THE MARCONIGRAPH

An Illustrated Monthly Magazine of WIRELESS TELEGRAPHY

EDITED BY J. ANDREW WHITE

Volume I. NOVEMBER, 1912 No. 2

CONTENTS

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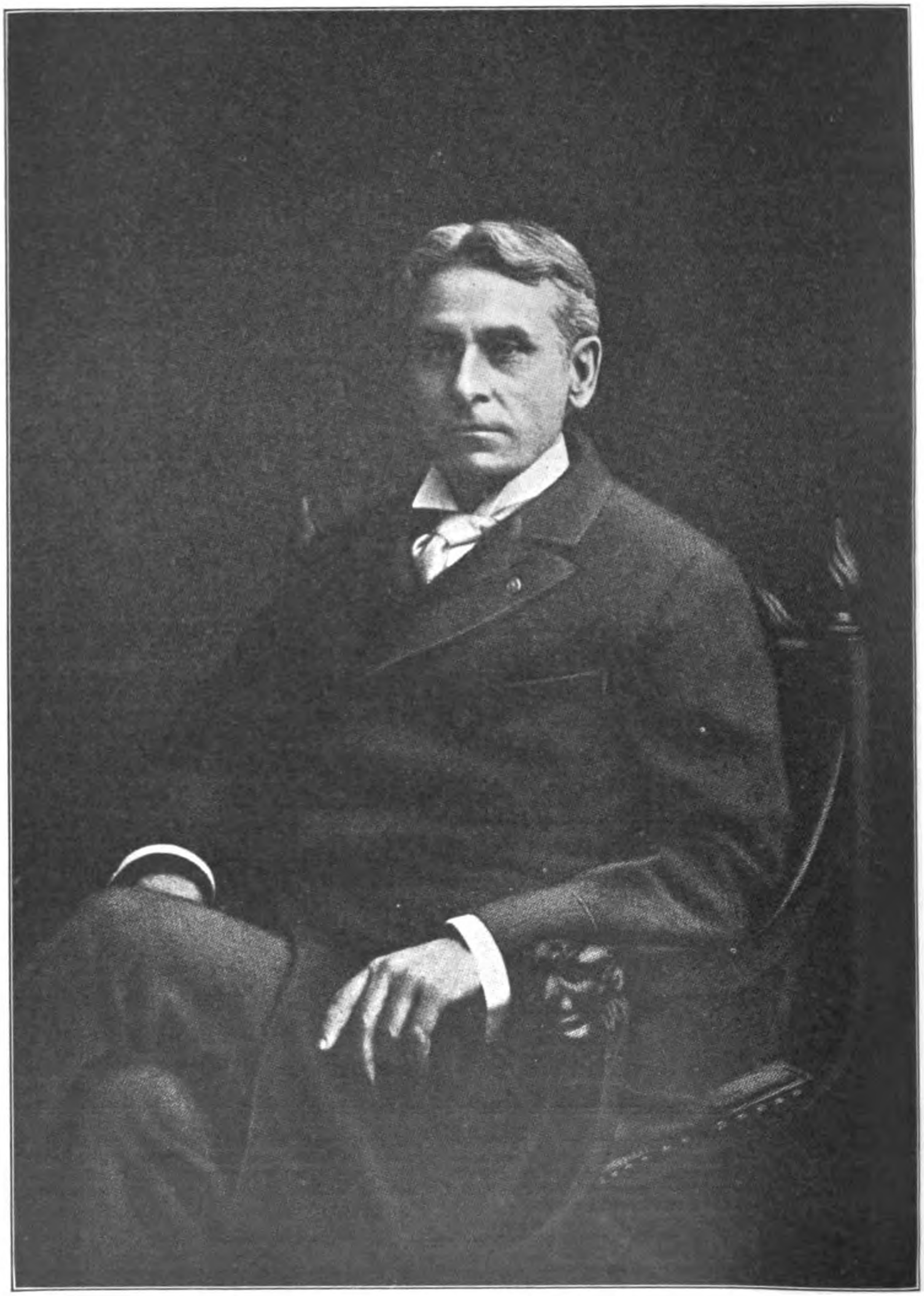

GOVERNOR JOHN W. GRIGGS

President Marconi Wireless Telegraph Co. of America

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Vol. I. **November, 1912** **No. 2**

IN presenting to our readers John W. Griggs, President of the Marconi Wireless Telegraph Company of America, we are adding but a very small contribution to the mass of laudatory articles that have appeared at frequent intervals over a considerable period of years. Perhaps no type of the human species is so susceptible to the sweet uses of publicity as is the politician. Yet, if the truth were known, it would probably be found that even the politician is prone to shun too much publicity, in the belief that it has the effect of embarrassing and retarding rather than quickening the operation of his mind and the development of his plans. After all, it is not helpful to a man to have constantly to dress his mind to suit the public eye, and still less to undress it in public as politicians are so often forced to do.

Governor John W. Griggs has lived a long and strenuous career, and had attained positions of dizzy eminence in the practice of the law and in the public affairs of his country before turning his attention to business and lending his mature talents for the development of the Marconi interests in the United States of America. He was born sixty-two years ago in the State of New Jersey, and after a successful, if somewhat uneventful, scholastic career, he prepared himself for the legal profession, and eventually became a member of the Bar of New Jersey and New York, and of the Supreme Court of the United States. To his undoubted talents he added keen intellectual perception, untiring energy, and infinite capacity for work. It is no surprise to find, therefore, that the engrossing labors of his profession did not diminish his interest in the welfare of his country, and that he was able to find time to render excellent service to the State. When the opportunity arose Mr. Griggs was at hand to make the most of it. It is recorded in the pages of history that great things have been done by men who made most of the occasion; men possessed of insight as well as foresight, who were gifted with the faculty of deciding how much was possible, by attempting that and not something else. That, if we may term it so, is the positive side of judgment —the facility of setting before oneself an object of attainment—which Mr. Griggs early in his public life showed himself capable of to a wonderful degree. But he was not lacking in the negative side of judgment, which we might say is to avoid making mistakes in the object set before one.

For eight years Mr. Griggs was a prominent member of the Legislature of New Jersey, and in 1895 he was chosen as Governor of that State. Henceforth known by the designation of Governor Griggs, he was to be made the recipient of still greater honor and responsibility. In 1899 he was appointed by President McKinley a member of the Cabinet, holding the portfolio of the Department of Justice as Attorney-General. He was one of the chief councillors of President McKinley during the period that comprised the Spanish war, the insurrection in the Philippines, and the Boxer rebellion in China, and while Attorney-General he argued many cases of great importance for the Government in the United States Supreme Court. In all these rôles, whether as councillor, statesman, or advocate, he displayed sagacity and sobriety of judgment, and to these natural gifts the fairy godmother added tact—a quality which perhaps flourishes somewhat sporadically.

Governor Griggs resigned the office of Attorney-General in April, 1901, in order to resume the practice of his profession. Since then he has held no public office. But it is not to be supposed that any country can forego altogether the services of a man who had shown a judicial or statesmanlike faculty of detachment that enabled him to see both sides of the question, and it is no surprise therefore that even after forsaking public life he consented to become a member of The Hague Court of International Arbitration.

He became a director of the Marconi Wireless Telegraph Company of America, and in 1905 was appointed President of that Company.

Rapid Advances Predicted for Wireless Communication

Some Views of a Columbia University Professor on the Advancement of Radio-Telegraphy

ACCORDING to Prof. I. Pupin, of Columbia University, wireless telegraphy is about to make some phenomenal advances. The professor believes that instead of the spark-gap method of sending out oscillations there will be used instead powerful high-frequency electrical generators.

To the layman this gives no hint of the tremendous importance of the step, but the student of wireless progress and development sees in it the promise of vast improvement. He foresees the transmission of wireless messages at all times and in all weathers and a new independence of atmospheric conditions. He foresees messages sent a far greater distance than at present and far more easily. He foresees the removal of many of the most besetting difficulties of wireless telephony. Above all, he foresees wireless brought down nearer to the level of its ultimate desire, the ordinary level of the ordinary telephone, the "foolproof" level.

When interviewed recently Prof. Pupin explained it was originally felt necessary that the oscillations for wireless transmission should be of very high frequency. The oscillations in wireless telegraphy are the aerial vibrations sent out from the transmitter of a wireless station to be caught by the receiver of a station within the radius of the waves produced. At the outset the operations called for as many as a half million or a million oscillations a second, high frequency such as only a spark-gap could produce. These were necessary for any great distance work, and yet there were difficulties involved in their use. Such high oscillations are constantly lost in sun-lit air, and, furthermore, besides being dependable on the weather, they are as discontinuous and irregular as the spit-spit of the crackling spark-gap itself.

Gradually, by such experimentation as is afforded only by the practical, commercial use of wireless, it was learned that messages could be sent across the water with a far lower frequency oscillation, as low as from twenty to forty thousand a second.

