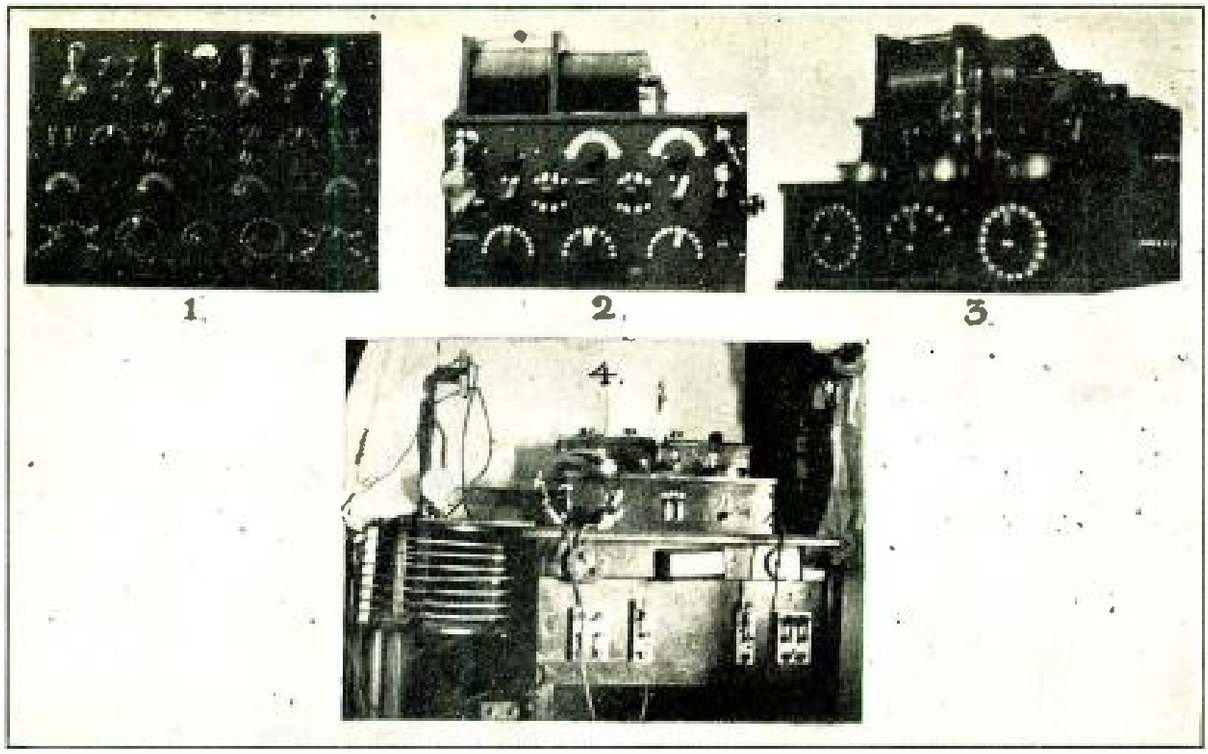
Mr. Geils and his associate, Mr. Shaffer, have been experimenting for seven years and claim to be among the first to take up amateur work in the New York district. They are now installing an outfit on board a boat and hope to be the first to float the N. A. W. A. pennant from the masthead. These enterprising experimenters also have in mind establishing a naval branch of the National Association, and will be glad to hear from those who would care to join them in this project.

The Connecticut Valley Radio Society, of Springfield, Mass., gave the technical high school student body a demonstration of wireless telegraphy on June 23. Preceding the demonstration of the apparatus, James Booth, vice-president of the club, addressed the school on the theory of wireless telegraphy. He was followed by the president of the society, Glenn Sabine, who spoke on the practical side of wireless telegraphy, explaining in detail the various essentials for sending the receiving messages. A few lantern slides thrown on the screen by Clinton Denault illustrated the talk. Successful reception and transmission of messages followed.

While Principal Warner was thanking the society for its interest in the school and congratulating the large number of "Tech" boys who are in the club upon their ability, he was handed a postal card from the militia concentration camp at Framingham. It proved to be from three of the "Tech" boys who are in the militia. The postal, which was signed by Howard M. Hubbard, Kurt R. Sternberg, Jr., and Edwin D. Martin, was read by Mr. Warner to the school, being to the effect that they had all arrived safely and in all probability would leave for Mexico soon. The boys mentioned how proud they had felt on hearing their schoolmates cheering for them when they paraded to the station, and that they looked forward eagerly to the time when they would leave for Mexico, where they were going to do their best to honor "dear old 'Tech.'"

Eight signatures are attached to the announcement that all persons interested in learning more about radio telegraphy and residing in or near Port Townsend, Wash., may open correspondence with Guy Hunter and be assured of a hearty reception from the enthusiastic amateurs who are on the lookout for recruits to their projected organization.

Giving promise of becoming an institution of considerable influence and value among the amateur and professional operators of Kansas, the Wichita Wireless Association asks for recognition of the progressive spirit upon which it has been founded. Members best informed upon each subject take up the discussion of the topics which comprise a broad knowledge of the radio art and experts deliver addresses on aeronautic applications of wireless at the meetings on Tuesday nights; tests are also made on commercial instruments and experience of inestimable value is thus gained at first hand. Professor W. S. Ezell, of the Wichita Telegraph College, has placed the complete station of that



Portable field sets made at the suggestion of Henry Geils

institution at the service of the members. The college has an up-to-date laboratory and a long distance station which greatly facilitates instructional progress with those experimenters who have been hampered by the lack of suitable instruments to carry out their investigations. C. V. Williams is secretary and will give further information to those who write him at 525 North Emporia Avenue, Wichita, Kansas.

A recent addition to the field of amateur organization is the Miami Wireless Association, of Miami, Fla., which was organized on April 19 with fourteen members. Howard Henshaw is secretary and may be addressed at R. F. D. No. 1, Miami, Fla.

The Radio Club of Irvington, which was mentioned in the June issue. has its headquarters in the State of New Jersey, not Irvington, N. Y., as the article erroneously stated.

The Amateur Marconi Radio Association, with headquarters at No. 1627 Seventh avenue, Troy, N. Y., has announced that it will hold one meeting each month during the summer and will continue programs as interesting as those which have characterized its past season's work.

At the first of the June meetings its members were addressed by Roland B. Bourne, of the Rensselaer Polytechnic Institute, a former employee of the American Marconi Company, who spoke interestingly on the "Goldschmidt Alternator Frequency-changer Method of Transmission," as employed at Tuckerton. Mr. Bourne, who is an honorary member, provided a very interesting discourse for the members in offices of the Schenectady and Albany radio associations, who were present. Plans were discussed for tri-city conferences.

At the second meeting, it was decided to erect at the Y. M. C. A. club headquarters a more powerful station; this will probably be done in the Fall. The semi-annual election of officers resulted in the choice of William A. LeMay, former vice-president, to succeed Wendell W. King, who has served efficiently as president for three terms. Mr. King is soon to enter Union College for an electrical engineering course. E. Malcolm Williams was elected secretary-treasurer, following which he spoke to the members on the "Elementary Mathematics of Aerial Construction."

William E. Robbins, a former member

of the Amateur Marconi Radio Association, has left for the Mexican border with the National Guard.

Miss Kathleen Parkin, who is described as one of the youngest girl wireless operators in the world

Miss Kathleen Parkin, of San Rafael, Cal., recently received a first grade commercial license. Miss Parkin is fifteen years old and gained her knowledge of the art of radio communication in her brother's station, where, as she expresses it, "I spent every minute of my spare time, and often helped him to make his instruments." She has made, without assistance, a ¼ k.w. outfit and now proposes to make a rotary spark gap and vacuum valve detectors for the receiving set with which she now uses a galena detector successfully at distances up to 1,000 miles.

Miss Parkin is beginning her third year of high school at the Dominican College, San Rafael, where there has been installed a small wireless set for the instruction of the physics class. Amateurs within range will be interested to know that Miss Parkin's call is 6-SO.

Under the leadership of O. M. Howard, the amateurs of Fresno, Cal., recently organized a radio club which promises to be one of the most successful organizations in that locality. Widespread publicity was given in the local papers and it is reported in Fresno and other parts of the San Joaquin Valley that since then there are a large number of men and boys who are taking great interest in wireless telegraphy. They have erected aerials and provided instruments, but so far have been working at cross purposes with few people to talk to and no organization to further the work, so there is a definite need for a progressive club of experimenters. Mr. Howard has planned the construction at his home of a 200 meter set, with a maximum range of 100 miles for transmitting, and will add to it a 3,000-mile long-distance receiving set. Recognition of the project was given in the local newspapers to this effect:

"In organizing the radio club, Fresno becomes a center of activity for the San Joaquin Valley. In order to have the club organized, application will be immediately made to the National Amateur Wireless Association, of New York City. This is the governing body for amateur wireless and all clubs operate as auxiliaries. One of the principal objects of the club will be to teach its members the use of the Continental Code, and Mr. Howard hopes to interest the Young Men's Christian Association in the new club and in this way get a large number of boys to participate. The temporary organization which was effected at the first meeting placed R. V. Denny as chairman, and O. M. Howard as secretary and treasurer. Oscar Schuwendt, Arthur Foster and S. M. Smith were appointed a committee to draw up the constitution and by-laws. Seventeen members were enrolled at the first meeting.

The second anniversary of the Bellevue Radio Chain, a club composed of the amateurs of the north boroughs of Pittsburgh, was celebrated with a banquet in its club rooms, located on Lincoln Avenue, Bellevue, Pa. The last election provided the club with the following officers: C. Kraus, president; T. Wray, secretary; W. H. Hoobler, treasurer.

Discontinuing regular meetings for the

summer months, the New London Radio Club, of New London, Conn., wound up the season with a banquet on June 2, served at the local Y. M. C. A., with twenty-two members gathered about the board. The principal speaker of the evening was Captain Stockford, of Fort Wright, who selected as his subject "Wireless During Wartime." Captain Stockford commended highly the work of the members and said it was considered of value both by himself and the Government, which was interested in them and ready to help at every opportunity.

The six honorary members were then called upon for two minute talks and the banquet was ended with a reading of a brief history of the club.

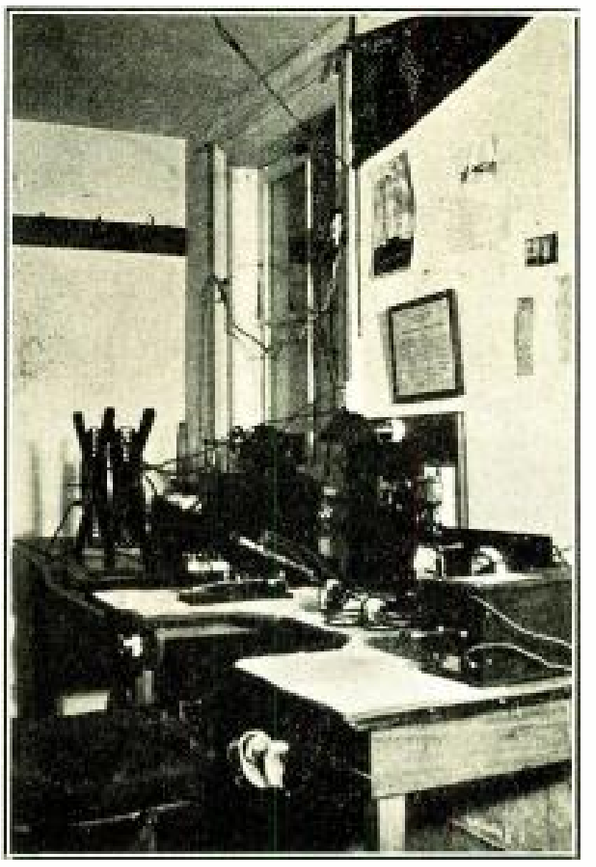
A committee was appointed to arrange for a course of instruction during the summer months, to be given by a navy operator free of cost to all members.

Bayonne, N. J., now has a club organized by the amateurs of the Bayonne High School. This organization has announced that it will become affiliated with the National Amateur Wireless Association and already has several members who are enrolled in the parent organization. Ernest Ruhlmann is president, and Peter Klimas is secretary and treasurer.

Sixteen charter members signed the constitution when the Santa Cruz Radio Association of Santa Cruz, Cal., was recently organized. Six new members have since been taken in and a large enrollment is shortly expected by the officers. The club rooms of this organization are located in the center of the city and consist of a library, open at all times to the club members, a meeting room, in which the members meet once a week, a reception room and a well equipped operating room. The transmitting apparatus is of 1 k. w. power, having an oscillation transformer and a rotary spark gap. The receiving set is a loose-coupled cabinet equipment. Two aerials have been erected, one for receiving, 600 feet long, and a 6-strand, 50-foot antenna for sending. The address of this club is 203 North Brancifort Avenue, Santa Cruz, Cal.

Residents of Denver have reason to be proud of the progress made by the Colorado Wireless Association which is making rapid strides under the guidance of Homer O. Whitman, president. The club headquarters is exceptionally well equipped, having two complete rotary quenched sets of 1 k. w. capacity each for sending, and receiving apparatus provided with vacuum valves, a 2-step amplifier and tuning inductances for the reception of damped and undamped waves up to 20,000 meters. The record working distance is given as 1,500 miles, with the steamship Columbian, en route to Chili. Hanover and Nauen in Germany have been received in daylight, as well as Darien, Tuckerton and Arlington, across the continent.

Mr. Whitman is authority for the statement that signals from Sayville and Tuckerton and the time signals from Arlington can be heard from 30 to 50



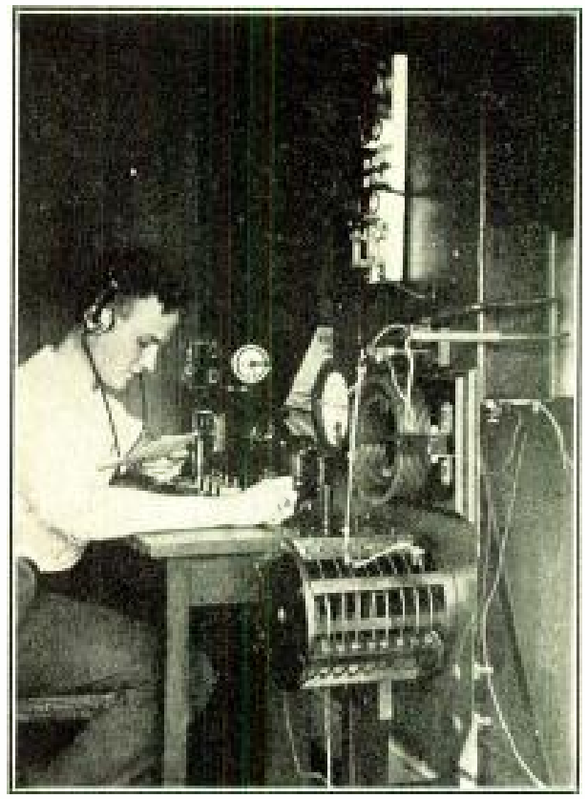
An efficient set, the property of Henry A. Wheat, of Geneva, N. Y.

feet from the receivers. The greater part of the apparatus is home made and in consequence the members feel very proud of the station, particular satisfaction being displayed with the rotary quenched

gap and valve receiving cabinets, which were made entirely by members.

When the Fowler Radio Club was recently organized in Cleveland, O., the ten members participating in the organization reported that they were all members of the National Amateur Wireless Association. Charles H. Bell was elected president and Frederick R. Franklin, secretary and treasurer.

Thirty-five members have been enrolled in the Albany Wireless Club, Albany, N. Y., with headquarters in that city's Y. M. C. A.



Ralph R. Chappell and his set

Ralph Raymond Chappell, of Richmond, Va., is the owner and operator of station 38-T of the N. A. W. A. A photograph of the set and its owner appears on this page. As only standard receiving apparatus is used the details need not be given. One object of interest, however, is the hot wire ammeter, built in an old steam gauge case. The volt meter is also home made.

An Amendment to Radio Regulations

The United States Bureau of Navigation has announced that the following regulation which is made pursuant to the Act of August 13, 1912, should follow Paragraph 152, Page 66, of the Radio Laws and Regulations of the United States:

Paragraph, 152-a, Page 66.

Holders of commercial extra first-grade radio operators' licenses may be issued renewal of such licenses without examination, provided the service records on the backs of the licenses properly certify to twelve months' satisfactory service in a land or ship station open to general public service, at least six months of which must have been served during the last twelve months of the license period.

However, holders of commercial extra first-grade licenses now employed as radio inspectors, radio instructors, or in similar occupations requiring exceptional qualifications where the duties require the testing, or demonstrating, or otherwise using commercial radio apparatus and the telegraph codes, may be issued renewals of their licenses without re-examination, provided, in addition to the above, they can show satisfactory evidence of such service covering a period of eighteen months out of the two-year license period. Where the applicant has not used regularly the telegraph codes, he will be given the code examination required in the original examination or, if he has used only one code, he will be examined in the code not used.

The service record shown on the licenses must be transcribed on Form 756.

The license may be marked "Expired" in red across the face and returned to the operator, if desired. The action taken should be noted on Form 756.

Where the record on the reverse side of the license does not show the service performed, the evidence submitted as proof of such service must be transmitted to the United States Bureau with Form 756.

Transcriptions of code tests must be submitted to the Bureau.

"Nowadays," the young man in the gorgeous blue uniform told the girl, "the Captain is a small potato compared to the wireless man"

Brass Buttons

By Magda Leigh

SHE lay alongside her dock, straining against the taut hawsers that held her, fore and aft. There was a busy swishing of skirts and a tramping of feet, up and down her amidships gangway. Over her yawning hatches, big nets full of cargo hung suspended, to be lowered, with a sudden run of the panting steam-winches, into the large holds. The last of the car floats nudged against the black hull, and an angry stevedore shouted his uncomplimentary opinion down from the after-well-deck at the belated arrival.