This was recently announced by Marconi himself, and with the announcement the electricians rose and said:

"If you can use oscillations of as low a frequency as that for wireless, then we can make you powerful dynamo-electric generators that will produce them. You will no longer have to depend on the spark-gap with its intermittent explosions. We will give you a powerful high-frequency machine that will send out a continuous, smooth train of oscillations and yet will have a hundred horse-power to drive them as far as you wish."

"And when that was made possible," said Prof. Pupin, "the practical problems of wireless were greatly simplified. For sending by slow oscillations is practically independent of the weather. The slow, continuous oscillations sent out from a hundred horse-power machine will go through any kind of atmosphere. The sunlight, which disintegrates the constituents of the air and destroys its capacity as a nonconductor, is ruination to the high-frequency oscillation, which calls for rain and cloud and darkness.

"The demands are just the reverse of those of the sailor's. The weather for ships is not good weather for the wireless, for good weather for wireless is good weather for ducks, as the saying goes. But the slow, powerful oscillations from the machine will go through any wind and weather and the stations need not be idle just because the sun is shining. This means an immense saving of time in that feature alone. Of course, it was always possible for the spark-gap to produce low-frequency oscillations, but to do so you would have had to drop to a horse-power of three or less. And that wouldn't reach very far."

Professor Pupin believes that within a year many high-frequency generators will be installed at the wireless stations on both sides of the Atlantic. He himself has ordered one for use in the laboratory at Columbia University. To speak of such machines as high-frequency machines is to use "high" only in relation to machines. It is very low for wireless of course.

Besides the fact that with this new method wireless transmission can go on at all times of the day, regardless of the weather, the use of the powerful machines such as any electrical company can manufacture for a station will mean a considerable extension of the practicable distance range of the stations.

"It will surely increase the distance," said Professor Pupin. "How much, I do not know. It may double it or even treble it. That is something we will have to find out.

"And, mind you," he went on, "this new step is being taken by the electrical world at large. It is not the work of a single mind, the device of a single inventor. It is a development arrived at by constant experimentation of many minds. It is a development such as the laboratory could not have brought forth, for it needed the experiments in actual world-girdling distances to ripen it. But wireless telegraphy has reached that stage where the touch of the genius is no longer needed and where the problems ahead for its perfecting are simply engineering problems. Marconi could die and wireless development would inevitably and continuously continue.

"When I say that, I am not slurring Marconi. On the contrary, I am giving him praise that is almost beyond words. It means that his work lives on and grows, whether he lives or not. And that means that his work is immortal."

Autos May be Run by Wireless

"In ten years from now gasoline-driven motor cars will be a thing of the past; in fifty years from now motor cars will be operated by electricity, the power being transmitted to them by means of a wireless arrangement," says W. H. Radford, Consulting Engineer of the Warren Motor Car Co.

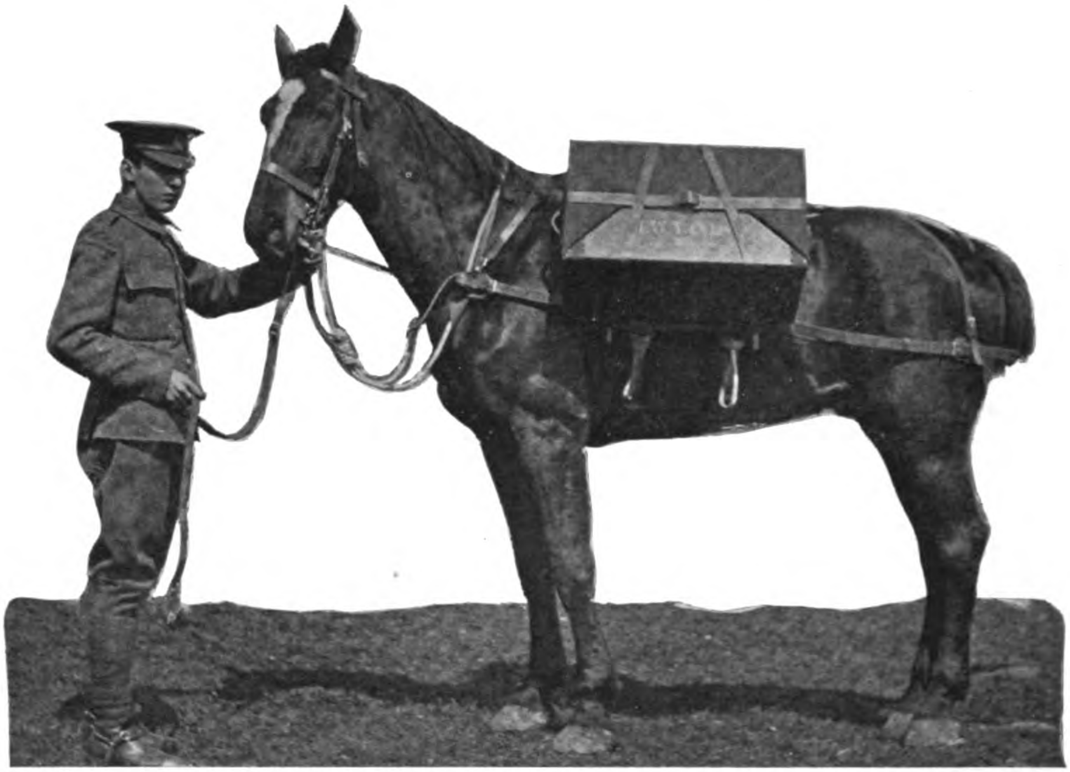
Mr. Radford made this statement while discussing the past and future of the automobile industry. He insists that the motor car in its present stage is far from perfection and that the next decade will witness a wonderful change, both in the process of manufacture and in the make-up of the car.

"The supply of gasoline is gradually becoming exhausted," continued Mr. Radford. "In the past ten years the price of gasoline has risen from 8 and 10 cents to 18 and 20 cents a gallon. In a few more years it will be prohibitive and it will be absolutely necessary for automobile engineers to devise other ways and means for propelling cars.

"I do not believe that alcohol will be successfully used. Probabilities are that some of the baser oils, for instance kerosene, will be brought into relief. Engine manufacturers have already succeeded in building an engine which can be run by kerosene. Automobile engineers will have to do the same thing. It is not a question of monopoly of gasoline, but a question of beating nature. You can't do that.

"In fifty years from now, and the probabilities are in less than that, all motor cars will be propelled by electricity. I do not mean that automobile owners will be compelled to carry around a thousand pound storage battery with them, but they will secure their power from wireless stations.

"The high towers will be eliminated and there will be a means of transmitting and catching the current without the use of high voltage now necesasry, nor the tall staffs that connect the wires."



Aiding the Aerial Scouts

Cavalry Detachments are Being Equipped With Wireless Sets to Assist in Transmitting and Receiving Messages Relative to the Movements of the Enemy

FOR many years the consensus of opinion among military strategists has been that the cavalry is the most effective division of an army. History tells us of countless victories won by sudden flank movements of the mounted squads and many an unrecorded victory no doubt could be attributed to the timely information secured by swiftly galloping scouts. Throughout the whole of the Civil War the dashing raids of the hard-riding Confederate cavalry figured prominently in every decisive battle; even during the late Spanish-American War the daily reports were filled with the exploits of our gallant Rough Riders.

Always a picturesque figure, the cavalry of the armies of the world are rapidly becoming even more so through the addition of wireless equipment; truly in these days of aerial scouts communicating the details of the enemy's position and movements to a wireless equipped cavalry troop, it would seem that the height of romance had been reached.

The most successful work thus far accomplished is credited to the cavalry type field sets made by the Marconi Company for several European Governments.

This type of station has been designed to be carried on four pack saddles, and to maintain communication over a distance of 30 to 40 miles, depending on the intervening country. As it is primarily intended for cavalry reconnaissances, the time taken to get into action was considered to be of the first importance, and has been reduced to a minimum.

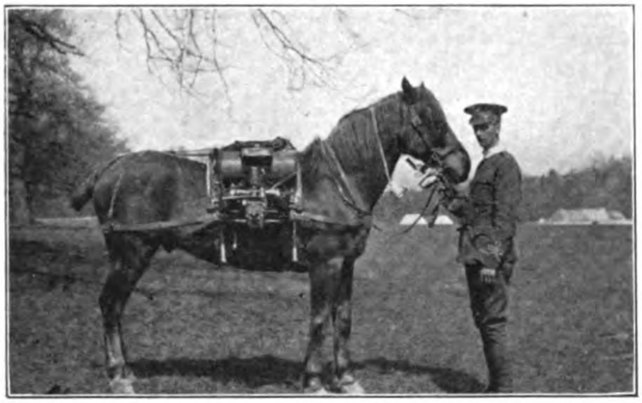
With a view to avoiding interference from other stations, the tuning of the receiving apparatus has been as sharp as possible, and arrangements have been made to change the wave length quickly.

Each station has two masts 30 feet long in six sections, which are all interchangeable. The masts can be erected without a derrick and support a Marconi patent horizontal aerial. The power is supplied by a small air-cooled gasoline motor, which is permanently mounted on one side of a rigid but adjustable saddle, the dynamo being similarly mounted on the other side. To bring this into action it is only necessary to lift the complete saddle off the pack animal, place it on the ground and connect the dynamo and motor with a self-adjusting driving shaft. The wireless apparatus is contained in three weatherproof boxes, which, being placed one on the top of the other, are instantly ready for use. The earth system consists of a short length of tough metallic netting which is rolled out on the ground, and plugged into a suitable socket in the receiver, after which the generator is connected to the transformer by a 50-foot length of armored flexible cable.

The system of loading is the outcome of many years' experience, and every detail has been carefully considered with a view to attaining both rapidity of loading, together with absolute security for the loads, and an important point is, that owing to the way in which the loads are secured to the saddles, the animals may be off-saddled without disturbing the loads in any way. By reason of its lightness the station can without difficulty keep up with cavalry and can be erected or dismantled in less than ten minutes.

The aerial load consists of two strong fibre cases weighing approximately when packed 71 lbs. each. The weight of the saddle is approximately 40 lbs., and the gross weight of the load 182 lbs. The offside case measures 27 in. by 15 in. by 7 in., and contains the aerial wire wound on two reels with standards fitted with a brake for unreeling, and the complete primary oscillating circuit in a box. The near side case measures 20 in. by 15 in. by 7 in., and contains the anchor-pegs, mast-stays, and halyard, spare mast and fittings, and a hammer; both cases are

The Instrument Load, Showing the Manner in Which the Transformer is Secured to the Saddle.



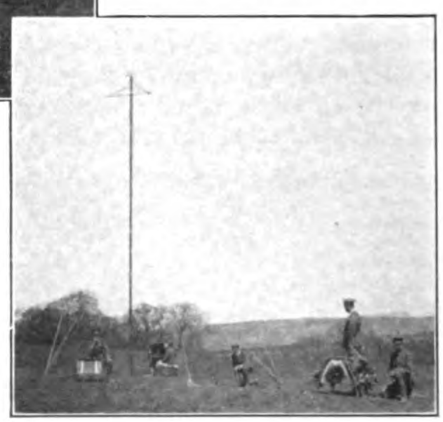
The Gasoline Engine is Fitted to a Specially Adapted Saddle Frame.

gross weight of the load approximately 190 lbs. The weight of the saddle is approximately 55 lbs.

The mast load is made up of 12 mast sections, two spreaders and the earth net, and is secured to the specially designed extensions of the saddle by means of straps which are tightened by powerful self-locking levers. This system admits of the masts being loaded and unloaded with the utmost rapidity, and at the same time provides a very secure attachment to the saddle.

The gross weight of this

Pack and Riding Horses Grouped Together Ready for Unloading.



Station Set Up and Working.

attached to the saddle by hooks and are firmly secured by bracing straps. The instrument load consists of two boxes weighing approximately 74 lbs. each. The weight of the saddle is approximately 40 lbs., and the gross weight of the load, 188 lbs. The offside measure 23 in. by 11 in. by 11 in., and contains the transformer; the nearside box measures 27 in. by 11 in. by 15 in., and contains the whole of the receiving and manipulating apparatus together with the secondary of the oscillatory transformer and all the necessary spares. These two boxes are fitted with hooks similar to the aerial load and are secured in the same way.

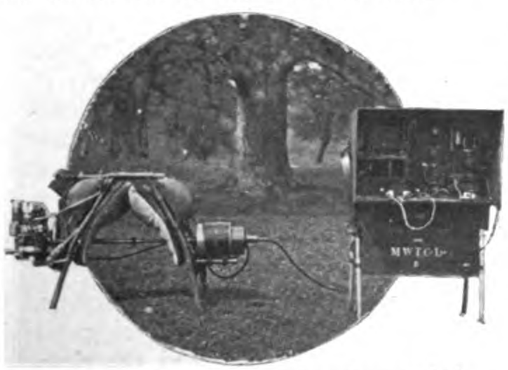
The engine load consists of a gasoline engine fitted on the offside of a saddle with specially adapted frame, and a self-exciting alternator fitted on the near side. The necessary tools, gas and oil tanks are fitted to the saddle on

The System Admits of the Masts Being Loaded load is 190 lbs., the weight of the saddle being 70 lbs., approximately.

One of the photographs shows the engine set up ready for working with the telescopic driving shaft fitted. The engine has two horizontal opposed cylinders, and is very perfectly balanced, so that when running at a high rate of speed the saddle requires no fixing whatever, and there is a minimum of noise and vibration. Air cooling is effected by an efficient fan on the flywheel, and an electric throttle is fitted, controlled by the working current, which maintains a constant engine speed during transmission. The lubrication is automatic and capable of instant regulation, and a valve lifter ensures easy starting. The generator is an enclosed self-exciting alternator coupled to the engine by means of a self-adjusting telescopic shaft fitted with universal joints at each end, which is capable of being fitted or removed in a few seconds. The tank over the engine holds two gallons of gasoline and one quart of lubricating oil and that on the near side of the saddle holds a similar quantity in reserve.

The three boxes which form a complete receiving and transmitting installation are placed one on the top of the other; the side of the top box opening out and forming a protection for the operator, as well as a table upon which to write.

In order to start working it is only necessary to make plug connections between the transformer box and the dynamo and manipulating key, respectively, and similarly couple the aerial and earth net to the receiver box.



Engine and Generator with Transmitting and Receiving Instrument Set Up.

With this system the method of "ringing" the pack and riding horses alternately previous to unloading leaves every man free to unload and the horses are quite secure and require very little attention.

Aircraft Sends Messages During Cruise

The most interesting feature of the recenty thirty-hour cruise of the new German naval airship was the craft's successful wireless communication with wireless stations. Messages from her were received at the military station at Strassburg, at Cologne, at Frankfort-on-the-Main, at Osnabrück, and, it is reported, at Norddeich, on the East Frisian Coast.

At Frankfort a message of good wishes was transmitted by wireless from Princess Frederick Charles of Hesse, and a wireless reply was received from Count Zeppelin.

Communication with Frankfurt was maintained for nearly an hour and a quarter. The airship carried twenty-one persons and nearly three tons of fuel.

Hydro-Aeroplane After Record

At Hammondsport, N. Y., the aviators are trying for a wireless record from aeroplanes; experiments are under way at the Curtiss Aerodrome. A Curtiss military hydro-aeroplane of the latest type has been equipped with a new wireless transmitter recently designed for United States torpedo boat destroyers and submarines.

It is extraordinarily light, and the electric generator, weighing less than five pounds, has a source of power independent of the aeroplane motor, and is therefore not effected by any accident to the latter.

The hydro-aeroplane flying five hundred feet above Lake Keuka can be seen for miles, lighted by a big searchlight. The light goes out as the operator starts to telegraph and flashes up as he stops sending.

The Wireless Compass

A Description of the Instrument Evolved to Aid Navigation in Foggy Weather

THE great development in both size and speed of modern ships enormously increases the responsibilities of those who command and navigate them, and has necessitated a careful examination of the existing methods for determining a ship's position at all times by day and night, and in all conditions of weather, both when in sight of land and on the open ocean. Great as is the value of the mariner's compass, its improvement has been but a slow process.

Now, however, comes an apparatus that will aid navigation in foggy weather and furnish ships with an undreamt of guide across the trackless waters. It is known as the wireless compass. Developed at the Marconi works, this apparatus represents a great step forward in the art of navigation for hitherto it has been necessary, in order to minimize the dangers of collisions or groundings, to reduce the speed of vessels in foggy weather, but this entails considerable loss of valuable time; and even when this precaution has been taken accidents are not infrequent. The new compass is worked by ether waves, such as are employed in wireless telegraphy and is quite independent of weather conditions. The two main aids which it affords to navigation are:

(1) The position of the ship with regard to any coast station can be determined.

(2) The direction of an approaching or overtaking ship can be found.

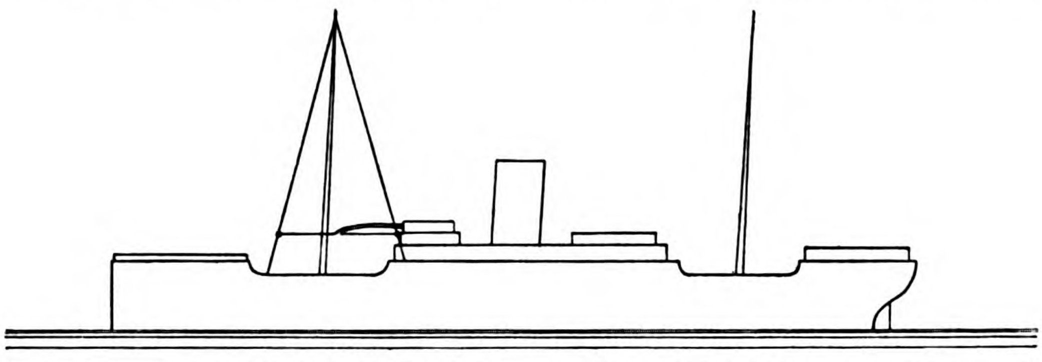


Fig. 1.