Captain Kerby stood on the bridge, pacing back and forth, looking down upon the scene below. The Little Third, clambering up the iron ladder from number two hold, raised a finger to his cap and shouted:

"Number One is finished, sir. Number Two will be, in about five minutes more." Captain Kerby smiled down at him and rumbled: "Good!"

The Tobago would be late getting away. She was invariably late. In fact, had any one asked her officers what they thought of their ship, the answer would have been unprintable. She was spoken of, by them, as "that big brute, the Tobago." She was unwieldy, tricky, unlovely. But her holds were capacious and her boilers good. Given plenty of space for cargo, and the wherewithal to drive that cargo between New York and West Indian ports, and what more could a company desire?

The Chief Officer, Mr. Taggart, tall, bronzed and muscular, approached the Captain and held a moment's conversation. He was followed by the Chief Steward. Then the Chief Engineer. From all departments—and the dock—men reported to or asked questions of the "Old Man."

And he was old—Captain Kerby. Old in knowledge, in experience, in faithfulness. Since young manhood, he had followed the sea, promotion coming to him rapidly, owing to his capable seamanship and his unfailing diligence. He had held better berths than the command of the Tobago, but none where he had made more money. This meant much. When a seafaring man grows too old to go to sea there is only one decent thing for him to do: provide handsomely for his family—if he have one—and die. This Captain Kerby realized. His efforts were all toward leaving Mrs. Kerby and the two lovely daughters comfortable.

He had never had any serious accident since taking command of his first ship. Never. In all his years as skipper, a kindly Fate seemed to have stood beside him, and he had brought his ships through snow, ice, lightning, fog or hurricane, without disaster. An enviable record, extending over a score of years. But there was always that dread possibility of an accident, now that he was so far clear. One never could tell! One huge engulfing sea—a submerged derelict—some other fellow's reckless speed in a fog—one never could tell!

These thoughts, accompanied by kaleidoscopic memories of faces of other-time shipmates, flashed through Captain Kerby's mind as he strode to and fro. His eyes raised now to the Blue Peter, fluttering aloft, now lowered to the British flag at the taffrail.

He paused a moment and shook his head. One never could tell—not with the German cruiser Niedheim hovering over the fringes of the Indies, destroying British commerce!

Suddenly there was a cessation of noise—a ponderous, startling quiet, punctuated by dull thuds. The Old Man roused himself. Those thuds meant the

lowering into place of the after-cargo booms. Number Three was at last finished.

The Little Third came slowly up the bridge ladder. His shabby uniform, much the worse for wear, was brushed of all removable dirt. His face shone from a violent application of soap and water.

"All finished, aft, sir, even to that lighter of cornmeal and flour."

The Mate was standing by, forward, on the fo'c'sle-head, waiting to oversee the casting off of the lines which held the Tobago's high bow shoreward. On the poop-deck, the Second—a strapping handsome Nova Scotian—stood by the afterlines.

The gangway was in; the lines were cast off. Two important, puffing tugs yanked and pulled and dragged at the back hull, and the Tobago moved slowly astern into the stream. There she was nudged and buffeted and shoved until her nose pointed down Buttermilk Channel.

The Little Third, at a word from the pilot, gave the engine room telegraph a yank. There was a faint jangle of bells, way below; an answering jangle on the bridge: a rumble, a shudder, and the Tobago, to the slow rhythmical beat of her own engines, set off on her way to Trinidad, B. W. I.

The Old Man sighed heavily. It was a hard life. Here was the old Tobago, under British registry, putting out to sea—and the Niedheim looking for prizes, somewhere to the south'ard. There was a new bo's'n this trip, who looked as if he would like to murder every negro in the crew, and a new stewardess, who was far too young to let loose aboard a ship full of men. There was a new Junior wireless man, too. He was the son of one of the stockholders in the company. He came to the Tobago with wonderful recommendations.

The Skipper said something, softly, under his breath, as he remembered about the Junior wireless man. "A gentleman's son! A special-German-prize-high-school graduate! A *nice* boy!" Oh, Lord! to give a man *that* kind in his crew—and in war times!

"He'll be full of big ideals!" the Old Man grumbled to himself. "One of those fussy young dandies who had a clothesline wireless set on his mother's roof—who smokes tailored cigarettes—and whose ambition is to be an S O S hero! I know the kind. They seem to think their one duty in life is to look magnificent in their new brass buttons, to talk modestly of their unflinching courage in times of danger, and to use some sort of preparation that makes their hair set straight back from their foreheads—like the pictures of the Apollos in the clothing ads!"

In spite of the activities of the Niedheim, the Indian Line was still running its ships under the British flag. There was a multitude of reasons for this—reasons which had their origin in the head offices of the company in Scotland.

In spite of their efforts to keep it quiet, there was a rumor along the waitre front that the cases marked on the manifest as containing "telephone batteries," and the kegs marked as containing "galvanized nails," held other matter. Some of the British cruisers in West Indian waters were in need of a slight replenishing of ammunition, and the old Tobago, lumbering on her seemingly innocent way southward, was more or less an arsenal.

Immaculate uniforms were an unknown quantity on the Tobago. The officers' pay was not high enough to allow much dressing. Therefore, it was with rather a shock that the Old Man ran full tilt into a gorgeously new uniform, after dinner, the first night out. Within the spotless garb was a slender form, vibrant with youth and tingling with pride. The Junior wireless man was in earnest conversation with a pretty young girl who had not yet succumbed to the effects of the Tobago's slow roll. The Old Man sauntered near, to feast his eyes on the wonderful spectacle.

It is a fact that Captain Kerby had no intention of listening to the conversation, but the words of the new addition to his crew floated serenely across the space between himself and the absorbed couple.

"Oh"—deprecatingly, "the Skipper does not have much to do or say any more. In the old days of sailing ships, and before there was wireless, he was

the Big Thing—the Main Squeeze. But now! Why, look at the part the Skippers have played in recent disasters. Look at the part the wireless men have played! Why, when the Titanic struck that iceberg, the Old Man was at supper. It was the wireless man who called those other ships to the aid of the drowning people, and the wireless men of the other ships who answered that appeal. In the disaster to the Monroe, it was that young fellow, Kuehn, whose picture was on the front page, as the hero. Of course, I do not mean that the Captain has nothing to do, in a wreck," generously. "But, nowadays, he is a small potato compared to the wireless man!"

Captain Kerby fled. Fled precipitately to his big, airy room, where he could give vent to his feelings in privacy—and in all completeness.

Wasted, all his years of service! Wasted, all his wonderful seamanship that had dragged the battered Bayamon through the hurricane of '96, and the disabled Managus through a night of hell off Hatteras, a few years later! Wasted were all those years of tireless watching and serving through storm and stress! He was deposed—supplanted—eclipsed—by this beardless youngster with the new, shiny brass buttons! The colossal young braggart! The insufferable little lubber!

For two days, the Tobago rolled her slow way southward, without anything more than a beam sea to disturb her tranquillity. But in those two days things were shaping themselves into a serio-comedy aboard the Tobago. The Skipper had, in a moment of thoughtlessness, spoken of the new Junior to the Little Third, as "Brass Buttons." The name spread like a disease—like a plague—over all the ship. From the chartroom to the stoke-hole, young Charlie Brown was known as "Brass Buttons."

The Senior wireless man was an experienced operator. He knew his duties from A to Z and attended to them quietly and unobtrusively. Perhaps, somewhere in his mind, there was a vague wish that he might be a "hero" some day, but just now, his main thought was to hammer some sense into his Junior—"Brass Buttons." True, the latter was a classy operator—could send and receive like a streak. But, oh! What he didn't know about ships and seagoing wireless matter! And it looked as if he would never learn. His log was a joke; his watch another. He had been warned, time and again, not to send any messages, after leaving a certain latitude, owing to the active Niedheim. But he had "butted in," during one of his watches, when he heard a fruit boat asking the air in general, if anything new had occurred in the zone of war. Brass Buttons had obligingly given the Fruiter the latest news from New York. This was, of course, the height of consideration for the Fruiter. But, unfortunately, a vigilant operator on the Neidheim happened to be listening in. Brass Buttons had told the fruit boat the name of his ship, and had pleasantly informed him of the rumor concerning the Tobago's cargo. All of this was duly reported by the Niedheim's operator to his commanding officer.

Now, the commanding officer, being a perfectly good German, could imagine nothing better than capturing the Tobago's kegs and cases. Their contents would serve a German cruiser quite as well as a British cruiser. Therefore, although there were many finer British ships afloat, many more desirable prizes after which the German might have raced, she hovered about in a certain vicinity, and waited.

Somewhere about 17.55 north and 63.12 west, Brass Buttons overheard, during an afternoon watch, a near-by, strange spark, talking via wireless. Enthusiast that he was, he scribbled down the dots and dashes as they came into his receivers. At first they made no sense. Then suddenly, Brass Buttons realized that he was taking down German. This was fun! His pencil raced across the form in front of him and a superior smile flashed into the brown eyes. Humph! Even Nobbie, the Senior, knew no German! Nor did the rocky, little, old sarcastic Skipper! Well, he'd show them! Call him "Brass Buttons," would they? And lord it over him? Well, he knew things they couldn't know, not in their lifetime, by Jove!

The words he was copying began to form themselves into definite, pregnant

sentences. They had to do with the Tobago—she was being reported to the Niedheim—two days ago in latitude 25.58 north, longitude 66.46 west. Steering about south 21 east—black hull—red funnel—high amidships and well-decks, fore and aft.—An awkward ship.

There was more, on the same order. Brass Buttons was thrilled. Some ship which had sighted the Tobago was giving her whereabouts to the German, eh? His British blood leaped. This was great! This was life!

He wondered what the Old Man and Nobbie would say when he chose to tell them what he knew? Brass Buttons considered that he *might* tell the Old Man—tell him in a sort of condescending way, as if picking up German from the air were child's play to him, although it was Greek to the Old Man!

But first—oh, madness of Youth! Brass Buttons decided he'd have a little fun with the "Dutchmen." He'd give 'em, a chase, all right! He fussed around with his apparatus a bit. Then, throwing on the power, he sent, in fluent German:

"Steamer reported must have changed her course. Sighted her yesterday, sailing almost due east. Was evidently making for Barbadoes."

There was a brief pause. Then there flashed back an abrupt: "Who are you?"

Brass Buttons grinned. He'd show them! He hadn't had a wireless outfit on his mother's roof for nothing—not he He knew the call-letters of half the ships that sailed the seas. In steady, impertinent dots and dashes, he flashed back the call letters of a well-known German ship which ran between New York and South American ports.

There is a Fate that surely watches over fools. Brass Buttons, absorbed in having fun with the Dutchmen, sent convincing answers to every one of the questions hurled at him by the German ship which had been giving the cruiser information. The cruiser, silent throughout the entire conversation, nevertheless took the words of both talking ships. Oh, fortunate youth who had won a special prize in German! His sending was superb! His fluency, fautless!

He was sure, judging by the thanks he received from the German, that he had impressed the enemy with the fact that the Tobago was making for Barbadoes. The Niedheim was silent, of course, but it was policy for her to be so. Brass Buttons had had some *fun!*

When Nobbie came to relieve him, he found the Junior operator leaning back in his chair, arms behind his head, a dreamy, contemplative smile on his unshaven lips. The form pad, with meaningless, silly scribbling on it, lay on the table before him.

"Anything new?" Nobbie grunted. He had been sleeping rather soundly, below, or he might have known there was indeed "something new."

"Nothing of any importance," Brass Buttons yawned. "A Dutchman was sending a while ago, I butted in, though——"

"You *what?*"

There was superlative horror in Nobbie's tone.

"Butted in," Brass Buttons repeated.

Nobbie sank down on the settee and stared, in agony, at his Junior. "You ass! You—oh, Lordy! You ass!"

For a moment, Brass Buttons was inclined to say things. He had been called about enough names. Nobbie, however, did not give him a chance. He reached for the telephone communicating with the chart room and rang the bell.

"Mr. Taggart, is the Skipper about?"

It was the Mate's watch and the answer was immediate.

"Yes, very important.—Oh, I say, we'll come to him—oh, all right, if he prefers!"

He hung up the receiver and turned on the Junior. 'Now, you bally idiot, you tell that to the Skipper. I'm through with you!"

Brass Buttons did not reply. He moved, so Nobbie could take his place before the set, and going to the small mirror he had installed in a corner, smoothed his hair back from his forehead. He was thus occupied when Captain Kerby entered.

"Well, what's the matter?" the Skipper asked, gruffly "What's wrong now?"

Nobbie tried to speak, but failing, pointed mutely to the Junior.

Brass Buttons faced his Skipper, calmly. "Nobbie's all excited because I told him I butted in on a Dutchman, a while ago."

"You what?"

"I butted in on a fresh Dutchman," he repeated, testily.

"I suppose you mean—" Captain Kerby's tone was verbal steel, "I suppose you mean that you have been talking to a German, when you have orders not to send at all?"

Brass Buttons' answer was wholly cheerful. "Yes, sir. But—"

Captain Kerby sank down on the settee and covered his eyes with his hand, as if to shut out the sight of this overwhelming young idiot.

"There is no such word as 'but,' at sea, young man. When you're given an order, you're supposed to obey it. Now tell the whole damning story, from beginning to end. Who and what was the 'Dutchman,' and what was he saying to you?"

"He wasn't talking to me, when I butted in," Brass Buttons replied, sullenly. "He was sending our position to some other German ship—that cruiser, I imagine. He described us, and gave what was our position, day before yesterday."

The Skipper groaned. "And you butted in and told him where we were to-day, I suppose?"

A sudden thought caused the Old Man to look sharply up at the Junior. "How do you know he was a German?"

"He was talking in German," doggedly.

"He was? Then how did you know what he said?"

"I speak German fluently," Brass Buttons announced modestly.

The Old Man seemed to be struggling for breath. "Oh, you do?"

"Yes, sir. I took a special prize in school for German."

There was a pause. Then: "Have you a copy of what passed between you and this—'Dutchman'?"

Brass Buttons reached over to the table and gathered up the form pad. He handed it to the Captain. Be it known, there was a look of malicious triumph in the eyes of the Junior operator.

The Old Man gave the papers one glance and then shoved them back at the youth. "Read them to me. I didn't win any prizes at school!" he thundered.

And Brass Buttons translated, fluently. As he talked, the Skipper's body lifted itself slowly from the settee. Brass Buttons did not notice the peculiar movement, nor did he see the extraordinary expression which sifted over the Skipper's face. He finished it and looked calmly at his superior.

"That's all. I bet that Dutch cruiser is chasing as hard as she can go toward Barbados, trying to intercept us!"

The Skipper gasped. "'Out of the mouths of babes and sucklings,'" he breathed, inaudibly. He stood silent a moment, thinking intently. Then he advanced a step nearer the Junior and shook a finger under his nose.

"Now, listen, young man! And listen well! For what you've done today, I ought to stick you down in the lazarette with the rats! You've disobeyed orders—and in war time! Oh —" He broke off, despairingly. "What's the use?" He turned to Nobbie. "Keep this—this—young fool out of this wireless room, until I can spare an officer to watch over him when he's on duty."

Brass Buttons turned and walked majestically out of the wireless room. This was the limit. He had been called an ass, an idiot, a fool—everything under the sun that he felt he was not.

Captain Kerby gave Nobbie some orders. Then he made his way hastily to the bridge. Here, he told the Mate of what had happened.

"The German may have swallowed it, and again, he may not. We've got to get to Trinidad, that's all—and pronto! We'll have to sail without lights at night —and I've an idea it may pay to change the color of our funnel, Mr. Taggart."

For the next two days the Tobago made her way stealthily toward her goal. Her funnel had changed from

bright red to black. She looked, for all the world, like a respectable tramp. At night she ran without lights, much to the consternation of the few women passengers.

When the Tobago crept into the Gulf of Paria, one of the most difficult feats of navigation ever heard of in these waters had been performed. Captain Kerby had brought his ship in through one of the lesser Bocas in a fog and a heavy sea. It had been a terrific risk, but—there was that highly important cargo to be delivered. He had chosen one of the smaller Bocas, because he had a suspicion the German might be hovering around in the vicinity of the Boca Grande. One never could tell.

An official of the Indian Line was one of the first up the accommodation ladder. In his hand he waved a slip of yellow paper. He was visibly excited.

Captain Kerby met him on the saloon deck.

"Great news, Captain!" the official hailed. "The German cruiser Neidheim has been sunk by the British!"

For an instant the Old Man stared. He had a sudden, queer premonition. He grasped the rail as if to steady himself, and asked: "Any details?"

"Plenty!" the official beamed. "She was sunk off Barbados, night before last. Jove! she ran right into our ships. We got the news by cable."

"Off Barbados?" The Skipper's voice was weak.

"Yes. Must have been chasing something over there. Our people got her right in their arms!"

The Tobago was back in New York. There was silence aboard. The Old Man had gone home to his wife and two lovely daughters. Nobody remained aboard but the Senior wireless man and the Little Third. They were sitting gloomily in the latter's room below.

Burst in upon this scene of quiet and loneliness, none other than Brass Buttons, he that had been ignominiously sacked immediately upon arrival. In his hand he held a copy of an evening paper.

"Hello, Nobbie! Hello, Mac! Have you seen the evening papers?" he burst forth.

The Senior frowned. "No—why?"

The answer was the tending of the paper to him. On the front page was a large picture under the big, red headlines. The picture was unmistakable. It was Brass Buttons! Nobbie leaned forward under the light and stared. It was Brass Buttons in his beautiful new uniform.

"Wh—what—is it?"

"Read!" The command was majestic.

And Nobbie read.

In his dining-room, under the drop light, with his wife and two lovely daughters hanging over his shoulders, Captain Kerby was reading the same thing, in other papers.

It was great copy—one of those "Hero-of-the-deep" things. It told, in high headlines and lurid language, how one Charles Brown, son of C. G. Brown, operator on the steamship Tobago of the Indian Line, had, by a clever ruse, sent the German cruiser Neidheim full tilt into the path of two British scout cruisers which were patrolling the high seas in search of her. It told the whole story of how young Brown, "one of the most modest of wireless heroes," had picked up the report of a German ship, had butted in, cleverly, and in fluent German, had put the enemy off the scent of the ammunition-laden Tobago, and sent her chasing a phantom, right into the very guns of the waiting British. It even told how Charles had won a special prize for German in High School.