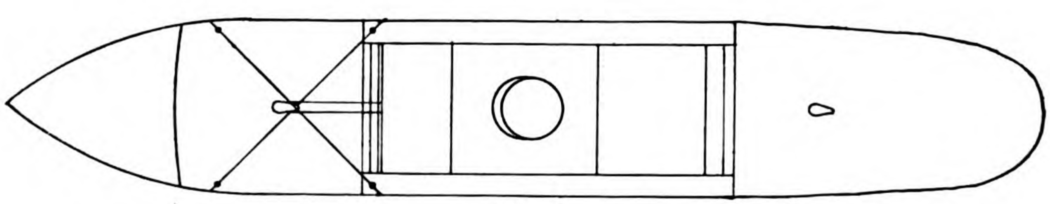


Fig. 2.

Mariners will agree that these are two very considerable advantages.

The wireless compass is formed of three main parts—the receiving aerials, the radiogoniometer, and the detector. The receiving aerials (Figs. 1 and 2) consist of two equal triangles, each formed by a single wire, placed so that their planes are exactly at right angles. The apices are held in position by a single porcelain insulator of special type which may be attached to a mast

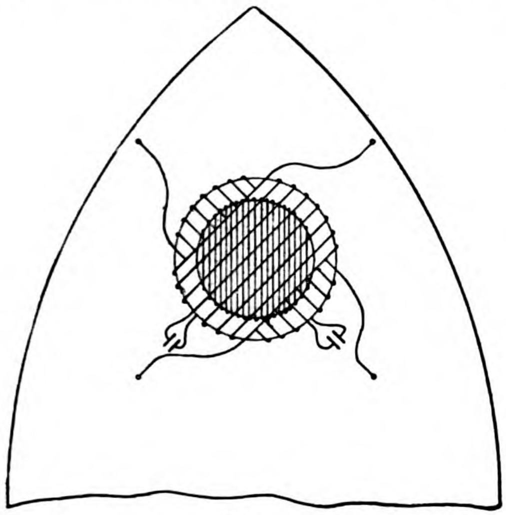


Fig. 3.

or stay between masts, the sloping sides and bases being stayed to stanchions or or convenient ship fittings with ebonite rod insulators. The bases are cut in the centre and insulators inserted; the four ends thus formed are led to the goniometer. The copper wires used are less than 1/5 in. in diameter, and besides being extremely light, are almost invisible.

The radiogoniometer (Fig. 3) consists of two equally wound coils fixed vertically and at right angles. In the space enclosed by these coils is fitted a single movable coil working on a vertical axis, and this coil is known as the "exploring coil." A circular scale calibrated from 0° (ahead) to 180° (astern) shows the position of the exploring coil. The two fixed coils are cut in their centres, and adjustable condensers are inserted; these condensers are used for tuning the aerials to the required wave-lengths, and are mechanically connected so that both aerials are adjusted simultaneously. Small protective spark gaps are also fitted.

The detector, which is connected to the exploring coil of the radiogoniometer by flexible leads, is arranged for use with either valve or crystal rectifiers. The necessary tuning condensers are included, and a variable coupling for increasing or decreasing the strength of the received signals is provided. The signals are received on a telephone. An accumulator is also provided which contains sufficient current to last for a very considerable time; when exhausted the accumulator can be easily recharged.

The Wireless Compass does not give magnetic bearings; it is azimuthal, and positions are given with regard to the ship's axis; the position of the axis is, of course, known from the magnetic compass. The compass does not give one absolute direction for the position of a station, but it gives two possible directions, one exactly opposite to the other. Thus a station shown on the port may be on the starboard quarter at exactly 180° from the port position. The port or starboard position of a land station is generally known, and in any case can be accurately determined by two successive readings. The range of the compass varies with the strength of

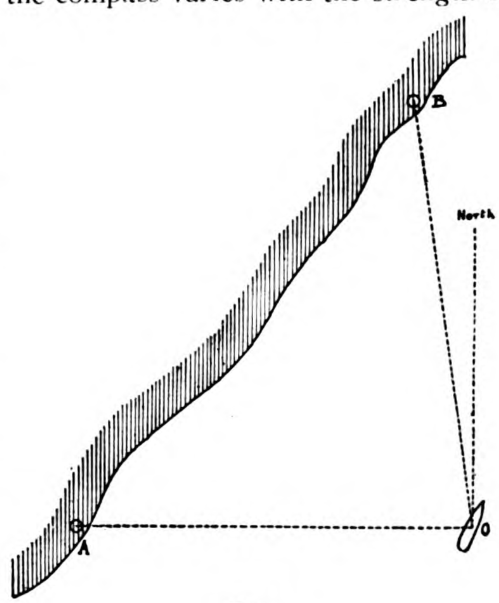


Fig. 4.

the sending station and size of aerials fitted; when used with a standard ship set it is from 25 to 60 miles.

The principle of the compass may be briefly explained thus: Each triangular loop of wire is a directive aerial, and receives best when its plane is in the direction of the sending station; if swung so as to be at right angles to the transmitter, it receives nothing.

The intensity of the received current varies with the cosine of the angle which the plane of the aerial forms with the transmitting station. Except in the case where the plane of one aerial is directly at right angles to the transmitting station, two currents, whose intensities depend upon the direction of the sender, will be generated in the aerials. These currents are carried through the fixed coils in the radiogoniometer, and generate in the enclosed cylindrical space two magnetic fields at right angles, which compose themselves in a resultant field in a position at right angles to the direction of the sending station, assuming the planes of the coils coincide with the planes of their respective aerials. The exploring coil will therefore be traversed by the maximum current when its axis coincides with the resultant field, and will be quite inoperative when at right angles to that field. The direction which gives maximum strength of signals is the direction of the sending station.

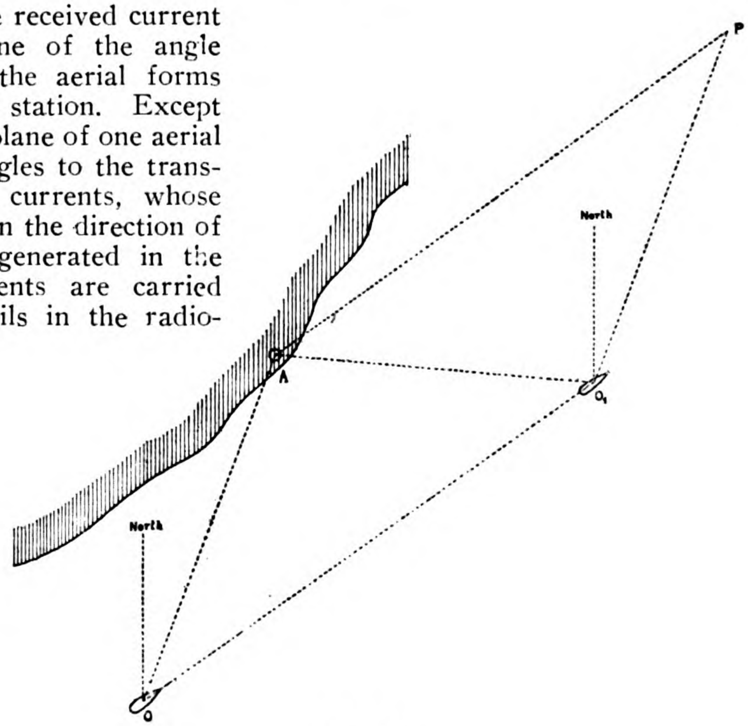


Fig. 5.

The compass is designed to work with ships' standard wave-lengths, and can be tuned continuously to all wave-lengths, between 250 and 700 metres. Special instructions given with each instrument explain in detail how to tune the various circuits. To find the position of maximum strength with great accuracy, the pointer should be turned to either side of the maximum until signals become inaudible—the mean ot the two points obtained is the exact maximum, and therefore the required position. In this way the direction of the transmitting station can be found to within 1 or 2 degrees.

Two coast stations, A and B (Fig. 4), being within range, the following method quickly gives the desired position of the ship, O: the direction of the stations having been found and read as angles to the ship's axis, a line representing the course is drawn on the chart and with this line the two read angles are drawn so as to pass through the land stations, A and B; the intersection of the lines gives the ship's position.

If *one station* only is available,, it is necessary to take two readings at an interval of time, as follows:

The direction, O A (Fig. 5), is found as an angle with the ship's course; the ship then proceeds for, say, half an hour at a known speed in the direction O O_1. A second reading is now taken, and the position worked out as follows: a line to represent the course is drawn on the chart; a line, A P, is drawn parallel to the course and equal to the distance covered in the intervening time between the readings. Lines from the station, A, making the read angles with the course are drawn; then from P a line is drawn parallel to the first line, O A. The intersection of this line with the second line, A O_1, gives the required position.

An important feature of the wireless compass is that it not merely enables a vessel to locate its own position, but also that of an approaching vessel.

How Wave Lengths are Measured

A Description of the Instrument Designed for That Purpose and How it is Used

Photo by Underwood & Underwood.

EVERY wireless expert knows that it is a matter of great importance in electric wave telegraphy to determine easily the length of the electric waves used, as well as the frequency of the oscillations in the antenna or aerial wire. An instrument whereby this can be done at once and without the slightest skill on the part of the operator has been devised by Dr. J. A. Fleming, F. R. S., for use on the Marconi system. It is known as the Cymometer.

The Cymometer, or Wave Measurer, also has numerous uses in connection with the measurement of small high frequency electric currents such as measuring small capacities, for instance, those of Leyden jars; of small inductances, such as those of short or coiled pieces of wire and also the frequency of high frequency electric currents. By the use of special adjuncts to the instrument the rate of decay of the oscillations in a train of waves can also be determined, and hence the number of waves or vibrations which make up a group or train of electric waves. It can also be used to demonstrate in an elegant manner the laws of electrical resonance, and is particularly suitable for this purpose in class or lecture demonstrations, as the effects can easily be witnessed by large audiences.

In fact, the Cymometer is an instrument of quite as much importance and utility in connection with high frequency electrical work as the potentiometer or Wheatstone's Bridge is

Determining the Number of Oscillations Taking Place in a Wireless Telegraph Transmitter. In this Particular Case the Number of Oscillations was Found to Be 1,200,000 in One Second of Time.

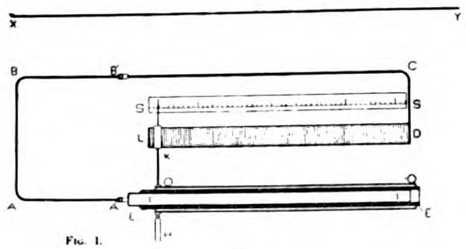


Fig. 1.

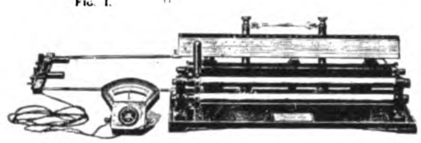


Fig. 2.

in connection with the measurement of continuous or steady electric currents.

The instrument consists of a sliding tube condenser which is joined in series with a variable inductance coil (see Fig. 1). These two elements are so connected together that one movement of a handle H varies simultaneously and in the same proportion the capacity of the sliding condenser OI and the inductance of the part of the coil LD in circuit. The circuit of the condenser and the inductance are completed by a thick copper rod ABC, forming what is known as a closed oscillatory circuit, the capacity and inductance of which can be varied simultaneously and in the same proportion over certain limits. If such a circuit is placed near another circuit, XY for example, the antenna of a wireless telegraph transmitter in which high frequency oscillations exist, these last tend to induce in the Cymometer secondary electric oscillations, but the amplitude of these secondary oscillations is extremely small unless the circuit of the Cymometer is **tuned** or adjusted to that of the primary circuit in which the oscillations are taking place. If, however, this adjustment is exactly made, then the primary oscillations create secondary oscillations in the Cymometer circuit of great amplitude; in other words, set up a powerful secondary current in the Cymometer circuit. This adjustment is effected by moving the handle H of the Cymometer, thus causing the tube or tubes which form one surface of the condenser to slide more or less off an ebonite tube which encloses other metallic tubes forming the second surface of the condenser, and at the same time inserts more or less of a spiral of wire into the circuit. The adjustment which is necessary to secure this precise tuning between the Cymometer circuit and the circuit under test is recognized by the employment of a Neon vacuum tube connected between the inner and outer surfaces of the sliding tube condenser. Neon is one of the rare gases contained in the atmosphere. Some years ago Dr. Fleming determined that a glass tube filled with rarefied Neon constituted an extremely sensitive means of detecting high frequency electric oscillations, as the tube glows with a brilliant orange light when the platinum terminals are connected to two points on the circuit in which such oscillations are taking place.

In its most recent form the Cymometer consists of a sliding tubular condenser formed of one, two or four inner brass tubes enclosed and fixed in one, two or four ebonite tubes and outside these last one, two or four movable brass tubes which are coupled to one another and to a handle (see Figs. 2 and 3). By moving this handle the outer tubes slide off the inner tubes and so vary the electrical capacity between them. From one end of the tubes a metallic arm projects, ending in a curved clutch K (see Fig. 1), which rests upon a spiral of bare copper wire LD wound round in grooves in an ebonite rod. The inner brass tubes of the condenser are connected to one end of the inductance coil or spiral by means of a thick copper rod, ABC, part of which is detachable for special experiments. The two surfaces of the sliding condenser are also in connection with wires supported by two ebonite pillars, and to the ends of these is attached the Neon vacuum tube. Over the spiral is placed a scale having four rows of graduations. One of these marked **Oscillation Constant,** the next two **Wave Lengths in Feet** and **Wave Lengths in Metres,** and the fourth row **Number of Oscillations per One Millionth of a Second.** As the handle is moved along, sliding the clutch over the unductance coil, a pointer attached to the latter moves over this divided scale. The term **Oscillation Constant** signifies the square root of the product of the numbers, denoting the capacity of the sliding condenser reckoned in microfarads, and the inductance in centimetres of that part of the coil which is included in the circuit of the instrument in any position of the handle. If, therefore, the handle is in a position so that the pointer indicates on the oscillation constant pointer gives us not only the oscillation constant of the Cymometer itself in that position, but also that of the circuit under test. If the circuit under test is the antenna of a wireless telegraph station there is a definite relation between the length of the wave radiated and the oscillation constant of the circuit and also between the frequency of the oscillation and the oscillation constant which is expressed by the following rules:

Wave length (in feet) $= 198.6 \times$ oscillation constant.

Wave length (in metres) $= 59.6 \times$ oscillation constant; and Frequency (in millions per second) $= 5.033 \div$ oscillation constant.

Hence, if the oscillation constant of

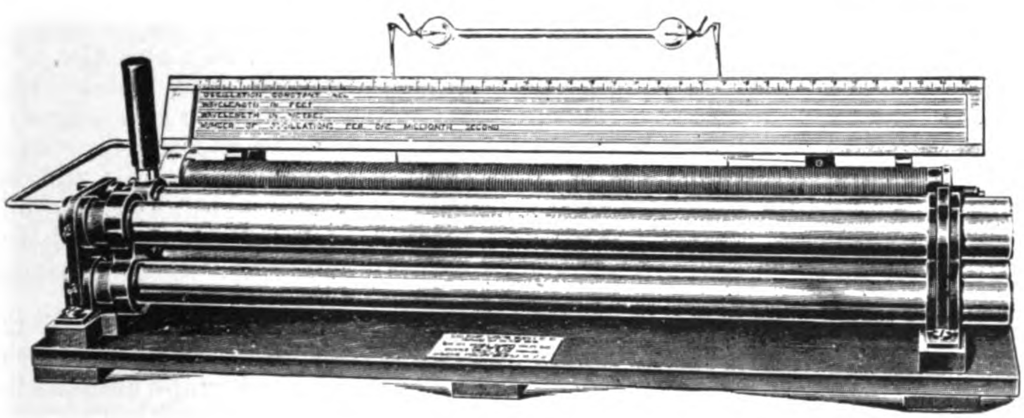


FIG. 3.

scale, say the number 5, this signifies that in that position of the handle the product of the capacity of the tube in its particular position reckoned in microfarads, and the inductance of that part of the spiral included in the circuit in that position is equal to $5 \times 5 = 25$, and so on for other positions. If then the Cymometer is placed in proximity to any other circuit in which oscillations are taking place. and if the handle of the Cymometer is moved to and fro, some position will be found in which the Neon tube will glow most brightly, and in that position the value of the oscillation constant indicated on the scale by the the antenna or aerial wire is determined, the above rules tell the length of wave being emitted in feet or metres and the frequency of oscillations in the antenna.

The oscillation constant of the antenna is determined by finding the oscillation constant of the Cymometer when it has been brought into exact tuning with the antenna by varying together its inductance and capacity.

Since each instrument has only a definite range of about 25 to 1, a suitable Cymometer must be employed for the particular measurements being made, so four types of Cymometers have been designed by Dr. Fleming,

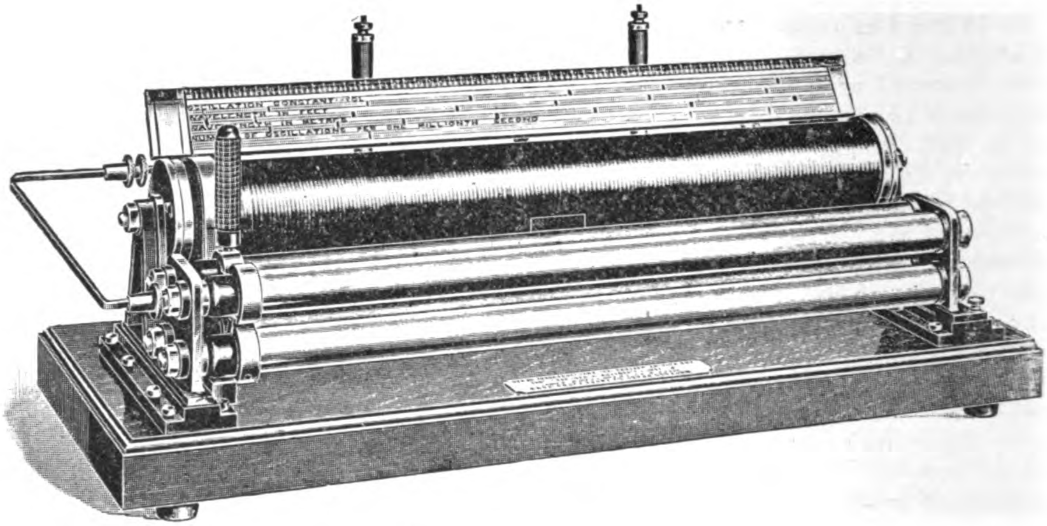


FIG. 4.

the first measuring oscillation constants from about 1 to 18, the second measuring about 2 to 25 (see Fig. 2), the third from about 3 to 37 (see Fig. 3), and the fourth from about 4 to 50 (see Fig. 4).