Nowhere in the whole article was Captain Kerby mentioned, except as the veteran Skipper, who was fortunate to have this brave lad on his ship.

And all at once, Captain Kerby remembered the words he had heard the second day out on that eventful trip: "Nowadays the Skipper is small potatoes, compared to the wireless man!"

And as he leaped to his feet, gurgling hysterically, his wife and two lovely daughters wondered what Captain Kerby meant when he sputtered:

"'Out of the mouths of babes and sucklings'—Brass Buttons! Oh, Lord! Brass Buttons!"

How the Bear's People Were Saved

What Wireless and Wireless Operators Did When the Vessel Was Wrecked in the Fog Bound Waters off Cape Mendocino, Cal.

ANOTHER steamship disaster in which wireless was employed as a means of saving lives has been reported from the reef infested waters off Cape Mendocino, Cal. While southbound from the Columbia River to San Francisco the steamship Bear went ashore at a point which lies approximately at middle distance between False Cape and Sugar Loaf Rock. The wrecking of the vessel, which was eventually lost, was due to the necessity of a change of course in a strong set of the current and the hampering presence of a heavy fog.

The prompt use of the wireless service by the two Marconi operators on board—L. S. Grabow and his assistant, J. F. Woods—who flashed the S O S three minutes after the ship struck, resulted in relief being despatched in record time to the persons on the Bear, and the saving, according to estimate, of 205 out of 210 lives. The discipline of the captain was equalled by the fortitude of passengers, who were safely launched in the small boats.

The stranding of the Bear occurred at twenty-two minutes after ten o'clock on the night of June 14, and the passengers and crew were made immediately aware of the fact that the steamship was in trouble by the jar as she struck the rock and stopped, careening, while the shrieks of the whistle and the booming of the surf nearby informed them of the nature of the happening.

Woods, the second operator, has given a vivid account of the subsequent happenings on board. Both of the Marconi men were in the radio room at the time. Grabow, standing by the wireless instruments, instructed Woods to repair to the bridge and ask the captain for instructions.

J. F. Woods, second operator on the wrecked Bear

"The distress signal was sent out three minutes later," said Woods. "The Marconi operator at the Eureka station answered instantly, and took up our S O S, sending it out to all ships. Then the commander sent out a message, giving the position of the ship as she had grounded, and reporting that all the passengers were being safely launched in the ship's boats and were waiting for assistance.

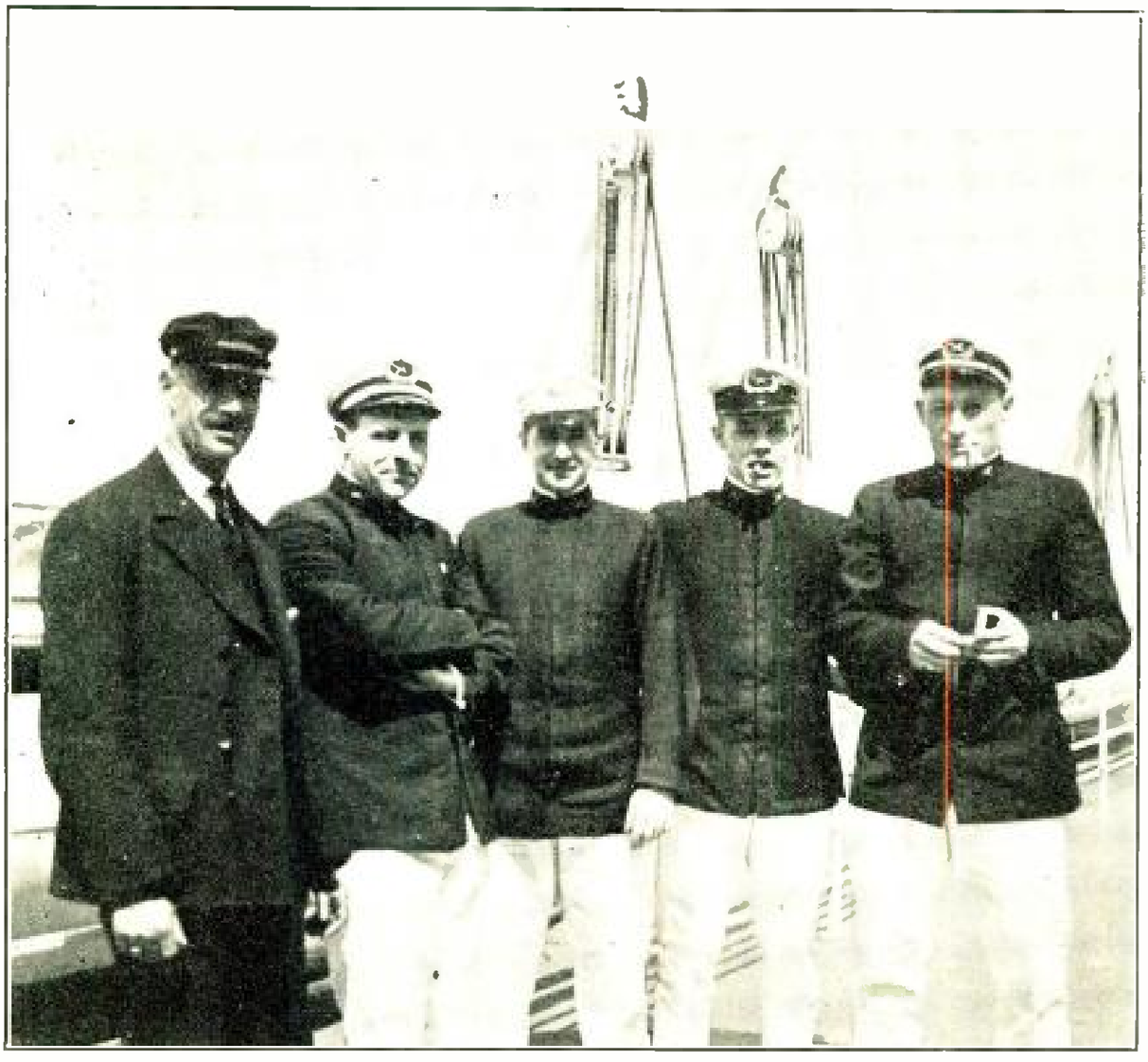
"Then came the welcome news at quarter to eleven o'clock from the Eureka station, that the United States Life Guard crew had left Eureka fifteen minutes before and that the tug Relief would follow as soon as its crew was assembled. Just as we had received this information, the fog, lifting for a moment, showed Blunt's Reef Lightship abeam on our starboard hand, about six miles distant. This position was sent to the Eureka operator, who at once broadcasted it to all vessels in the vicinity.

"The same operator informed us at 11:31 P. M. that the United States Battleship Oregon had obtained full particulars of our plight and would turn back to try to pick up the small boats, which were then adrift.

"Soon afterwards news also came from the commander of the steamship Grace Dollar, who sent a message stating that he was hurrying to our assistance and would reach Blunt's Reef Lightship by ten minutes to two o'clock the next morning. Another cheering message came later from the operator at Eureka, who certainly deserves unbounded credit for cool headedness and promptness in handling the situation. He now told us that the tug Relief was coming at full speed to our aid. As the various radiograms containing the welcome news of the relief expeditions were received, they were megaphoned from the bridge to the passengers getting away in the small boats, allaying their fears and inducing a feeling of confidence among them.

"At 11:52 a message was sent to the Eureka operator informing him that the captain's orders were to abandon ship. This was followed by a personal 'good-bye' and '30,' the telegraphers' finish."

The two Marconi operators stood by their ship until ordered by their commander to abandon her, and they left in the last boat. When it was discovered by the chief officer, who was in charge of this boat, that the captain and three others had been left behind, he returned to close proximity of the wreck with the intention of trying to take the four men off. He was ordered back by the com-



A group of the officers of the steamship Bear. The captain refused to leave the ship when ***the others were taken off***

mander, however, who regarded this as an undertaking too dangerous to be attempted.

All night long the boat was rowed about in the fog and cold. Added to these perilous conditions was the knowledge among the shipwrecked men that the course they were pursuing was beset with the treacherous rocks of Blunt's Reef. At length dawn arrived and with it the welcome sight of the tugboat Relief which picked up the little band. The Grace Dollar was also standing by and she aided the Relief in picking up the remainder of the survivors.

The Union Iron Works wrecking tug Iaqua left San Francisco late on June 15, arriving at the wreck on the following evening. Chief Operator Grabow of the Bear returned to the wrecked steamship the following day and began handling all traffic, being in constant communication with the wrecker Iaqua and the Eureka station. He remained on board for a week, engaged in salvaging operations, until all hope was abandoned for saving the vessel.

A TESTIMONIAL TO OPERATOR CHAMBERLAIN

Mr. and Mrs. S. R. Chamberlain, of Sawtelle, Cal., the parents of George Ernest Chamberlain, the Marconi operator, who lost his life in the wreck of the steamship Roanoke off the California coast, on May 9, have received the following letter from Edward J. Nally, general manager and vice-president of the Marconi Wireless Telegraph Company of America, expressing appreciation of their son's services:

"I have heard with deep regret of the sad death of your son, who lost his life in the discharge of his duties while assigned as radio operator on the S. S. Roanoke of the North Pacific Steamship Company.

"We know there is little we can do to assuage the grief which is yours, but if there is any comfort in the thought that the memory of our wireless heroes is treasured throughout the Marconi service, please accept from this company its deep appreciation of the services rendered by your son and the sincere sympathy of all who have been his coworkers."

NEW STATION LIST

The new list of "Radio Stations of the United States," edition of July 1, 1916, will contain the names, addresses, and call letters of all licensed amateurs of record in the Bureau on June 30, 1916, and where applications for station licenses were received after June 30, the names will not be published until the 1917 list is issued.

NAVAL STATION NEARS COMPLETION

The new United States naval radio station at Chollas Heights, seven miles from San Diego, Cal., constructed at a cost of $300,000, will be put in commission about August 1. Seventy-two thousand feet of phosphor bronze wire are being used in the antennæ, which will swing from the apex of three 600-foot steel towers. These towers are completed. The sending instruments will be of 150-kilowatt capacity.

STATIC BLOCKED MESSAGES

Wireless messages to be sent from the Sayville and Tuckerton stations were refused on June 27, because of the congestion of business. The Western Union Telegraph Company announced that static conditions in Berlin had interfered with the transmission of messages and that service had to be suspended to allow the operators to catch up.

RADIO LINK TO PLANTATIONS

A complete wireless telegraph system will probably be installed by the Mississippi Delta Planting Company, from its offices in Memphis, Tenn., building to its six or seven plantations in Mississippi.

This announcement was made by L. K. Salsbury, president of the company, who said his object was to eliminate the cost of long distance telephoning, and to secure greater privacy and secrecy for his messages, which will be sent in code. The Memphis station is to be erected on top of the Central Bank Building, while there will also be substations at each of the farms.

From and For those who help themselves

Experimenters' Experiences.

The editor of this department will give preferential attention to contributions containing full constructional details, in addition to drawings.

FIRST PRIZE, TEN DOLLARS

The Construction of a 1 k.w. Closed Core Transformer

The core for the transformer I am about to describe is built up of annealed soft iron strips having a thickness of No. 28 A. W. G. and of two sizes; the first set of strips should be 14 inches by 2 inches, and the second set 6 inches by 2 inches. A sufficient number of strips are required for each size to make two piles each 4 inches in height when compressed together. Two legs of the longer strips are built up to a height of 2 inches and in such a manner that 2-inch spaces are left alternately at the ends for the 6-inch by 2-inch cross pieces. When the legs are assembled they should be tightly taped and wrapped with empire cloth or oiled muslin to within 2 inches of each end and to a depth of ¼ of an inch.

Previous articles in THE WIRELESS AGE have told how to assemble the transformer core. The ends should be overlapped in such manner as to leave a space between the longer legs of about 4 inches in order to give the necessary clearance for the secondary pies. The laminations should be properly shellaced to cut down the Eddy currents and care should be taken to make the coating thorough.

The primary winding consists of about eight pounds of No. 10 double cotton covered magnet wire wound on one of the long legs to a depth of four layers; a space of ½ inch should be left at both ends of the insulating sleeve so that there will be no danger of the primary winding grounding on the core. The consecutive layers should be paraffined and insulated by several layers of empire cloth, as the electrostatic induction from the secondary circuits may puncture the insulation of the primary winding. To remove this danger a high capacity series type glass plate condenser should be shunted across the supply mains, as in Fig. 1.

The construction of the secondary coils will next be taken up. The fine wire for this winding should be reeled in thin pancakelike sections. The small hole in the center of the section should be large enough to allow it to fit snugly over the core and its insulation, which for this transformer will be about 2¼ inches square. A simple winder for the secondary pies may consist of a fan motor with a section winder bolted to the end of the shaft, as in Fig. 2. This winder or form consists of two discs of ¼ inch maple, 7 inches in diameter. Upon the face of one disc are fastened four iron pegs, spaced 2¼ inches apart. The wire is wound over these pegs between the walls of the disc until a section is formed about 6 inches in diameter. Twenty sections should be made in this manner. The size of the wire used in the secondary winding is No. 32 double cotton covered and for the purpose about nine pounds will be required.

After being wound, the secondary sections should be removed to a pan of melted paraffine for impregnation. Al-

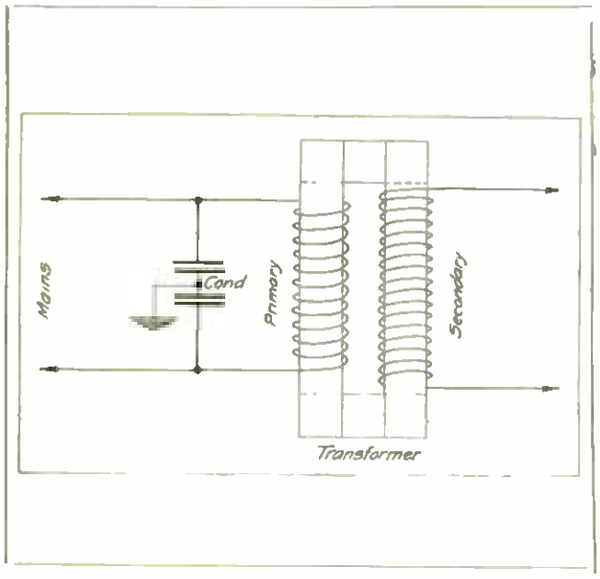


Fig. 1, First Prize Article

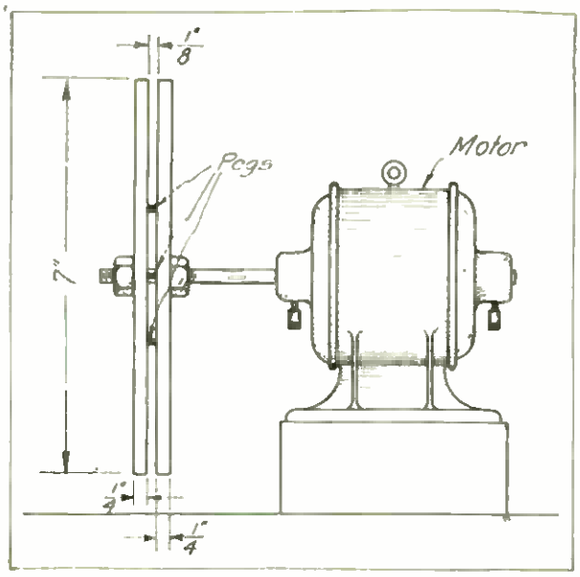


Fig. 2, First Prize Article

low the coils to remain in this insulating mixture for at least fifteen minutes until all the air bubbles cease rising. They should then be pressed between marble slabs until cold and afterwards taped, particular care being observed that the wires do not become kinked. Note should also be made of the direction in which the secondary windings are wound.

Inasmuch as the secondary output of this transformer is 20,000 volts, a potential difference of about 1,000 volts will exist between the consecutive sections. Circular separators of oiled or empire cloth 6½ inches in diameter should be placed to relieve the strain between the successive pies.

To complete the assembly of this transformer, clamp the core leg in a vise and slip a section on to it within 2 inches of the lower end of the insulating sleeve. A separator should then be placed against this section and the inside turn of the wire brought out under it. After observing the direction that this turn takes, another section should be lowered into position in such a manner that its inside turn runs in the opposite direction to that of the first coil. The wires should be scraped clean with a sharp knife and soldered and taped. Another separator and section should be placed on the leg and the outside turn of the previous section connected to the outside turn of that one. Assemble the entire secondary winding in this manner, taking care that the turns of each section run in the opposite direction to the preceding one, as per Fig. 3.

If a mistake is made in the connections of the secondary winding this transformer will not operate at full efficiency.

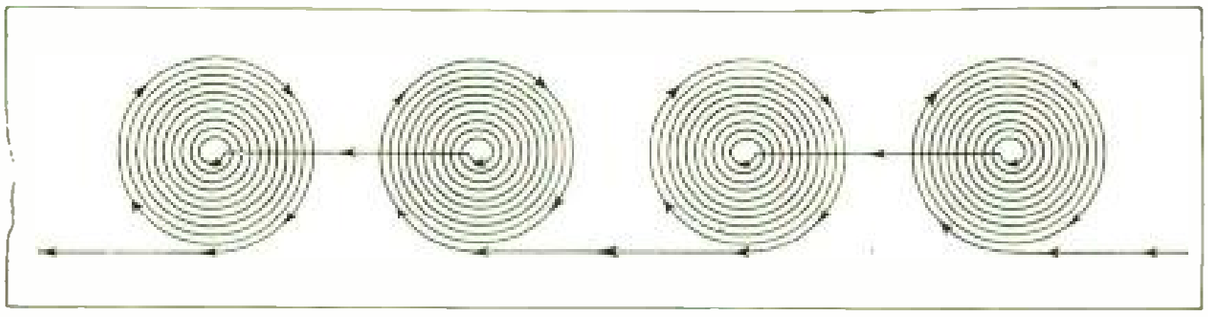


Fig. 3, First Prize Article

After the secondary winding is completely assembled heated wax should be poured over it until all the spaces between the sections are filled. This has the effect of increasing the electrical and mechanical strength of the transformer. The end pieces of the core between the primary and secondary windings may now be inserted, and the complete transformer mounted in a case to suit the builder, or it may be immersed in a metal tank filled with boiled linseed oil. If it is placed in a metal tank a space of 2 inches should be left between the windings and the sides of the tank to prevent sparking.