The first instrument, called No. 1 size, measures wave lengths from about 33 to 700 metres, the second (No. 1a) from about 66 or 99 metres to 1,400 metres, the third (No. 2) from about 99 or 130 metres to 2,000 metres, and the fourth (No. 3) from about 330 metres to 3,000 metres. The complete range of instruments enable wave lengths of any length between 33 and 3,000 metres to be measured.

The most useful type for ordinary laboratory measurements will be found to be the No. 1 size, measuring oscillation constants from 1 to 18.

A standard inductance consisting of turns of insulated wire stretched on a rectangular frame is supplied with each instrument. These inductances vary from about 4,000 cms. to 75,000 cms., depending on the pattern of the Cymometer in question. In the larger patterns the inductance is arranged so that turns can be cut in or out at will. Part of the thick copper rod which completes the circuit of the Cymometer is made removable and forms a double bend of $A^1 ABB^1$ of copper rod (see Fig. 1). The complete Cymometer outfit also includes a single pivot sensitive galvanometer, an ammeter and a rheostat, as well as a carbonic acid vacuum tube and one or more vacuum tubes containing Neon. For many purposes all that is required is a single Neon or carbonic acid tube.

In determining the length of the waves given off by a Marconi aerial wire or wireless telegraph antenna the Cymometer is placed with its copper bar parallel to the lower portion of the aerial wire and a few inches from it, the outer surfaces of the condenser tubes are connected to earth by connecting to earth the right hand terminal on the ebonite pillar to which the vacuum tube is attached. The transmitter coil is then set in action and the handle of the Cymometer moved until the vacuum tube glows most brightly. The reading on the scale gives the wave length, both in feet and metres. In general, it has been found that there are two positions of the handle in which the tube glows. These correspond to the two wave lengths sent out from the aerial.

In making this experiment the copper bar BC (see Fig. 1) is placed as far from the circuit being tested as possible. Should it be placed too far away, however, the vacuum tube does not glow under any circumstances, but when it is brought just near enough, a position is found with a very sharp scale reading in which the vacuum tube just glows.

Another experiment of particular interest is to measure the decrement of the oscillations in an oscillatory circuit. When electrical oscillations are created in an antenna or other circuit by means of condenser discharges, each electric spark discharge creates a train of oscillations which gradually die away. The oscillations decay in amplitude according to the law that the ratio of any oscillation to that the next preceding is constant. This constant ratio is called **the damping** of the oscillation and the Napierian logarithm of the ratio of one oscillation to the preceding one is called the logarithmic decrement, or shortly, the **decrement** (d). If we assume, as we may do, that the oscillations in a train are practically extinguished when the last oscillation is not more than 1 per cent. of the initial one, then it is easy to show that the number of semi-oscillations M in the train is given by the rule

$$M = \frac{4.605 + d}{d}$$

where d is the decrement per semi-period or

$$d = \log_e \frac{I_1}{I_2} = 2.303 \log_{10} \frac{I_1}{I_2}$$

that is, d is the Napierian logarithm of the ratio of two successive oscillations or 2.303 times the ordinary logarithm to base 10 of the same ratio. As the qualities of a train of electric waves depend greatly upon the damping, the determination of the quantity d is an important measurement.

The Cymometer is used to determine the decrement as follows:

The simple double copper bend with which the Cymometer is provided for completing its circuit is replaced by a special double bend (see Fig. 5) containing (i) a fine resistance wire and (ii) a fine resistance wire having thermo-electric junction in contact with it. These resistances and thermo-electric junction are contained in two ebonite boxes attached to the special bend (see Fig. 5) and a length of flexible connecting wire is provided by which the thermo-electric junction is connected to a single pivot sensitive low resistance galvanometer.

The first step is to calibrate this galvanometer so as to ascertain the value of the currents which when sent through the fine wire produce certain galvanometer deflections. The two fine resistance wires are included in small ebonite boxes. The one which possesses a thermo-electric junction in contact with the resistance is marked THERMO-ELECTRIC JUNCTION. These resistances are kept short-circuited by brass straps and are closed when not in use. The outfit includes a direct reading milliam-

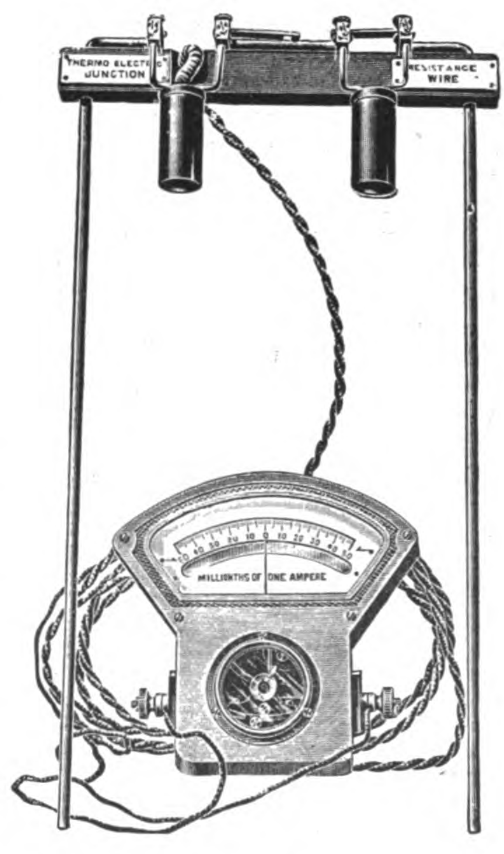


FIG. 5.

meter and rheostat and certain coupling wires.

To calibrate the galvanometer the procedure is as follows:

The milliammeter, the rheostat, a secondary cell and the copper bend are joined up in series in one circuit, all resistance having been carefully inserted at first. The flexible leads are then attached from the thermo-electric junction to the galvanometer and the strap short-circuiting the thermo-electric resistance only is removed. Careful note is taken of the deflection of the galvanometer as the rheostat is varied so as to pass known currents, read off on the milliammeter, through the copper bend. The rheostat can be varied from 200 ohms to 20 ohms, and if the secondary cell has a voltage of 2 volts, currents can be obtained varying from 10 milliamperes to 100 milliamperes as read off on the ammeter.

Corresponding to each particular current the galvanometer deflection is noted and a curve constructed on squared paper showing the relation of the true current in milliamperes through the fine resistance wire to the deflection of the galvanometer in connection with the thermo junction in contact with it. Such a curve enables the determination from the galvanometer the effective or root-mean-square value of the electric oscillations which when passing through the fine resistance wire produce an observed deflection on the thermo-galvanometer.

Having done this, the plain copper bend of the Cymometer is replaced by the special bend and the Cymometer used in contiguity to any oscillation circuit of which it is desired to know the decrement. In doing this care is observed that the Cymometer is not brought too near the oscillation circuit under test at first, or the oscillations set up in it may be so strong as to burn out the fine resistance wires in the ebonite boxes.

A series of observations were taken as follows: The Cymometer handle was set at one end of the scale so as to include all the capacity, and moved forward step by step, noting the reading of the oscillation constant and at the same time the reading of the galvanometer in connection with the thermo junction. It was found that on approaching the position of resonance the galvanometer reading increased very rapidly to a maximum. To get good results it was necessary, therefore, to move the Cymometer handle very slowly and by very small steps near this maximum. The observed values of the oscillation constants were converted into **frequencies** by the rule

$$\text{frequency} = \frac{5{,}000{,}000}{\text{oscillation constant}}$$

and the galvanometer scale readings converted into amperes by the aid of the already determined curve.

A curve called a *resonance curve,* of which the abscissae are frequencies and the ordinates are Cymometer currents was then plotted out. In so doing it was found best to take the maximum value of the Cymometer current as unity and the corresponding resonance frequency as unity and correct the other figures to match.

In this manner two resonance curves were obtained, one with the additional fine wire resistance in the Cymometer bar short-circuited or cut out, and another with this resistance inserted. We had then all the observations necessary to obtain the decrement.

It has been shown by V. Bjerknes and by P. Drude that the following relation holds good between the decrements of the two circuits and their frequencies.

Let d_1 and n_1 be the decrement and frequency of the circuit under test and d_2 be the decrement of the Cymometer. These being the decrements per half period. Let n_2 be the frequency read on the scale of the Cymometer when the handle is in any position in which the Cymometer current is a amperes and let A be the maximum Cymometer current when it is in resonance with the circuit under test. Then when n_2 is **nearly the same** as n_1 we have

$$d_1 + d_2 = \pi \left(1 - \frac{n_2}{n_1} \right) \frac{a}{\sqrt{A^2 - a^2}}$$

or if we put x for $1 - \frac{n_2}{n_1}$ and y for $\frac{a}{A}$ we can write the above formula in the form

$$d_1 + d_2 = 3.1415\ x \frac{y}{\sqrt{1 - y^2}} = X \ldots (1)$$

We can from the resonance curve first obtained measure off several corresponding values of y and x and in so doing we must not take values of n_2/n_1 which exceed 1.05 or fall below 0.95.

So that x has a value not far from 0.05. It is best to take several neighboring values of x and y and take the mean of all the x values and the mean of all the y values and use them in the formula (1).

The result gives the sum of the decrements of the circuit under test and of the Cymometer.

To find the separate values we increased the Cymometer decrement by a known amount which is done by inserting an additional resistance in the circuit and taking a second resonance curve.

The insertion of this resistance increases the Cymometer decrement by an amount d'_2. Then from the second resonance curve the value of the sum of the decrements with this added resistance could be obtained, for it is

$$d_1 + d_2 + d'_2 = 3.1415\ x \frac{y}{\sqrt{1 - y_2}} = X^1 \ . \quad . \quad . \ (2)$$

where the x and y in this last formula refer to the second resonance curve. The difference between the mean values of X^1 and X gave us the value of d'_2.

Again, Bjerknes and Drude have shown that if A and A^1 are the maximum Cymometer currents in the two cases, *i. e.*, without and with the added resistance, we have

$$A^2\ d_2\ (d_1 + d_2) = A'^2\ (d_2 + d'_2)\ (d_1 + d_2 + d'_2)$$

$$\text{or } A^2\ d_2\ X = A'^2\ (d_2 + d'_2)\ X^1$$

$$\text{Hence } d_2 = \frac{X^1 d'_2}{\left(\frac{A}{A^1}\right)^2 X - X^1} \ldots (3)$$

and $\quad d_1 + d_2 = X$

$$\text{Hence } d_1 = X - \frac{X^1 d'_2}{\left(\frac{A}{A^1}\right)^2 X - X^1} \ldots (4)$$

The value of X is given by the formula (1), and that of X^1 by the formula (2), and the ratio of $\frac{A}{A_1}$ is given at once by the observations, for it is the ratio of the maximum Cymometer currents without and with the added resistance.

Hence these observations give us the value of the Cymometer decrement d_2 and that of the circuit under test, viz., d_1 and the formula

$$M = \frac{4.605 \times d_1}{2 d_1}$$

tells us the number of **complete oscillations** in each train of oscillations which occur before the oscillations in the circuit under test decay to 1 per cent. of the initial value. As an example of such a determination we give the following figures: A Cymometer was used as described and a pair of resonance curves determined, and by measurement of x and y near the maximum, the values of X and X^1 determined. Thus it was found for the first curve that we had the following values:

$\frac{a}{A} = y$	$\left(1 - \frac{n_2}{n_1}\right) = x$	$d_1 + d_2 = X$
.95	.0120	.115
.90	.0165	.112
.85	.0205	.104
.80	.0255	.107
.75	.0293	.105
.70	.0335	.103

Hence the mean value of X was .108.

From the second curve, with resistance added, the following values were obtained:

$$\frac{a}{A} = y \quad \left(1 - \frac{n_2}{n_1}\right) = x \quad d_1 + d_2 + d'_2 = X^1$$

.95	.0125	.120
.90	.0210	.138
.85	.0255	.130
.80	.0300	.125
.75	.0345	.124
.70	.0385	.119

The mean value of X^1 was .126, also the ratio of the maximum Cymometer currents in the two cases, or of $\frac{A}{A^1}$ was found to be 1.53.

Hence $\left(\frac{A}{A^1}\right)^2 = 2.34$

Accordingly $d_1 + d_2 = 0.108$

$d_1 + d_2 + d'_2 = 0.126$

Hence $d'_2 = 0.018$

and $d_2 = \frac{0.126 \times 0.018}{2.34 \times 0.018 - 0.126} = 0.017$

Hence $d_1 = 0.108 - 0.017 = 0.091$

The observations showed therefore that the resonance frequency n_1 was 0.95×10^6, the decrement of the circuit under test $= d_1$ was 0.091, and the number of complete oscillations per train as above defined = M, was 25.

It is to be noted that the value of d_2 includes the decrement due to the resistance of the wire against which the thermo junction presses. From its resistance the resistance of this wire is found to be 0.012, and hence that of the Cymometer *per se* when the plain copper bend alone is used is 0.005.

This shows that the Cymometer circuit in itself has a very small decrement.

It may also be noted that from the value of the primary decrement, d_1, the resistance of the oscillatory spark can be found if the high frequency resistance of the metallic part of the circuit can be calculated.

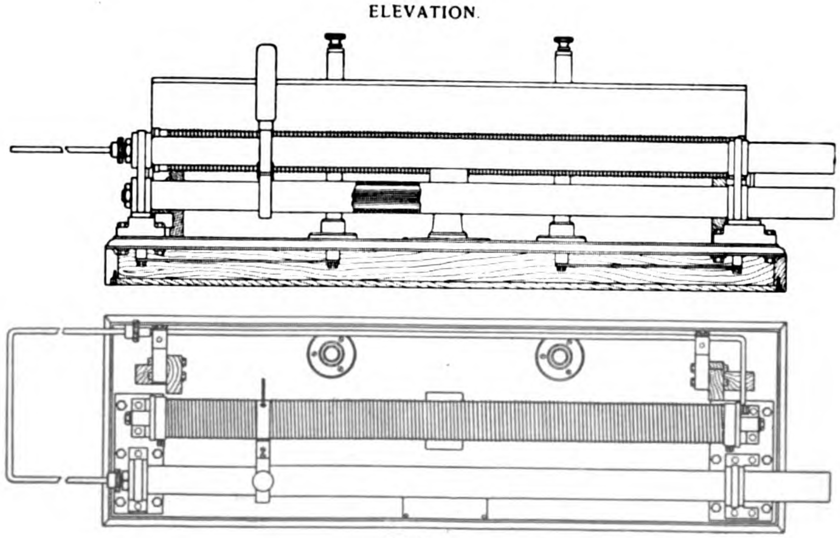
In this case the circuit under test consisted of a rectangle of wire having an inductance L = 5,000 cms. and a high frequency resistance $R_1 = 0.23$ ohm, calculated from its dimensions.

The spark resistance r can be calculated from the formula

$$r = \frac{4n_1 L d_1}{10^9} - R^1$$

and from the values given we have in this case $r = 1.23$ ohms.

DIAGRAM OF CYMOMETER



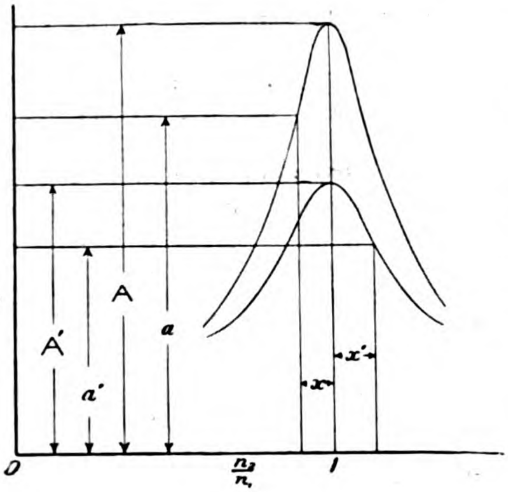


FIG. 7.

It will be seen, therefore, that the combination of the Cymometer and the necessary adjuncts enables all the required information concerning the oscillations in the primary circuit to be obtained.

When operating as described upon a wireless telegraph transmitter antenna which is inductively coupled to the condenser circuit, the resonance curves will be found to be curves with a double hump, and if these humps are not too close we may apply the above process to each hump separately and obtain the decrement of the two co-existent oscillations in the antenna.

Wireless Iconography

According to *La Revue,* a young Italian experimenter, Francesco de Bernocchi, the son of a Turin merchant, has been successful in his attempts to send pictures by the Marconi process. Though only 25 years of age, he has been interested in the subject, it is stated, since 1897, having been inspired by Professor Rhigi's investigations of the Hertzian waves. He has now succeeded in transmitting images, drawings and autographs which retain the precise features of the original with great fidelity.

Trifling Amateurs Madden U. S. Men

Take it from the wireless operator on the revenue cutter the new regulations will be welcome; he feels it is about time Uncle Sam put his thumb down on the trifling amateur. "We're not trying to knock kids who are in earnest," said the operator on one of the fast cutters, "but we're tired of listening to their love songs in springtime. It is an odd fact that no sooner does a kid get a wireless plant than he gets a girl who has a wireless plant. Or else his chum gets a girl—and that girl always wants to talk over the currents—and there isn't a girl living that can talk for three consecutive seconds about anything but a man.