If the foregoing instructions are carried out carefully the resulting product will be a very efficient transmitting transformer.

HERMAN E. WERNER, *Ohio.*

SECOND PRIZE, FIVE DOLLARS

An Experimental Arc Gap for Radio Telephony

In the past, to obtain the best results from a radio phone arc, an atmosphere of illuminating gas, a circulating cooling system, and, in the majority of designs, special parts were required which could not be found in the usual amateur's work shop. The writer endeavors to present herewith a new design for a radio telephone arc, which generates its own atmosphere, is self-cooled and made of such material that it may be assembled with a standard set of tools at very little expense.

A fair idea of its construction is shown in Fig. 1, which will be described fundamentally, leaving the minor parts to the ingenuity of the constructor. The base for the arc is formed by a marble slab, ½ inch in thickness and 5 inches square. This is drilled to accommodate screws to clamp the pipe flange and the copper anode in place. The bottom flange is fitted with a short length of 2¼-inch iron piping as shown. The main body of the arc fits into this pipe, which is formed by a standard 2-inch piece of iron piping, 5⅜ inches in length. These pipes should be constructed to slide easily within each other and if they do not they may be ground with emery paste and machine oil until the desired results are obtained.

The copper electrode for the arc is ¾ of an inch in diameter and 2 inches in length, drilled and tapped at one end for a 10-32 screw, while the opposite end has 4 equally spaced ⅛-inch holes drilled parallel with its axis with a second set of holes drilled radially to connect with these. The purpose of these holes will be apparent shortly.

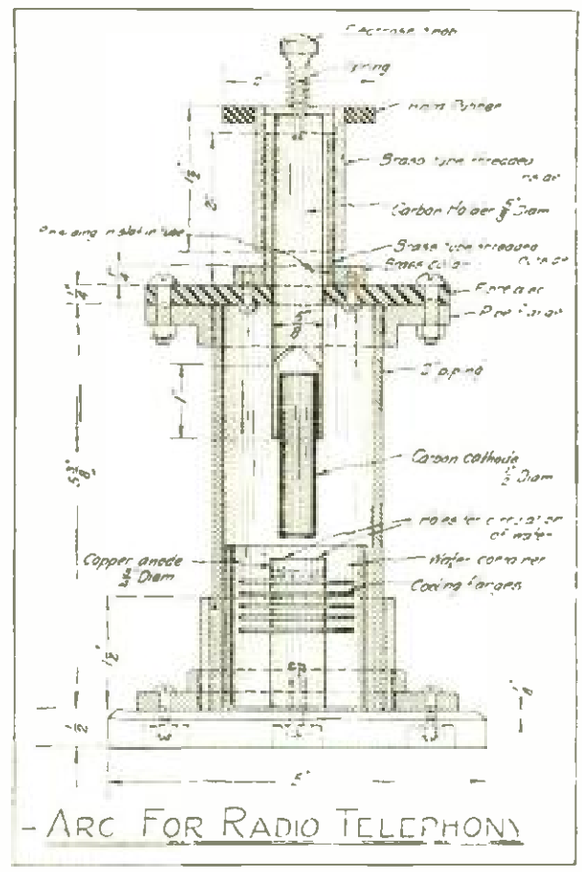


Fig. 1, Second Prize Article

Four or five heat distributing vanes cut from sheet copper and forced into place surround this electrode. A metal container also surrounds the copper electrode and is ¼ of an inch higher than the latter. This vessel holds the water around the copper and is firmly held in place by a screw in the bottom.

Attention is next directed to the regulating mechanism. A fibre disc is

firmly bolted to the upper flange with a gasket between them. A 5/8-inch hole is drilled in the center of this disc to pass the carbon holder. A brass collar, 1 5/8 inches outside diameter, 1/4 of an inch in thickness, is threaded with a female thread for piping and held in place by 4 machine screws. Threaded into this collar is a piece of 5/8-inch brass tubing, 2 inches in length, which has a slot cut in along its length to take a small pin which enters into the carbon holder. This pin prevents the holder from turning as it is fed down.

A piece of 3/4-inch tubing, 1 1/2 inches in length, is threaded to go over the above tube and one end of it has a disc of brass soldered into it. A fibre or hard rubber washer is forced over it to act as a knob. A hole is drilled through the closed end to pass an 8-32 screw.

The carbon holder proper is a piece of 5/8-inch brass tubing or rod. A 1/2 inch hole is drilled to a depth of one inch in one end. The edges of the tube are split by a hack saw to grip the carbon tightly. An 8-32 threaded rod is fitted into the upper end and extends 3/4 of an inch above the same.

The arc feeding mechanism is assembled as shown and clamps in position on the body of the tube. Connections are then made to the copper electrode and brass collar. Since the iron casing is not in the circuit, there is no danger from shock if the casing is accidentally touched.

A few words concerning the manipulation of the arc are now in order. The arc is struck by depressing the small knob at the top and then releasing it. It is adjusted by slowly turning the knob below it. When the arc is finally in operation it will heat the water in the container and the steam given off acts as an atmosphere of gas; in fact, tests have proven a steam surrounded arc to be as stable as with any other gas that could be used for the purpose. If it is intended to operate the arc for a long period means must be provided for renewing the water. This may be accomplished by passing small pipes up through the base, one to the supply of water and the other to act as a drain, the precaution being taken to keep the top of it level with the top of the copper anode. The holes in the copper allow the water to flow close to the arc and assure the steady generation of steam immediately in the vicinity of the arc proper.

The remaining parts required for a wireless telephone set are choke coils, a regulating rheostat, a microphone transmitter, a condenser and an oscillation transformer.

Choke coils can easily be made by winding three layers of No. 16 double cotton covered wire on a core of soft iron, 1 inch in diameter and 8 inches in length. Two coils are required, one in each current lead, to prevent the condenser from discharging back into the dynamo.

A satisfactory rheostat may be constructed of a bank of 5 or 6 32 c.p., 110

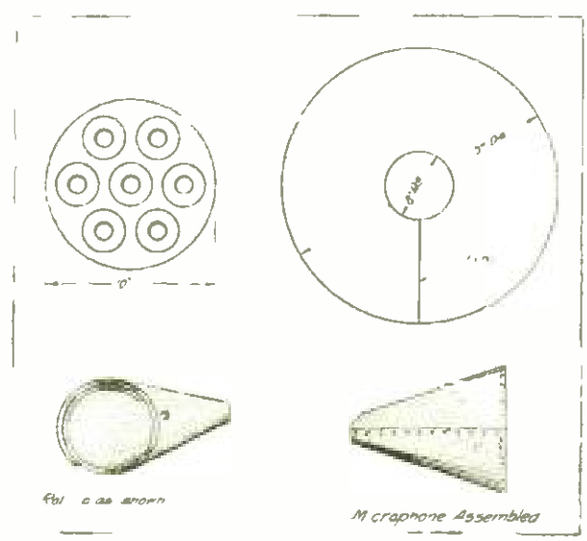


Fig. 2, Second Prize Article

volt incandescent lamps, arranged with switches, so that they may be cut in or out of the circuit as desired. Very satisfactory results can be obtained when the arc passes from 5 to 6 amperes.

The condenser is one of small capacity; it may be of the rotary plate type, which can be filled with castor oil to increase the insulating qualities as well as the capacity. This makes a very convenient condenser and will be found superior to the usual glass plate type.

A number of designs for oscillation

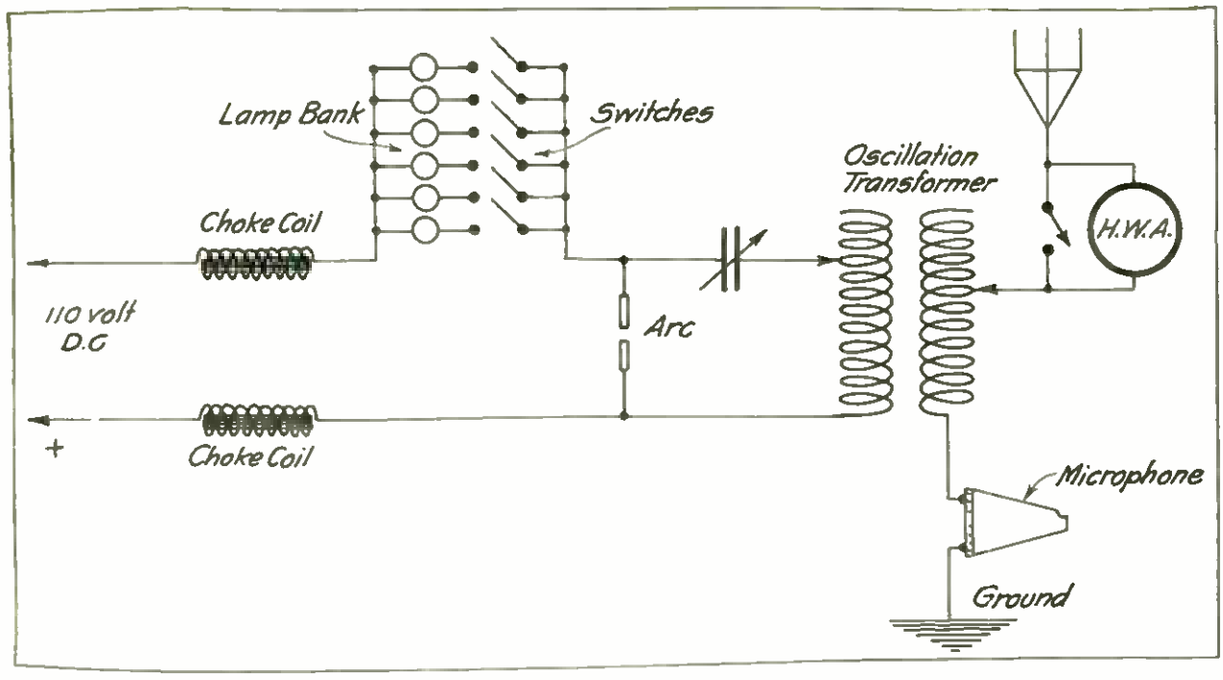


Fig. 3, Second Prize Article

transformers have been published in previous issues of THE WIRELESS AGE, and consequently detailed instructions will not be given. It is sufficient to say that one having a fairly large range of coupling should be selected. An oscillation transformer of the spiral type is very convenient and extremely easy to construct.

The greatest problem is presented in the construction of the microphone. A good one for purposes of wireless telephony can be made as follows: Cut out a circular piece of wood, 10 inches in diameter and ¼ of an inch in thickness. Mount on this, as shown in Fig. 2, several ordinary telephone transmitters equally spaced and connected in parallel. A horn is now constructed to cover the entire set of transmitters. On a piece of heavy cardboard lay out a circle 32 inches in diameter and another 8 inches in diameter, using a common center for both. Measure a distance of 31 inches around the larger circle, mark the points and draw a line from these points to the center.

Cut out the cardboard along the heavy line; by rolling this piece around the wood disc it will form a horn. Next tack the cardboard to the wood and fasten the overlapping edges with paper fasteners and glue. A notch is cut out to allow the insertion of the nose while talking. This microphone is mounted against the wall at a convenient height and given a coat of shellac or covered, if desired, with cloth. Its current carrying capacity is about 2 amperes continuously without heating.

A diagram of connections for the entire apparatus is given in Figure 3. The microphone may be connected in at several different points of the complete set, but it is preferred to connect it in series with the earth lead from the secondary winding of the oscillation transformer. The entire set I have described was designed to handle a ½ k.w. and will give a range from 10 to 25 miles, depending, of course, upon the aerial and the surrounding country. A wave-length of 800 to 1,000 meters may be employed, but a wave-length in excess of 2,500 meters gives the best results. The circuit should be carefully tuned with the wave-meter if long range is desired. Conditions of resonance between the two circuits may be obtained by means of a hot wire ammeter connected in series with the antenna circuit.

THOMAS W. BENSON, *New York.*

THIRD PRIZE, THREE DOLLARS
A ½ K. W. Panel Transmitting Set That Has Found Favor

The panel type of transmitting apparatus has found general favor among amateur experimenters and is growing in popularity. With the set about to be described it will be comparatively easy for the amateur to comply with the Government restrictions in regard to wave-length, power, etc. In addition, the equipment should be efficient because of the shortness of the connections in the circuits of radio frequency and the overall compactness and ease of adjustment obtainable.

For the mounting of the instrument a piece of slate or marble, ¾ of an inch by 16½ inches by 33½ inches, is required which should be drilled for the necessary switches. The dimensions of the panel board are included in the drawing of the front elevation.

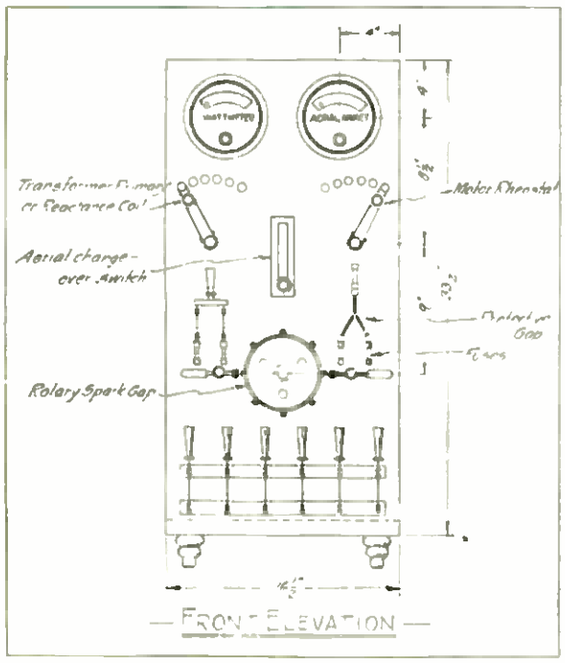


Fig. 1, Third Prize Article

At the top of the panel and to the left is mounted a watt-meter, and to the right an aerial hot wire ammeter. In the center, immediately below the meter, is placed the aerial changeover switch, which is mounted in a novel manner, the switch proper being mounted on a bracket shelf at the back of the panel with the handle protruding through an opening so that it may be operated from the front (not side elevation). This opening should be fitted with a brass slideway to give it a neat appearance.

To the left of this switch is placed the transformer primary tap-off switch, which could be, if desired, connected to a reactance or choke coil. To the right is mounted a rheostat for the control

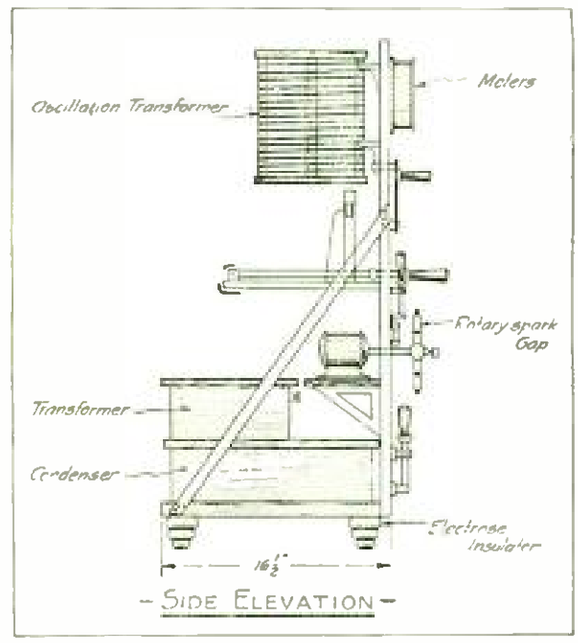


Fig. 2, Third Prize Article

of the speed of the non-synchronous rotary spark gap. These switches are of the usual construction, but care should be taken to have them of sufficient carrying capacity for the purpose.

The rotary gap is mounted immediately below these switches in the same manner as the antenna switch, that is to say the motor is mounted on a shelf supported by a bracket at the rear of the panel; the shaft of the motor is extended through a steel bearing in the panel with the disc for the rotary attached on the front. Suitable means should be provided for the lubrication of this bearing.

To the left and above the rotary gap is the power switch which is fitted with a fuse box for connecting the 110-volt alternating current mains to the apparatus; to the right a suitable protective device is mounted for protection of the primary circuits from electrostatic induction.

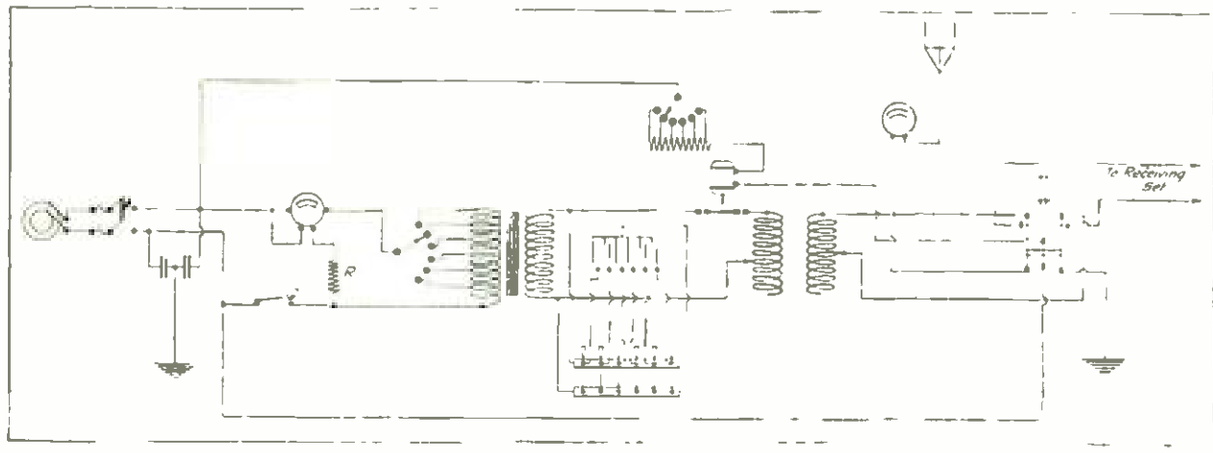


Fig. 3, Third Prize Article

Immediately at the bottom of the panel board is placed a six section condenser switch consisting of six single pole switches with clips mounted on two strips of bus copper, 1 inch in width. A piece of oak is fitted at right angles to the panel at the bottom and suitably braced by steel strips. On this base is mounted first the condenser, second the transformer; the oscillation transformer is mounted at the top of the panel by brackets. The complete panel board is placed on electrose insulators.

The correct diagram of connections for this apparatus appears in Fig. 3 and although a complete and detailed description of the associated parts of the apparatus has been omitted, the correct dimensions can be obtained from the book "How To Conduct A Radio Club," published by the Marconi Publishing Corporation. It is hardly probable that any amateur designer will follow my design in detail, but if the general outline is adhered to, an efficient and compact set will result.

ARTHUR C. BURROWAY, *Ohio.*

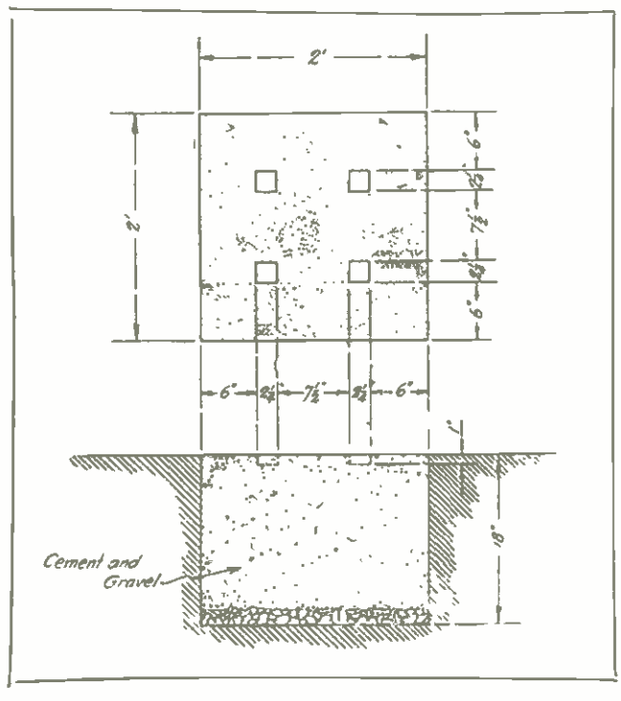


Fig. 1, Fourth Prize Article

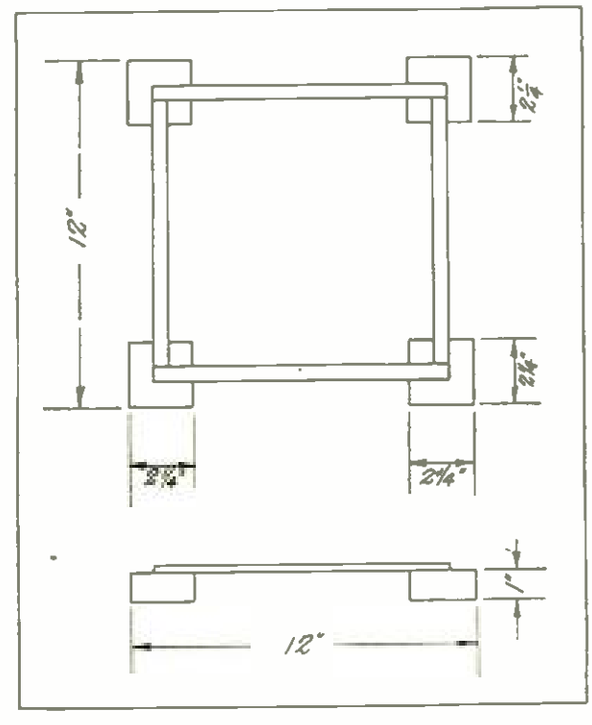


Fig. 2, Fourth Prize Article

FOURTH PRIZE, SUBSCRIPTION TO THE WIRELESS AGE

The Construction of a 100 Foot Tower

I wish to describe the construction of a 100 foot wireless tower, but I believe my design will appeal only to those amateurs who are ambitious to continue their experiments beyond the stage of self-amusement. It is, however, hoped that all readers will obtain some ideas from this article, which will aid them in improving their own stations.

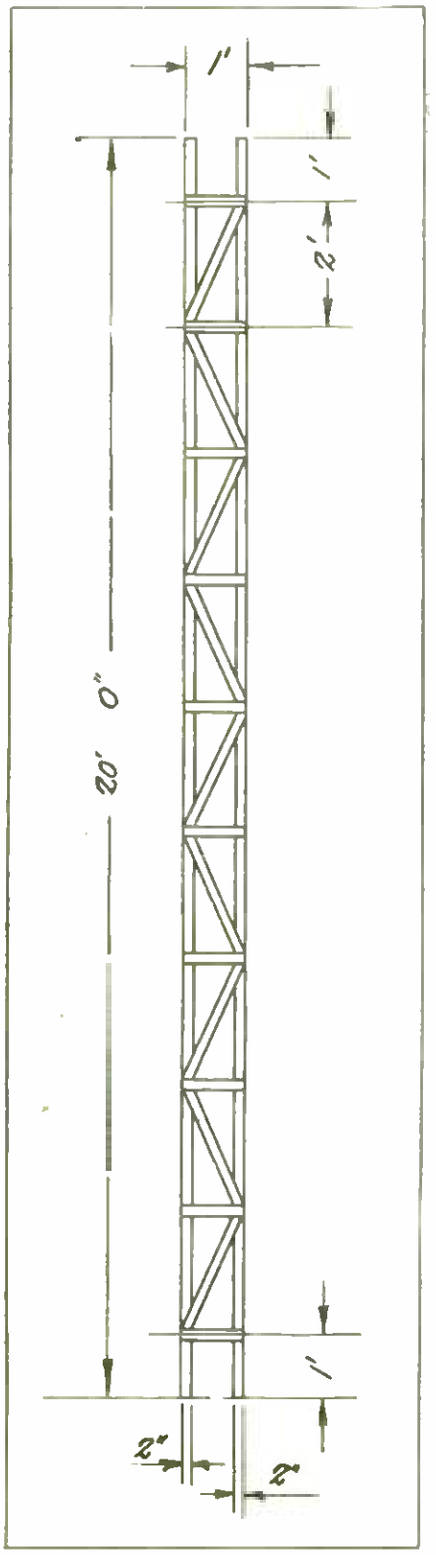


Fig. 3, Fourth Prize Article

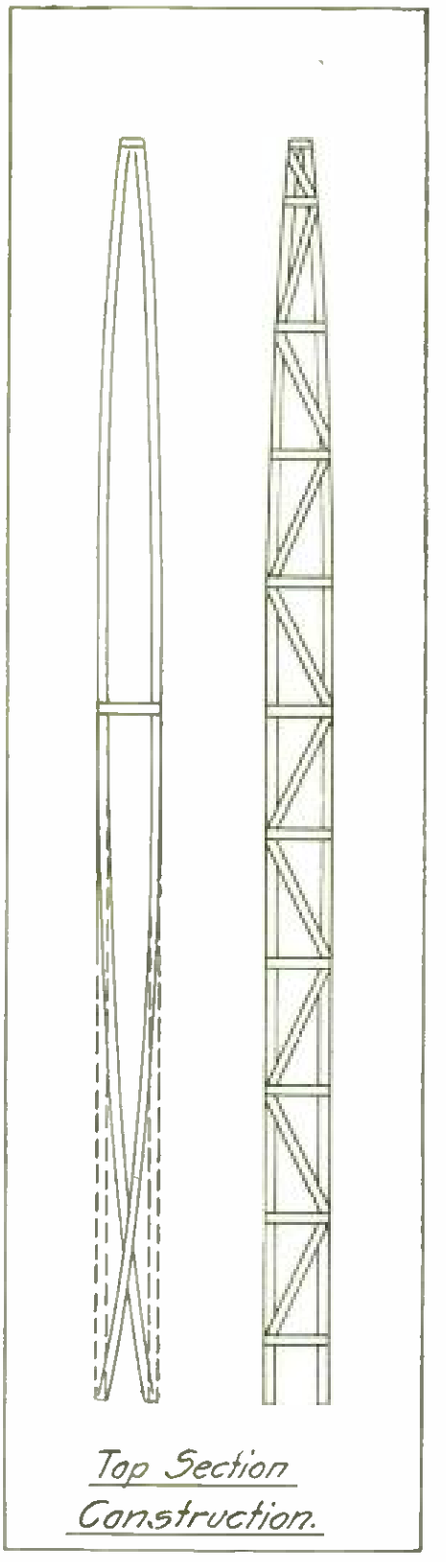


Fig. 4, Fourth Prize Article

To construct the mast I have designed the following materials are required:

For the base, 1 sack of Portland cement, and a quantity of gravel and

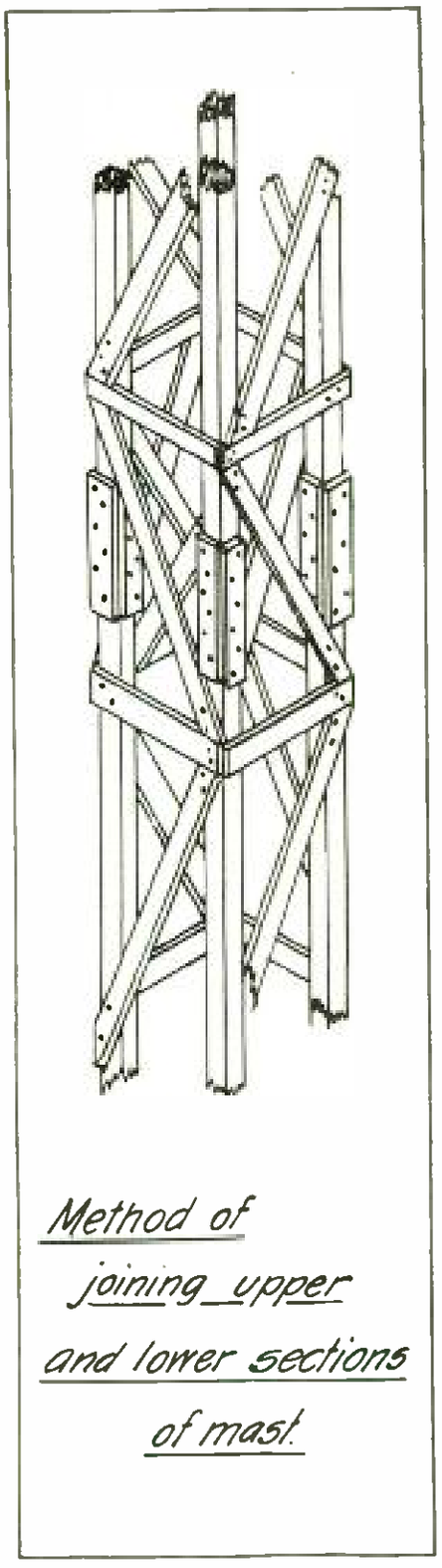


Fig. 5, Fourth Prize Article

stone; for the tower, 250 feet of 2 inch by 4 inch lumber, ripped to 2 inches by 2 inches, and 525 feet of 1 inch by 3 inch lumber, ripped to 1 inch by 1½ inches. The 2 by 2's should be 20 feet in length.

The miscellaneous material required is:

Twenty pounds of 2½-inch boxing nails, two gallons of green paint, and 3,500 feet of 3-16-inch 7-strand steel cable.

In the construction of the base, a hole 2 feet square is dug to a depth of

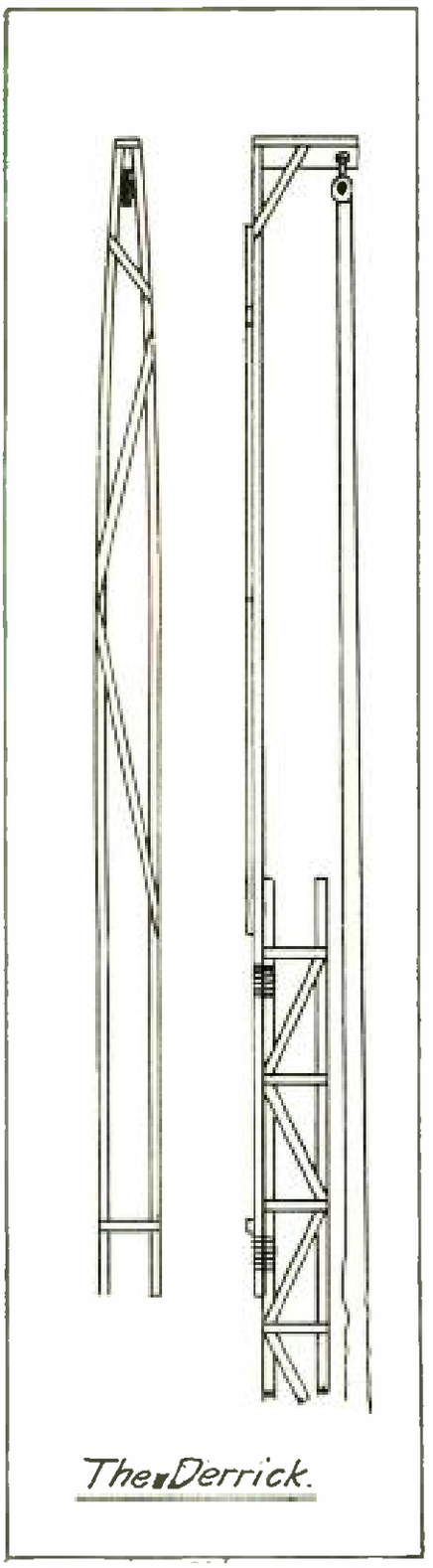


Fig. 6, Fourth Prize Article

about 18 inches and the bottom covered with large stone (Fig. 1). The cement and gravel are mixed in the proportion of 1 to 4; then mixed with water and poured in on the stones until the mixture rises nearly to the edge of the hole. While the cement is still wet a light frame carrying blocks, 2¼ inches square and 1 inch in height, is placed on the base so that the blocks are buried in the cement (Fig. 2). When the base has set, the blocks are withdrawn and four holes are left in which the bottom of the tower rests.

In building the sections the 2 by 2's are matched up in sets of four—one for each section. Then two sides are constructed, as in Fig. 3; they should be joined in the same manner, making a rigid section 20 feet in length.

The top section is modified somewhat, in order to give it a more finished appearance. The 2 by 2's, instead of being parallel, are laid out as in Fig. 4. The free ends are then drawn together, as in the figure, which bows the 2 by 2's, as shown in the drawing. Cross pieces are then nailed on, while the 2 by 2's are curved. When the upper half is complete, the ends of the 2 by 2's are let loose and the lower half is completed in the same manner as the first one.

Two 20 foot sections are joined together and up-ended in one piece, after the manner in which telephone poles are raised. The completed joint is plainly shown in Fig. 5.

When this section is raised and guyed, a derrick, as shown in Fig. 6, is carried up to the top of the structure and lashed in position. By means of the block and tackle attached thereto the next section is raised and held in position, the joint being made as previously described.

Guy wires are run from each corner at the top of each section to four large trees, each being more than 100 feet from the base of the tower.

The cost of the material for the construction of this mast varies widely in different parts of the United States, but in general a tower of this type should be constructed at an expense of about $30.

JAMES A. TILTON, JR., *Massachusetts.*

POLICE CLASS AT BROOKLYN Y. M. C. A.

The members of the newly organized wireless class of the New York City Police Department, Sergeant Pearce in charge, were entertained at the Radio Laboratory of the Eastern District Y. M. C. A., Marcy Avenue, Brooklyn, on the evening of June 23rd. The long distance receiving set, recently installed at the Y. M. C. A. was the principal object of attention, the policemen spending the greater part of the evening in copying messages from high-power stations in the United States and abroad.

Unusually effective results were obtained by the use of this set, which has a daylight receiving range of 3,500 miles and a night range of 5,000 miles. The tests were conducted by Elmer E. Buehler, instructing engineer of the Marconi Wireless Telegraph Company of America, who explained in detail the circuits of the set. His explanation was followed by experiments on a standard 2 k. w. Marconi commercial radio set and also on a special Boy Scout transmitting and receiving set. Additional tests were made with a wavemeter and other testing apparatus, to demonstrate the principles of electrical resonance in wireless telegraphy.

The radio laboratory at the Y. M. C. A. has been used for the initial experiments on the junior military portable wireless apparatus designed by the Marconi Company for the National Amateur Wireless Association.

The members of the Eastern District Marconi Club, the headquarters of which are at the Eastern District Y. M. C. A., invite other organizations to visit the laboratory at prearranged dates. Appointments for demonstrations can be made by addressing L. H. Brown, Educational Director, Eastern District Y. M. C. A., Marcy avenue, Brooklyn, N. Y.

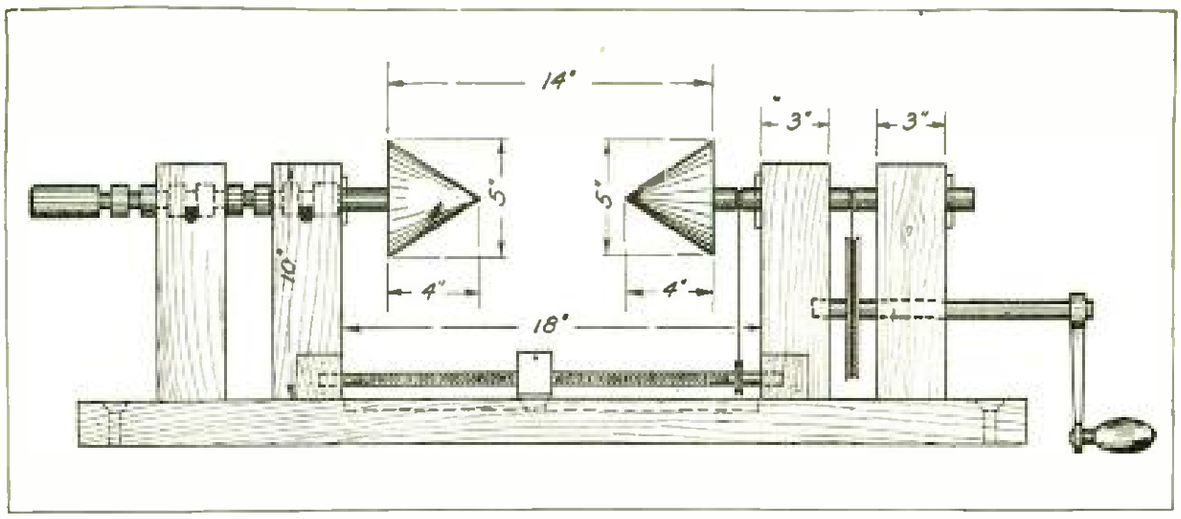


Fig. 1, Honorary Mention Article, Bayard B. Alcorn

HONORARY MENTION

A Winding Machine That Every Amateur Requires

Although I have been an enthusiastic reader of constructional articles appearing from time to time in THE WIRELESS AGE, I have so far failed to see a description of a satisfactory

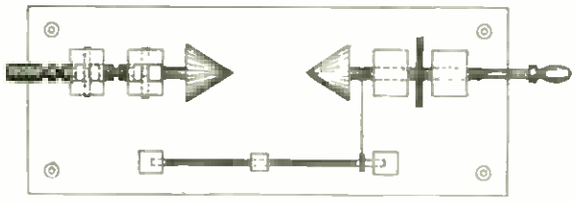


Fig. 2, Honorary Mention Article, Bayard B. Alcorn

winding machine. As every experimenter knows, the construction of a radio set involves the winding of a number of coils and the operation is rather tedious when done by hand.

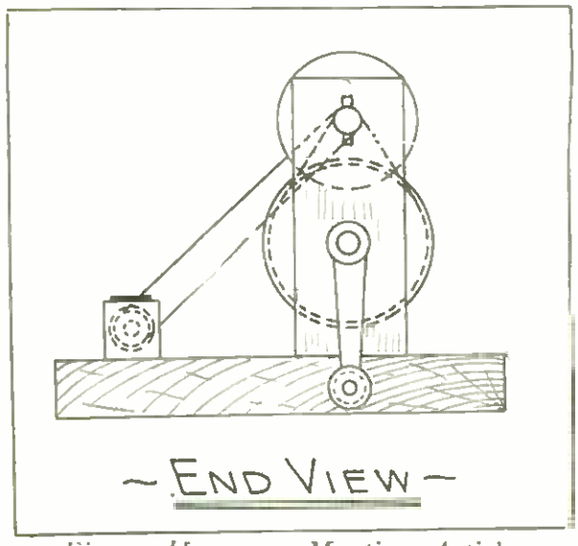


Fig. 3, Honorary Mention Article, Bayard B. Alcorn

A suggested design for a winding machine is given in Figs. 1, 2, 3 and 4, the dimensions of which it is believd are satisfactory for the average amateur's work. The drawings with the accompanying dimensions are largely self-explanatory. The cones should be geared to turn three times to one turn of the crank and the traveller should

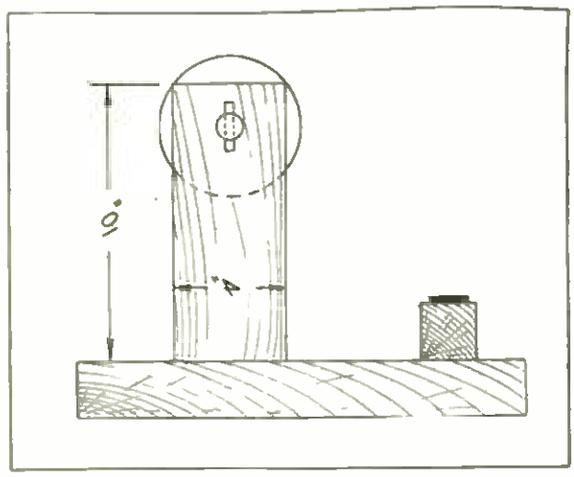


Fig. 4, Honorary Mention Article, Bayard B. Alcorn

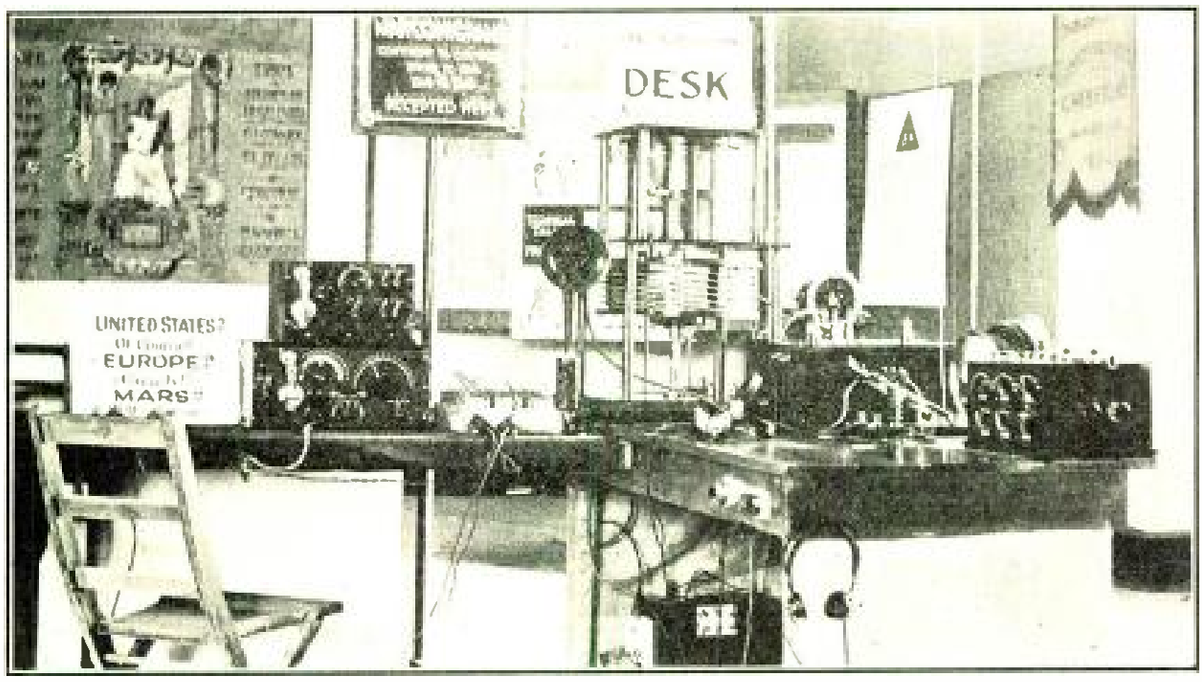
turn about the same speed as the cones. Any tube from the smallest up to five inches in diameter can be wound on this machine—in fact tubes of greater size can be accommodated by increasing the size of the cones. The dimensions given are the best suited for general work, but may be varied, of course, to suit the builder.

While the standards for the bearings are preferably made of metal, it is obvious that they can be made of wood and fulfill the purpose required.

BAYARD B. ALCORN, *New Jersey.*

The Bunker Hill's Wireless Log

Transmitting News of the Massachusetts Institute of Technology's New Building Celebration by Radio



The amateur set installed on the new Institute building

PROMINENT among the features of the events attending the dedication of the new building of the Massachusetts Institute of Technology on the Charles River, on June 14, was the demonstration of wireless telegraphy by the Marconi Wireless Telegraph Company of America on the steamship Bunker Hill, which carried the alumni of the Institute and their guests from New York to Boston. The company's exhibit of radio apparatus in the new building, showing the various types of equipment from the early days of the art to the present, also attracted considerable attention.

The Bunker Hill, equipped with a Marconi wireless set, left New York early in the evening of June 11, the passengers including many who have made their mark by notable achievements. The arrangements for the trip were in the hands of L. D. Gardner, an alumnus of the Institute. In charge of the wireless equipment was David Sarnoff, assistant traffic manager of the Marconi Wireless Telegraph Company of America, aided by Arthur D. Moulton as first operator and Walter J. Henry, as assistant. Particular interest is attached to the operation of the Bunker Hill's wireless because of the fact that, through the courtesy of Edward J. Nally, vice-president and general manager of the Marconi Company, The Tech, published in Boston by students of the Institute, was enabled to receive the news of the trip direct from its correspondent on the vessel, by means of radio.

The complete "story" of the Bunker Hill's voyage, was sent by wireless, the first dispatch being dated Saturday (June 10), 11:30 P. M., at the Technology Club, Gramercy Park, New

York. The next marconigram was flashed from the Bunker Hill while she was off the Battery, on the following evening at six o'clock.

In describing the arrival of the passengers on the vessel, the reporter wirelessed as follows: "During the afternoon, Frank B. Gilbreth, the well-known engineer, who is a 'movie' enthusiast, as well, commenced filming the crowd. He caught Mr. Orville Wright, while he was in the act of explaining to Mr. Alan R. Hawley, president of the Aero Club of America, how he expected that soon the aeroplane would be sailing out of the harbor, rising into the air and landing a few hours later on the other 'side.' Rear Admiral Coops, and another distinguished guest, were caught explaining to the ladies the mystic ceremony of 'keelhauling.' Mr. Philip J. Roosevelt, a guest of aeronautic leanings, and a cousin of T. R., was explaining how it all happened.

"The ship is now rounding the Battery. The Woolworth Building is being illuminated in honor of the alumni, through the courtesy of Mr. Frank Woolworth."

Continuing his snapshot impressions of the voyage, the Tech man filed a marconigram, dated, "Passing Through Hell Gate." It read: "Hell Gate is being raised. A messenger has just announced that a Roman submarine has been sighted off the port bow. Everyone is being ordered on deck. The engines have stopped and Neptune (an alumnus in costume), has hailed the captain of the submarine (also an alumnus) who has appeared on deck wearing the service uniform of a Roman gladiator."

The next message, dated "Entering Long Island Sound," told of a conversation that took place between Neptune and the "captain" of the "submarine."

When the Bunker Hill was off Saybrook, Conn., the following dispatch was flashed: "Rockets are now being seen on the shore . . . where '96 is having its outing. Cardinal and gray flares signify their celebration."

"On board Bunker Hill leaving Long Island Sound, Monday, 1:20," read the succeeding marconigram. "Final message. Boat well under way. Everyone happy and hoping for good weather. The Marconi wireless, through courtesy of Mr. E. J. Nally, placed equipment on board for receipt of congratulatory messages. . . . Full details tomorrow."

These messages were received at the Boston station of the Marconi Company and immediately delivered to the office of The Tech, enabling that publication to print a complete account of the trip of the Bunker Hill and place it on sale on the vessel when she arrived off Boston Light on the morning of June 12.

Throughout the trip the wireless equipment was one of the principal objects of interest. Messages were sent through the land stations at Sea Gate, Siasconsett and Point Judith, R. I., the latter station being used by courtesy of the National Signaling Company. Messages received from Arlington were amplified to such a degree that they could be distinctly heard by passengers on the deck outside the wireless cabin. Special receiving apparatus was installed on the Bunker Hill by Mr. Sarnoff, and wireless telephone experiments were conducted between Roy A. Weagant, chief engineer of the Marconi Company, who was in charge of the wireless telephone installation at the Marconi laboratory at Aldene, N. J., and Mr. Sarnoff on the steamship.

Included in the Marconi Company's exhibit in the Institute building were the first type of transmitting key and oscillation transformer used. In contrast to the old equipment was shown modern apparatus consisting of a ½ k.w., 500 cycle panel set. The exhibit was explained by G. W. Nicholls, manager of the Marconi station in Boston.

An amateur station was installed on the new building and messages were transmitted to the Marconi station on the Filene Building, in Boston, whence they were flashed to various parts of the country. Among those who wirelessed greetings to the Institute alumni was George S. De Sousa, traffic manager of the Marconi Company. His marconigram was sent from the steamer Antilles in the Gulf of Mexico.

Several expressions of thanks for the aid given by the Marconi Company were received by Mr. Nally, who in replying

referred to the company's gratification at the appreciation shown.

H. E. Lobdell, general manager of The Tech, wrote as follows: "Permit me to express the appreciation of The Tech for the courtesy extended to us by yourself and the Marconi Company. By it we were enabled to place a complete story of the voyage of the Bunker Hill on sale on the boat off Boston Light Monday morning.

"The alumni on board felt that the Marconi Company had conferred a distinct honor on the New Technology by this aid. Needless to say the issue caused great comment on the perfection of the Marconi system."

"All messages came through with promptitude and accuracy," read a message sent on behalf of the Bunker Hill's passengers.

"I wish to express to you our appreciation for the splendid wireless demonstration which you gave on the Bunker Hill," wrote L. D. Gardner. "Everyone spoke in the highest terms of your courtesy and I assure you that it has been greatly appreciated.

"I also wish to thank you for the wireless exhibit. . . . It was splendidly placed and the thousands of guests were evidently very much interested."

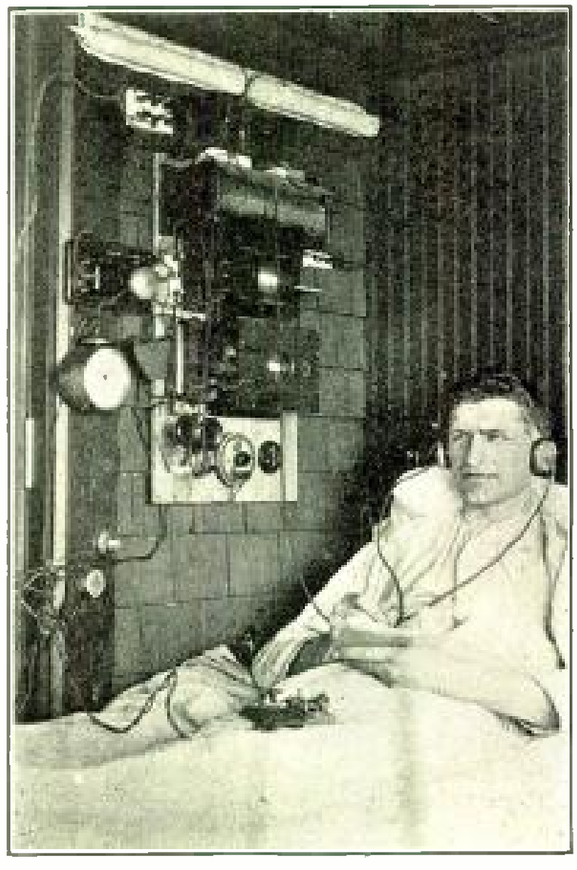
At a meeting of the Committee on Exhibit, "Fifty Years of Technology," Alumni Association of the Institute, it was unanimously voted that the thanks of the Committee and through them of the General Committee on the Dedication Reunion, be extended to the Marconi Company for the loan of the apparatus at the exhibit.

A Station in a Hospital

The Story of the Achievement of a Bed-Ridden Patient in a Pittsburg Sanitarium

A NEW application of the humanitarian use to which wireless telegraphy can be put has been revealed by the activities of Paul F. Shuey, a patient in the Tuberculosis League Hospital, Pittsburgh, Pa. Shuey, who is a graduate of a university, was studying to obtain a fellowship at the Mellon Institute for Scientific Research when he was stricken with illness. Sent to the hospital, he found time hanging heavily on his hands until he installed a set by his bedside.

By means of this station Arlington time signals, the baseball scores and war news are received. Extensions to various wards enable other patients to listen to messages flashed from all parts of the country. They also give them the privilege of hearing concerts and other musical entertainments in the hospital without leaving their beds. The study and practice of the code are now being pursued by a considerable number of the patients.



Paul F. Shuey operating his set

VESSELS RECENTLY EQUIPPED WITH MARCONI APPARATUS

Names.	Owners.	Call Letters.
Geo. E. Paddleford	Petroleum Transport Co.	WIV
J. M. Danziger	Petroleum Transport Co.	WIW
Cape Cod	Captain F. H. Ely.	KPW
Tug Clincher	Clinchfield Navigation Co.	KMC
Admiralen	Crew Levick Co.	LFN (temporary)
Avellaneda	Oriental Navigation Co.	LMK
Theo. Roosevelt	Roosevelt S. S. Co.	WCT
Maitland No. 1	Toronto, Hamilton & Buffalo Ry. Co.	WLE

THE SHARE MARKET

NEW YORK, July 6.

Marconi issues on the curb today were particularly strong, the brokers assert, American shares showing better than a half point advance over our July issue's report and gains of two and three points being registered in the English issues. Canadian Marconi shows a fractional advance also, after a long period of inactivity. It was pointed out that the advances on the New York curb had not yet caught up with the foreign market, however, American Marconi being sold a point higher in London and English ordinary shares at a two point advantage. A definite rumor was afloat that the market would soon feel the influence of general buying, in anticipation of favorable announcements. The quotations on Marconis remained firm from the opening of the day's trading until its close.

Bid and asked quotations today:

American, 3⅝—3⅞; Canadian, 2—2½; English, common, 13—16; English, preferred, 12—15.

MARCONI SHIP OPERATORS RECEIVE ACCIDENT POLICIES

An augmentation of the insurance plan of the Marconi Wireless Telegraph Company of America, details of which were published in the May number of THE WIRELESS AGE, has been announced by Edward J. Nally, vice-president and general manager of the company. Under the terms of the addition to the plan ship operators in the Marconi service will be provided with $500 accident policies, without expense to themselves. The announcement follows:

"It gives me much pleasure to announce an extension of the Company's Insurance scheme which became effective April 1, 1916. As a further mark of appreciation for the work performed by our ship operators, the company desires to provide some protection for them until such time as they are eligible for regular life insurance, and it has therefore arranged with the Ocean Accident and Guarantee Corporation, Ltd., to furnish without expense to ship operators not insured under the company's life plan, a $500.00 Accident Insurance Policy.

"The policy will be valid for one year, and cover loss of life, both hands, both feet, one hand and one foot, or the sight of both eyes, by accident, in the amount of $500.00.

"Should the operator, upon passing into the Life Insurance class, desire to continue the accident policy arrangements have been made whereby he may do so at exceptionally low rates.

"It is necessary for each ship operator, of less than one year's service, to fill out an application form, in which the insured may name his own beneficiary. A service form properly filled out should also accompany the application form.

"Should a ship operator leave our employ before completing one year's service, the policy will be terminated. Each new ship operator should be required to fill out accident insurance papers, immediately upon entering the service."

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.

N. B. Hill, Milwaukee, Wis., inquires:

Ques.—(1) I employ an aerial composed of four No. 12 copper wires, 250 feet in length, 125 feet in height, with a lead-in of 80 feet. It is connected to a standard set of receiving apparatus and makes use of a galena detector. With this equipment how far should I ordinarily be able to receive; also what is the wave-length of this aerial?

Ans.—(1) The fundamental wave-length of this aerial is approximately 575 meters, which probably will require a short wave condenser in series with the primary winding for the reception of wave-lengths of 600 meters. You, of course, understand that this aerial is too long for the reception of signals from amateur stations at the wave-length of 200 meters. If you are an operator, familiar with the characters of the Continental Telegraph Code, you probably can find out more accurately for yourself just how far this apparatus will receive than we could tell you. You should have no difficulty during the favorable months of the year in hearing the stations located on the Atlantic coast. Your daylight range can best be determined by experiment.

Ques.—(2) Can I use a ¼ kw. Hytone transmitting set with an aerial composed of 12 wires, spaced one foot apart? It is 100 feet in length and 100 feet in height. The lead-in is 60 feet in length. Also what is the wave-length of this aerial?

Ans.—(2) The natural period of the antenna is 395 meters, which is a little too long to be operated at the wave-length of 200 meters. There is no reason, however, why the Hytone set could not be employed in connection with it, but you must take particular care that you do not exceed the restricted wave-length of 200 meters. Your aerial could be made suitable for transmission at the wave-length of 200 meters by attaching the lead-in wires to the center of the flat top portion.

Ques.—(3) What distance could I expect to cover with this transmitting set in daylight or after darkness?

Ans.—(3) The range is problematical. The average amateur transmitting set in your district communicates from forty to sixty miles in daylight—sometimes further—and from 500 to 800 miles after dark. Reports of long distance working on the part of amateurs appear in THE WIRELESS AGE and should be of interest to you.

* * *

W. K. Galveston, Texas, inquires:

Ques.—(1) Please tell me the approximate fundamental wave-length and the capacity of the following aerials: The first one is composed of two No. 6 wires, 650 feet in length, 95 feet in height at one end and 45 feet at the other; the spacing is 4 feet and the lead-ins 25 feet. The second aerial is composed of five No. 10 wires, spaced 3 feet. It is 95 feet in length, 50 feet in height at each end, with a lead-in of 20 feet.

Ans.—(1) The natural wave-length of the first described aerial is near to 1,000 meters and the capacity approximately .0017 microfarad. The natural wave-length of the second aerial is approximately 280 meters and the capacity about .0004 microfarad.

We cannot give the possible wave-length adjustments of the first described aerial, because we do not know the dimensions of the receiving tuner with which it is to be used. This antenna is of the correct dimensions for the reception of signals at wave-lengths up to 10,000 meters.

You should have no difficulty in hearing Nauen, Germany, Darien, Isthmus of Panama, and Honolulu, T. H., during the night hours, if you use apparatus like that described in the second edition of the book, "How to Conduct a Radio Club." The complete circuits for an oscillating vacuum valve are given, which will respond to either damped or undamped oscillations at wave-lengths up to 10,000 meters.

Ques.—(2) Is there any law which allows an amateur to use a very long wave-length for his transmitting apparatus?

Ans.—(2) In cases where the amateur experimenter can satisfy the Government authorities that by the operation of his station at wave-lengths in excess of 200 meters, he can in some way benefit the art, particularly if he is conducting a series of experiments, the Department of Commerce will, after consideration, allow a license, but for mere amateur communication along the usual lines, a license for wave-lengths in exces of 200 meters will not be allowed.

Ques.—(3) At what time and what wave-length does the Illinois Watch Company send the time signals?

Ans.—(3) It is listed in the radio stations of the United States as having irregular hours of operation. The call letters are 9ZS and two wave-lengths of 600 and 2,000 meters are given.

* * *

C. D. L., Nuttallburg, W. Va.:

That you are not able to receive the Arlington time signals with the apparatus you describe may be accounted for by the fact that your station is located in a canyon 1,000 feet below the level of the surrounding country. It is a fact that receiving aerials so disposed are often hindered in the reception of long distance signals. However, with a very sensitive receiving set, such as a vacuum valve amplifier, you should have no difficulty in receiving Arlington time signals in view of the fact that your receiving station is but 255 miles distant from that transmitting station. The natural wave-length of your 80-foot aerial is approximately 238 meters, and, of course, you would secure better results by an aerial of greater dimensions. It may be that your receiving detector is not sensitive or that you are not wholly familiar with its adjustments. It is also possible that the primary winding of your receiving tuner has insufficient values of inductance to raise the wave-length of the antenna circuit to 2,500 meters used by the Arlington station for the transmission of time signals. We are not familiar with the dimensions of the coils in the receiving tuner you describe, but we would suggest that you communicate with the makers direct and ask them if they consider that your antenna has sufficient dimensions for the receiving tuner they have sold you. A receiving tuner particularly suitable for Arlington time signals is described in the second edition of the book, "How to Conduct a Radio Club."

Ques.—(2) Will a fuse block serve the same purpose as a ground wire in protecting my instrument from lightning?

Ans.—(2) No. A fuse will be of no value for lightning discharges, because even if the fuses blew, the succeeding lightning discharge may be of sufficient value to jump the gap in the fuse and injure your apparatus. During a severe lightning storm all transmitting and receiving apparatus should be completely disconnected from the antenna wires and the antenna wires in turn directly connected to a stout copper wire, which is connected to an earth capacity having at least 200 square feet of metal.

* * *

W. G., San Rafael, Cal.:

The information you request concerning the Austin oscillating vacuum valve is given in full in the second edition of the book, "How to Conduct a Radio Club." A circuit of this type is also published in the Proceedings of the Institute of Radio Engineers.

H. V. R., Hollis, L. I., inquires:

Ques.—(1) Is an aerial 125 feet in length, with a 30 foot lead-in, having an average height of 40 feet, too long for operating at the wave-length of 200 meters?

Ans.—(1) It will have a natural wave-length close to 360 meters and, of course, is of excessive value. By attaching the lead-ins near to the center the fundamental wave-length of the aerial will be reduced sufficiently to permit operation at the wave-length of 200 meters.

Ques.—(2) Will it effect the efficiency of the set if the lead-in wires are not brought exactly from the center?

Ans.—(2) No.

Ques.—(3) Can a 1-inch spark coil be connected directly to 110 volt A.C. mains without the use of a step-down transformer if the precaution is taken to screw the vibrator up tight?

Ans.—(3) The primary winding of this coil has an insufficient value of impedence for connection to 110 v. A.C. mains and will undoubtedly burn out, unless an external reactance or resistance coil is employed.

Ques.—(4) Will a lightning switch, mounted on a wood base, give less leakage than one where the clips of the switch are mounted on a slate base?

Ans.—(4) Dry wood is undoubtedly a better insulator for high potentials than slate, but you will find it still better to mount this switch, if possible, on a slab of hard rubber on a plate of glass. Slate is a very inferior material for high potential alternating current.

* * *

T. T. M., inquires:

Ques.—(1) I recently noted in a store window a ½ h. p. water motor, which is to be operated direct from a faucet. Do you think that this will give sufficient power to run a dynamo which in turn is to supply current for an alternating current transformer or an induction coil? If you believe my proposition feasible, what type of generator or dynamo would you consider advisable? I possess a 1-inch spark coil, a 4-inch spark coil and 1 kw. 110-volt 60-cycle transformer. Which of the foregoing should I use? Any information you can give me along the lines of generating home-made current will certainly be appreciated.

Ans.—(1) It is, of course, evident that a ½ h.p. water motor cannot operate a 1 kw. 110-volt 60-cycle transformer; consequently you have to resort to the 1-inch or 4-inch spark coil. For either of these coils you would not require a potential in excess of 18 or 20 volts; therefore you should have some manufacturer quote you on a 250 or 300 watt direct current generator, giving a potential of from 18 to 24 volts. In our opinion the ordinary water motor is a rather unsatisfactory proposition for taking care of the loads imposed by a wireless telegraph set upon a generator. Very cheap gasoline engine generating outfits can be obtained nowadays and you would do well

to get in touch with the manufacturers of this apparatus. In case you purchase the latter outfit we would recommend that you get one of sufficient capacity to generate ½ kw. 60-cycle alternating current, or, by special design, a 120 or 240-cycle generator could be provided.

* * *

W. A. S., Ridgewood Heights, L. I., inquires:

Ques.—(1) Please state the wave-length of an aerial 40 feet in length and 45 feet in height.

Ans.—(1) Assuming that it has four wires the fundamental wave-length is about 155 meters.

Ques.—(2) Could Arlington and Cape May, N. J., be received on this aerial with a 700-meter tuning coil, a loading coil 12 inches in length, 3 inches in diameter, wound closely with No. 24 green silk covered wire, a crystaloi detector and a pair of 2,000-ohm head telephones shunted by a fixed condenser?

Ans.—(2) The entire apparatus has sufficient value of inductance in the antenna circuit for adjustment to Arlington signals, but a loading coil should also be connected in series with one lead to the receiving detector in order to keep the circuits in resonance, or the two leads extending from the tuner to the receiving detector may be shunted by a small variable condenser. You, of course, understand that it is highly important for best results that the antenna and detector circuits be in exact resonance. This condition you probably cannot obtain in your present apparatus.

Ques.—(3) What process takes place in a loading coil that gives it the quality of inductance?

Ans.—(3) Any electrical conductor possesses the property of inductance because it has the ability to store up energy in magnetic form. When an electric current of varying strength is sent through a coil of wire, owing to the increase and decrease of magnetic lines of force about the wire, a reactive effect is set up in the circuit, causing a tendency to oppose the current which originally produced it. A straight wire possesses inductance as well as a coil, but the effect is greater in a coil of wire because the lines of force are concentrated within a small space and the adjacent turns act directly upon one another. When inductance is placed in a radio frequency circuit it has the effect of increasing the time period of vibration, requiring a greater length of time for a complete oscillation to take place in that circuit.

* * *

L. W. C., Swampscott, Mass., inquires:

Ques.—(1) Attached to this query you will find a diagram of Cohen's new receiving set as employed at some of the stations of the United States Navy. Can any better results be obtained from this circuit than from a receiving transformer of the usual inductively-coupled type?

Ans.—(1) We see no reason whatsoever why the Cohen circuit should give better signals than a receiving transformer of ordinary construction.

Ques.—(2) Referring to my diagram: What are the proper proportions of the coils and the variable condensers if they are wound with No. 20 single cotton covered wire, so that the entire apparatus will be adjustable to wave-lengths of 2,500 or 2,600 meters? This equipment is to be used in connection with a vacuum valve detector.

Ans.—(2) In the first place we do not advise the use of No. 20 wire in connection with a vacuum valve detector. Better results would be obtained with No. 30 S. C. C. wire. If the coils, L1 and L2, are 10 inches in length, 3 inches in diameter, wound with No. 30 S. C. C. wire, they will give good results with the vacuum valve detector.

Ques.—(3) Is the noise made by the arc circuit at the Charlestown Navy Yard, Charlestown, Mass., caused by the towers reradiating energy which is absorbed from the aerial?

Ans.—(3) The irregular sounds heard from this station are undoubtedly due to irregularities in the action of the arc gap which has a slight damping effect on a radiated wave, causing the signals to be audible in the receiving tuner employing an ordinary crystalline detector.

Ques.—(4) What type of detector does the Boston Marconi station use?

Ans.—(4) Cerusite and carborundum crystals are in use.

Ques.—(5) How much power is regularly employed at this station, also at the Cape Hatteras, N. C., station?

Ans.—(5) The Boston station employs a 2 kw. sixty-cycle synchronous spark set. The Hatteras station is equipped with a 2 kw. 240-cycle synchronous spark transmitter.

* * *

J. B., Hyattsville, Md., inquires:

Ques.—(1) Will you kindly advise the type and the dimensions for a condenser and a helix for use with a ⅜-inch Bunnell spark coil. The apparatus to be used at a wave-length of 200 meters.

Ans.—(1) A condenser of exceedingly small capacity is required. Generally a single plate of glass, 8 inches by 8 inches, covered with a sheet of foil 6 inches by 6 inches, the glass being ⅛ of an inch in thickness, will suffice. The oscillation transformer may be 8 inches in diameter composed of 12 or 14 turns of No. 10 wire for the primary winding. The secondary winding may have from 8 to 12 turns for your present aerial.

Ques.—(2) How far can I transmit with this outfit?

Ans.—(2) You should cover from three to five miles under the usual conditions, but probably better results could be obtained by discarding the helix and condenser and connecting the spark gap directly in series with the antenna system.

H. D., Cape Girardeau, Mo., inquires:

Ques.—(1) A wireless set located in a building which is lighted by a 220-volt direct current generator, in turn run by a reciprocating engine, is bothered by interference from this generator or its feeder. The power house is located 75 yards from the building in which the wireless set is located and the leads thereto are run underground; yet every stroke of the piston of the engine is received as a click in the receiving set, so that when the engine is running a continuous clatter is heard in the wireless. This is very objectionable and often it is impossible to hear anything else except the noise from this generator. It is observed that the generator does not spark at all at the brushes. One of the leads of the generator is grounded and the frame of the machine is also connected to earth. I have permission to make any changes that will not involve too much expense or interfere with the operation of the lighting and power system. Other remedies that I have tried have so far failed. What do you suggest as a possible remedy?

Ans.—(1) You have not stated the type of engine employed. If a gasoline engine with an electric spark ignition system is employed, you would, of course, receive interference from the spark discharge at the spark plug. If a steam engine is used to run this generator, the trouble is very likely due to electrostatic induction from the power leads, and we believe that if careful observation is made of the brushes when they are in operation it will be found that a slight sparking does take place which sets up the induced currents in the wireless telegraph aerial. You, of course, understand that there must be a variation of the current from this generator in order to set up the disturbance.

The effect may be corrected to some extent by connecting condensers of 2 microfarads capacity across the power mains and in turn connecting the center lead (the lead between the two condensers) to the earth. Also, particular care should be taken to connect the conduit in which the power wires are laid to moist earth. You might also try connecting condensers of large capacity across the brushes of the armature. For example: Two condensers may be connected across series in a set of brushes and the center point connected to the frame of the machine. It may be possible in this manner to absorb a considerable amount of the counter electromotive force of the windings and thereby prevent them from affecting the wireless telegraph aerial. You have a difficult problem on your hands and in some cases it cannot be solved.

Ques.—(2) Will you please explain the fading out of wireless telegraph signals, particularly in a case where the effect is more noticeable from an amateur station than from a commercial station. What is the known or the probable cause and what steps can be taken that will minimize this objectionable phenomenon?

Ans.—(2) The subject is rather too comprehensive to be completely covered in this department, but freely we may state that the fading of radio signals is not clearly understood. So many factors are involved in the case that a study must be made of the given station to determine the probable cause. Usually this phenomenon is observed when the receiving station is outside the daylight of the transmitting station. Under these conditions a wide variation of signals is observed and is supposed to be caused by the reflection of the conducting surface of the space represented at a distance of about 15 to 40 miles above the surface of the earth. It is assumed that, owing to the absence of air, this space is more or less of a conductor and consequently has the property of reflecting wireless telegraph waves emanating from radio stations located in the earth proper. It is possible that this reflecting medium changes its position with conditions of daylight or darkness and perhaps is not constant throughout a consecutive hour, causing the signals to go up and down at a given station accordingly.

The fading of signals is often due to an improperly designed transmitter; one which is leaking at some portion of the apparatus. It is also sometimes caused by heating of the spark gap electrodes and frequently has been found to be due to leakage of the antenna current over the high potential insulators. At the receiving station the fading of signals may often be accounted for by irregular action of the receiving detector itself, which does not remain in adjustment for any distinct period. For example: A crystalline detector will lose its sensitiveness if damp air is allowed to blow over it. The subject of the daylight and night effect is fairly well described and discussed in the Proceedings of the Institute of Radio Engineers, copies of which can be purchased from the Secretary, at No. 111 Broadway, New York.

Regarding your query in reference to the refraction and reflection of ether waves: You would do well to study thoroughly the early experiments of Hertz in this respect; you will find the reports of his researches rather comprehensive. It is possible to reflect, refract and diffract either waves of wireless telegraphy as well as those of light. In fact, ether waves of all lengths are subject to reflection, refraction, diffraction and absorption, and bodies that are opaque to the passages of light waves will permit the free passage of the long electric waves used in wireless telegraphy.

* * *

A. C. B., Canton, Ohio:

A diagram of the balanced crystal system, as used by the Marconi Company, is given in the "Text Book on Wireless Telegraphy," by Rupert Stanley. These crystals are not connected thus to prevent interference, but to eliminate the effects of atmospheric electricity.

National Amateur Wireless Association

OFFICERS OF THE ASSOCIATION.

PRESIDENT, Guglielmo Marconi.

NATIONAL ADVISORY BOARD OF VICE PRESIDENTS

Professor A. E. Kennelly,
Harvard University.
President, Institute of Radio Engineers.

Professor Samuel Sheldon,
Polytechnic Institute of Brooklyn.

Professor Alfred N. Goldsmith
College of the City of New York.

Professor Charles R. Cross,
Massachusetts Institute of Technology.

Hiram Percy Maxim,
President, American Radio Relay League.

Major William H. Elliott,
Adjutant General, Junior American Guard.

Capt. W. H. G. Bullard, U. S. N. Superintendent, U. S. Naval Radio Service.

Lieut.-Col. Samuel Reber, Signal Officer, U. S. Army.

E. E. Bucher, Instructing Engineer, Marconi Wireless Telegraph Company.

ADMINISTRATIVE OFFICERS:

ACTING PRESIDENT,
J. Andrew White,
Editor, THE WIRELESS AGE.

MANAGING SECRETARY,
Clayton E. Clayton,
450 4th Avenue, New York.

A national organization of wireless amateurs was announced in the October, 1915, number of THE WIRELESS AGE. Further details of the organization are given in an address made by J. Andrew White, which was published in the November WIRELESS AGE. Reprint copies sent upon request.

MEMBERS' EQUIPMENT.

1st. CERTIFICATE OF MEMBERSHIP.

The handsomely steel-engraved Certificate, with shadow background half-tone, is sealed and signed by Officers, with the endorsement of Senatore Marconi, as President. Every member will want to frame and place it alongside of his Government License certificate, two documents establishing status as wireless amateurs.

2nd. AERIAL PENNANT.

The 36 inch aerial pennant, painted in four colors on scarlet felt, will stand long service at your aerial mast head. Every member will be proud of the National Insignia flying from his aerial.

3rd. MEMBERSHIP PIN.

The National Amateur Wireless Association Pin in gold and enamel is the National emblem of the Association. The design shown on the preceding page can but faintly describe its handsome appearance in three colors and gold. The pin has a special patented hub and shank which permits it being securely fastened on the coat lapel or on the vest without turning upside down.

4th. LIST OF RADIO STATIONS OF THE WORLD.

Revised Edition just published. See advertisement. Regular 50c edition.

5th. HOW TO PASS U. S. GOVERNMENT WIRELESS LICENSE EXAMINATIONS.

Regular 50c edition of this popular book. Members who already have a copy, see concessions below.

6th. HOW TO CONDUCT A RADIO CLUB.

This splendid book, which has been months in preparation and incorporates portions of articles running under the same title in THE WIRELESS AGE, is re-written to cover every new development, and with a large proportion of new matter. It is the foundation stone of the National Amateur Wireless Association activities. Price of this book 50c.

7th. MONTHLY BULLETIN SERVICE.

It is intended to make the monthly bulletin service for members of the National Amateut Wireless Association one of the most important features of the Association. This bulletin is to be used in connection with "List of Radio Stations of the World" described above. It will carry all additions (both amateur and commercial) to "List of Radio Stations of the U. S.", issued by the Bureau of Navigation, U. S. Department of Commerce, and secured for members at 18c a copy. The Government list is issued only once a year. The Association Bulletin will keep both lists up to date for you month by month, and in addition, will carry other special and invaluable Association features not obtainable elsewhere

8th. ONE YEAR'S SUBSCRIPTION TO THE WIRELESS AGE.

THE WIRELESS AGE is the Official Organ of the National Amateur Wireless Association and will contain full reports of wireless amateur activities, both national and local. It is planned to give published recognition to individual amateur achievement.

CONCESSIONS:

Those who, *during the past six months,* have become subscribers to THE WIRELESS AGE, or have renewed their subscription, or have purchased any portion of the Membership Equipment, may consider such payment as partial payment of Membership Application as given below. If you have paid for a subscription to THE WIRELESS AGE which includes books which are not a part of the Membership Equipment, then you may credit $1.25 of the remittance as partial payment on the Membership. For example, you may have remitted $2.25 for the combination offer of the 1915 Year Book with one year's subscription to THE WIRELESS AGE. In this combination, the price of both the book and the subscription was reduced, to make the special offer; therefore, you may be credited only with that part of the payment which went to the magazine—that is, $1.25. *Coupon subscribers receive no credit for trial orders.* Subscribers to THE WIRELESS AGE who *began or renewed more than six months ago,* will secure through Membership dues a renewal for another year; and their subscriptions will be extended for one year from the time the present subscription expires.

INITIATION FEE

An initiation fee of $1.00 is required of all new members to pay for the initial membership equipment, consisting of Nos. 1, 2, 3, 4, and 5.

ANNUAL DUES

The annual dues are to be not more than $2.00. For this, all members are to receive:

1st. The Monthly Bulletin Service.

2nd. THE WIRELESS AGE for one year.

3rd. How to Conduct a Radio Club or equivalent.

4th. 10% discount on any book on wireless published, and other features to be announced later.

SPECIAL NOTICE REGARDING CORRESPONDENCE.

As the National Amateur Wireless Association is in no sense a money making enterprise, and as the nominal dues will cover a very small amount of handling expense, it is desired that the correspondence be limited to only the most essential necessities. A cordial invitation is extended to all club officials to write on matters pertaining to organization. This invitation also includes those who are interested in starting new clubs.

Charters—Out of the amount paid by each member for annual dues, it is purposed to allow organizations that have become part of the National Amateur Wireless Association a rebate of 50 cents out of each $3.00 for their own treasury—a fund to take care of local expenses. Please note that this is a rebate, not a deduction. In order to qualify for recognition as a unit in the National Amateur Wireless Association, a club must have at least five active members and at least one-quarter of its total membership become members of the National Amateur Wireless Association. Clubs securing a charter will have representation in the National Council; this means that they elect their own delegate and thus secure a voice in the management of the Association and in the planning of its future development and activities.

Clayton E. Clayton, Managing Secretary,
450 4th Ave., New York.

Checks and money orders should be made payable to: Natl. Amateur Wireless Assn.

APPLICATION FOR MEMBERSHIP.

CLAYTON E. CLAYTON, Managing Secretary,

NATIONAL AMATEUR WIRELESS ASSOCIATION, Date.....

450 4th Avenue, New York City.

As I desire to receive full recognition as an amateur wireless worker of the United States, I ask the privilege of enrollment as a Member in the National Amateur Wireless Association and request that you send me the complete Members' Equipment for which I enclose herewith remittance of $1.00 Initiation Fee, covering Initial Equipment, and $2.00 for First Annual Dues—or $3.00 in all. Option.*

I trust that you will act upon my application promptly and forward the equipment to me at the earliest possible date.

My qualifications for membership are given in blank spaces below.

Signature ..... Age.....

Street Address .....

Town and State.....

Please credit me with $..... paid for.....

* Option.

In the event that an applicant is unable to send the entire amount of the membership dues with this application, the figure $3.00 may be crossed out and $1.00 written in its place. This will be considered an agreement on the part of the applicant accepted for Membership that the balance of dues ($2.00) will be paid at the rate of 50c per month for the next four months, at which time pin, pennant and Certificate of Membership will be issued. The other equipment will be sent at once.

FILL IN ANSWERS TO THESE QUESTIONS.

1—Have you a Government License (give number.....) or do you purpose applying for one?.....

2—If you are under 21 years of age, give names of two adults for references as to character.

Reference.....

Reference.....

3—If you are a member of any Local, State or Interstate wireless club or association, give its name, and name of Secretary with address.

.....

4—Are you now a subscriber to THE WIRELESS AGE?.....

5—If you already have any books included in the equipment, state which ones.....

.....

National Amateur Wireless Association

A DIRECTING ORGANIZATION DEDICATED TO THE PROMOTION OF RADIO COMMUNICATION

GUGLIELMO MARCONI, PRESIDENT

CALL LETTERS 9PY
S. W. PIERSON
CARROLLTON, ILLINOIS

Reduced fac-simile of letter head.

For Clubs and Members of National Amateur Wireless Association

The following list of items of optional equipment is listed at cost price in order to give members and clubs of the Association every material advantage in the way of a complete equipment that may be desired. Prices include transportation charges to 5th Parcels Post Zone. Postage extra to 6th, 7th and 8th Zones.

LETTER HEADS AND ENVELOPES:

100 National Association Letter heads with imprint of member at left hand side, as illustrated above 75c
Without member's imprint..... 35c
100 Envelopes with imprint..... 65c

Special prices on 1000 Letter Heads to Clubs.

MESSAGE BLANKS:

Pads of 50..... 10c

STATION LOG BOOK:

A record book in which to keep track of all your operations and communications, in paper..... 15c
in cloth 30c

RADIO STATIONS OF THE U. S.:

Call list issued by the U. S. Department of Commerce, postpaid.. 18c

PHOTOGRAPHS AND PICTURES:

Photographs of important stations, such as Belmar, Arlington, Sayville, Honolulu, etc., 9" x 12", each $1.00

Duotone picture of G. Marconi, with facsimile signature, suitable for framing 25c

SOLID GOLD BUTTONS, 14 Karat N. A. W. A. emblem..... $1.75

WIRELESS MAP OF THE WORLD in colors 50c

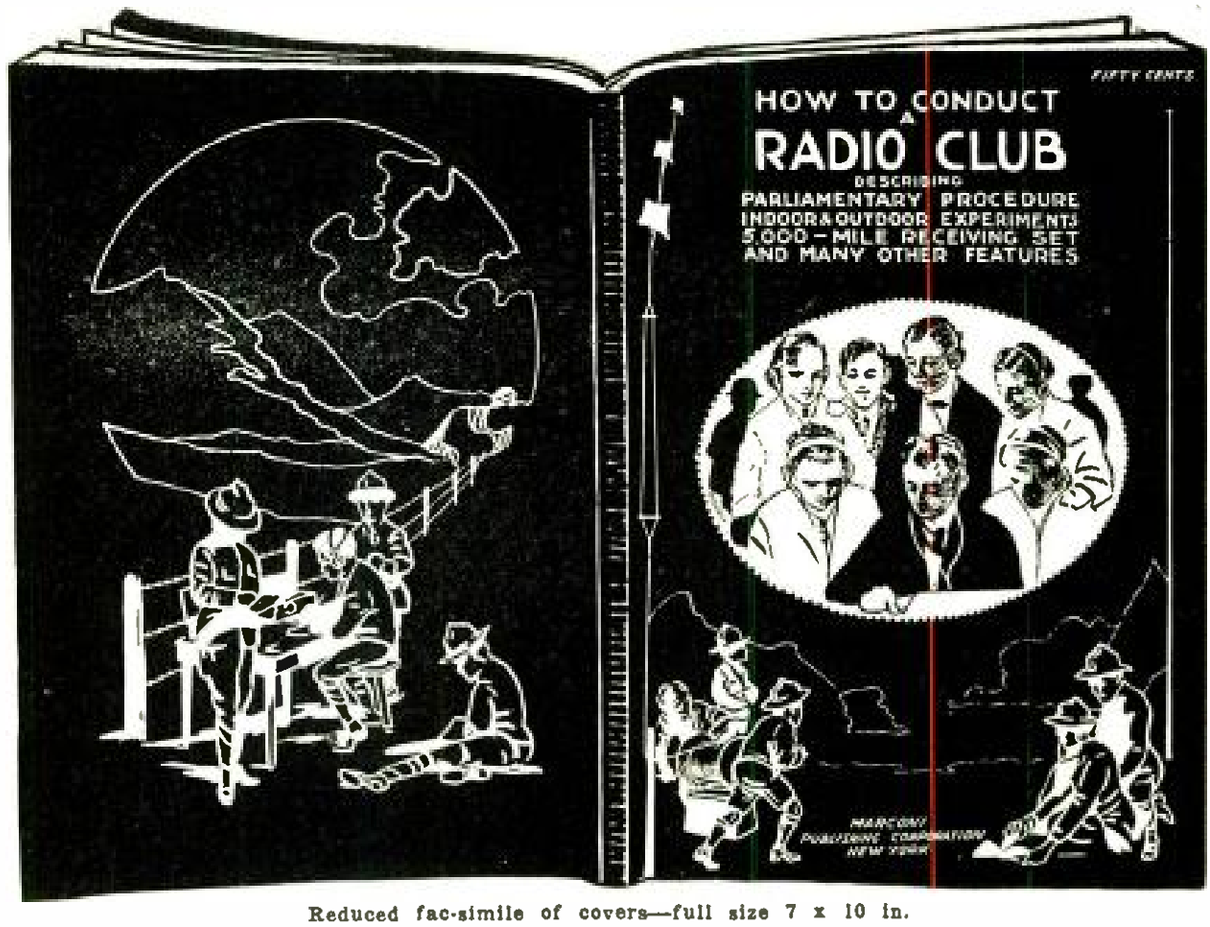
YEAR BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY, published at $1.50, special to members and clubs $1.10

CLUB PENNANTS: Made of first quality wool bunting, letters and emblem sewed on with cut outs in color and name of club added, prices on application.

Extra pennants for members 30c each

Fac-simile of 36 inch Pennant

Send all orders to Clayton E. Clayton, Managing Secretary, National Amateur Wireless Association, 450 Fourth Ave., N. Y. City.



Reduced fac-simile of covers—full size 7 x 10 in.

First Edition Is Already Sold. Second Edition Ready

How to Conduct a Radio Club

Describing Parliamentary Procedure, Indoor and Outdoor Experiments, 5000-Mile Receiving Set and Many Other Features.

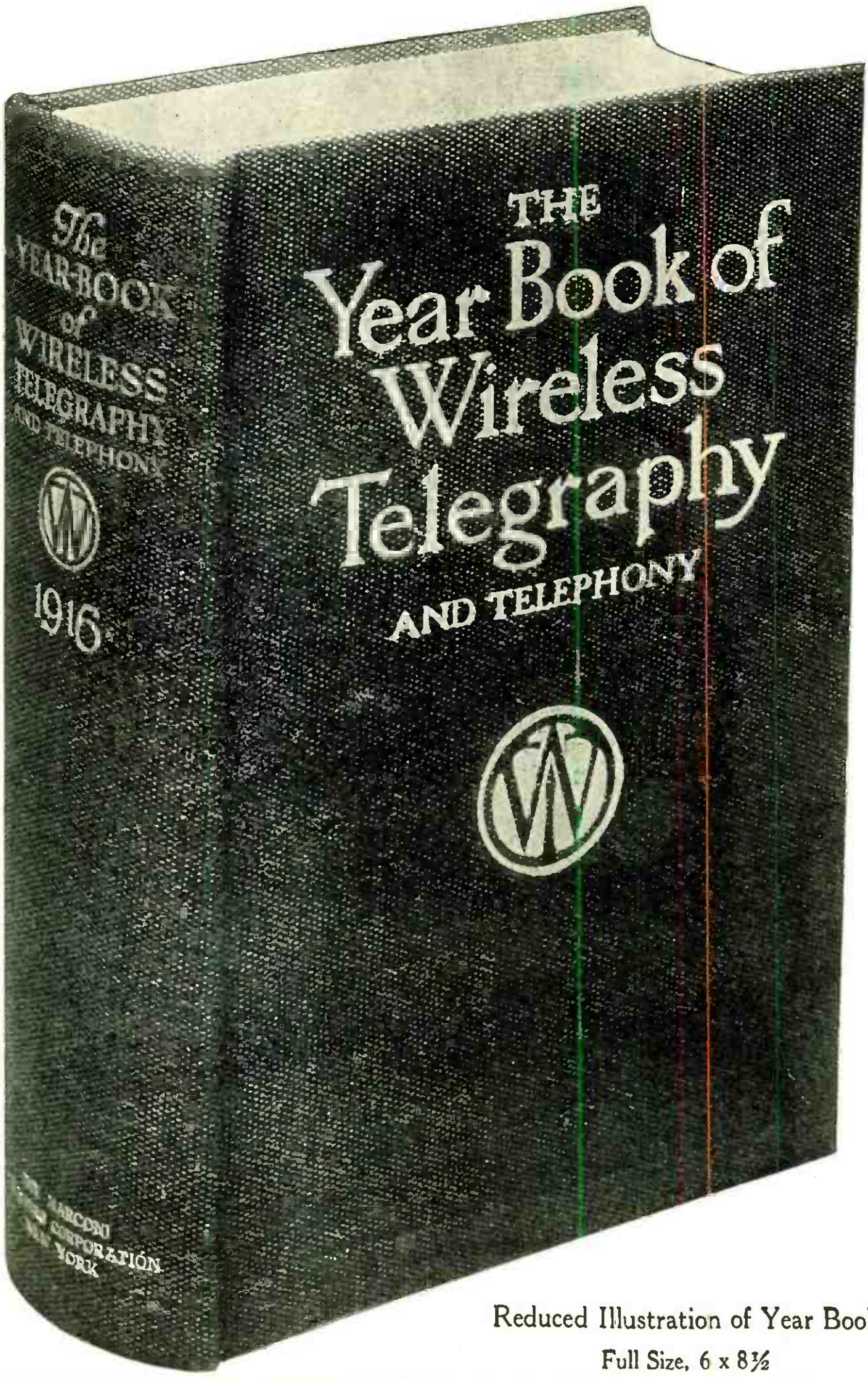
116 ILLUSTRATIONS

By E. E. BUCHER, Instructing Engineer
The Marconi Wireless Telegraph Company of America

TABLE OF CONTENTS

PRICE 50 CENTS A COPY

Published by THE WIRELESS AGE **450 Fourth Avenue, New York**



Reduced Illustration of Year Book
Full Size, 6 x 8½

THE J. G. WHITE Engineering Corporation

Engineers  **Contractors**

Reports—Valuations

Constructing the following high power wireless stations for the Marconi Wireless Telegraph Company:

New Brunswick - -	New Jersey
Belmar - - - -	New Jersey
Marion - - - -	Massachusetts
Chatham - - -	Massachusetts
Bolinas - - - - -	California
Marshalls - - - -	California
Kahuku, Oahu I. - - -	Hawaii
Koko Head, Oahu I. - - -	Hawaii

Also engaged in the engineering and construction of steam and electric railroads; power plants; water powers; and engineering reports and physical valuations of public utility properties.

43 Exchange Place, New York