"The other night we were expecting an order to whoop it out of here on the hunt of a derelict. Washington told us that one had been sighted down about Hampton Roads—in that dangerous angle of which Cape Hatteras is the peak—and the moment that she could be definitely located we were to be off. We had steam up in our boilers and at a minute's notice we would have yanked the hook out of the mud. And then, as I sat there with my ears growing fast inside the receiver, the kids began to coo. I'd hear a little, faint click. 'Is that you, Sallie?' some kid would ask. And Sallie would say, 'Yes darling,' while every wireless operator between Point-o'-Woods and Portland light bawled at her to go kiss a pig.

"And that pair of drooling infants kept up that annoying blither until everybody suddenly went mad. The men on the incoming steamers and the Fire Island station and the station at Sagaponack, and on the cutters and on the steamers in port began to 'jam' those messages of endearment. For a solid hour that kept up, until the youngsters finally saw that they would not be permitted to utilize the air for their dribbling folly. And in the meantime the business of all this end of the water world was held up because Sallie loved her Joe."

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No manuscripts will be returned unless return postage is enclosed.

Vol. I. NOVEMBER No. 2

Editorial

The sympathy of the American people goes out to Guglielmo Marconi as the announcement of the loss of his right eye is made public.

The enormous number of messages which arrived at the hospital at Spezia, a substantial proportion coming from the United States, were deeply appreciated by Mr. Marconi and he insisted that each of the inquiries be read to him, saying that it was the most soothing means of helping him through his convalescence.

From the day of the automobile accident in which he received the injury that made the removal of his right eye imperative, he never for a moment lost his habitual calm, and during the whole of his illness his expressions of gratitude toward those attending him and his deep appreciation of the inquiries from hosts of friends, awakened the admiration and caused the sympathy of the whole world to go out to him in his affliction.

During the critical time when it was first announced that a consultation of eminent physicians and specialists had been held and it had been decided that the operation was necessary to save Mr. Marconi from total blindness, the natives of Spezia gave a most touching demonstration of their intense sympathy. Almost every one, from the authorities and aristocracy, down to the poor, gathered about the hospital to make inquiries. Poor, rough, sunburned sailors were seen, as soon as they landed, to rush toward the hospital to pay their tribute to him whom they call Master of the Waves of the Air. Not since the anxious days with the great Victor Emmanuel and Giuseppe Garibaldi, respectively, has such a demonstration been witnessed.

It is a source of great gratification to us to state, contrary to the newspaper reports, that serious complications had set in and total blindness was feared, that Mr. Marconi has left the hospital and the injury is thoroughly healed.

The loss of his eye will not prevent him from continuing his work and now that the pain he has been suffering has abated his physical and mental powers have reasserted themselves and he is already impatient to resume his labors. He plans to leave for England shortly and later hopes to come to the United States for the purpose of making new wireless experiments.

While Mr. Marconi will bear with him throughout the remainder of his life a keen sense of loss, he may find consolation in the knowledge that few men of the present hour have been as useful to their fellow-men and a feeling of satisfaction in the reflection that many men suffering from defective vision have accomplished work of vast importance. England's great captain, Nelson, had lost one eye long before his splendid career was brought to a close. No doubt many worthy achievements will yet be credited to Marconi.

Having been unable to answer the numberless messages of sympathy he has received, Mr. Marconi wishes publicly to thank all who sent them.

Elsewhere we print the details of the new wireless regulations. We desire to call particular attention to the provisions made therein for amateurs. That the United States government recognizes the importance of wireless experimentation for young people, is best demonstrated by the words of the secretary of the department of commerce and labor: "The department recognizes that radio-communication offers a wholesome form of instructive recreation for amateurs. At the same time, its use for this purpose must observe strictly the rights of others to the uninterrupted use of apparatus for important public and commercial purposes. The department will not knowingly issue a license to an amateur who does not recoginze and will not obey this principle."

It should be made a point of honor among amateurs to live up to this rule in letter and spirit. By doing so they can help to make more useful the most wonderful method of communication ever devised. Any other course will quickly force a demand for the abolition of all amateur stations, as the matter is too important to be treated lightly.

The Share Market

NEW YORK, November 4th.

According to the brokers, the slight decline in Marconi stocks is in a measure due to the misleading newspaper statements in regard to the investigation in England and the reports of Mr. Marconi's unfortunate accident, but more particularly to the general weakness of the stock market always noticeable in the days preceding a Presidential election. It is the general opinion in Wall Street that after Election Day much higher prices can be looked for. The market is fairly active and the stocks hold firm. Bid and asked prices to-day:

American, 6¾—7; Canadian, 4½—5; English, common, 25—28; English, preferred, 22—23.

For United Shareholders

We have received a great many letters from former holders of United Wireless shares asking for information in regard to the disposition of the American Marconi stock held by the Wireless Liquidating Company.

To these shareholders we can say that we have every reason to believe that every one holding United Wireless Certificates of Deposit or Wireless Liquidating Company's certificates, will receive in exchange American Marconi stock, but not now.

At a meeting of the stockholders of the Wireless Liquidating Company, held September 28, it was resolved that all persons should be excluded from the reorganization who had not sent in their papers and money prior to May 1. It was further resolved that the option of receiving, on or before October 1, $700,000 in cash from the Marconi Company, in lieu of 140,000 shares of American Marconi stock, should not be exercised and that the 140,000 shares of American Marconi be accepted.

This is the stock that is to be distributed pro rata among those who paid their assessment and exchanged their United stock for Certificates of Deposit.

As to the time when the Marconi stock will be allotted we understand that the work of distribution is being rushed forward but that the shareholders themselves have in a great measure delayed the proceedings. Those in charge at the offices of the Wireless Liquidating Company inform us that on August 1, a circular letter was sent to all holders of record of United Certificates of Deposit giving full instructions for the exchange of these certificates for Wireless Liquidating stock. Despite the fact that this circular letter was sent out more than three months ago there are from 2,500 to 3,000 shares yet to be heard from.

Of course, not until these certificates of Deposit are exchanged and the detail work completed can the distribution of Marconi stock begin.

As to the basis of exchange nothing definite can be learned. It is possible that it will be in the ratio of 100 to 45. For example: a holder of 100 shares of United who paid the 50c. per share assessment and received in exchange 50 shares of Wireless Liquidating stock, will be entitled to 22½ shares of American Marconi stock. It must be distinctly understood, however, that nothing definite in regard to the ratio of exchange has yet been determined, and that it will approximate 100 to 45 is only a supposition.

As mentioned before only those who sent in their United stock together with the assessment money prior to May 1 will participate in the reorganization. The others will receive a dividend in bankruptcy should there be any; but from what can be learned at this time it will probably be very small.

Wireless Night Letters From Catalina

The application made by the Marconi Wireless Telegraph Co. of America to the state railroad commission for permission to institute a wireless night letter service between Santa Catalina Island and Los Angeles, Cal., presents a unique example of the public utility powers of the railroad commission.

The night letter innovation is a further advance in the commercial wireless service that is being maintained between Avalon and the mainland. Visitors to Catalina and citizens of Avalon are enabled through this service to keep in close communication with Los Angeles; wireless messages to be forwarded to Eastern points may be sent from Avalon when the innovation is established and a message can be filed in Los Angeles at any time during the night and delivered at Avalon the next morning. The rate is 85 cents for fifty words; each additional ten words or fraction costing 17 cents.

There is no reason to doubt that the application will be granted, but the formality is necessary under the scope of the public utilities law.

Seattle Station Doing Well

R. H. Lawler, Seattle, manager of the Marconi Wireless Telegraph Company of America, sends word that the 25-kilowatt equipment in the station near Fauntleroy Park, is now in active operation. The station has a 320-foot tower and is considered the most powerful on the North Pacific. The aerials consist of eight sections of eight wires, requiring nearly nine miles of wire.

During the tests of the big tower, messages being sent by the steamship *Mongolia*, 320 miles west of Honolulu, were easily picked up, and the wireless station at Olongapa, in the Philippine Islands, was heard working with vessels plying out of ports in the Orient.

The equipment is so arranged that any part or all of the aerials may be used in transmitting or receiving messages. They may be tuned to work with the steamers plying on Puget Sound or given sufficient power to communicate with vessels plying the Pacific or with stations in Alaska, the Orient, or along the California coast.

The Marconi station at the university will be kept in operation for a short time, and messages relayed to it from the big station near Fauntleroy Park. Later the university station is to be abolished and all messages to ship and land stations received and transmitted from the big tower near Fauntleroy Park.

Operators Being Re-Examined

The Marconi Wireless Telegraph Company of America has been busily engaged in placing applications in the hands of Government inspectors for the re-examination of operators in compliance with the new wireless law.

Under the new law every vessel must be prepared to communicate with two wave lengths, one of 300 meters and one of 600 meters. This means that about 500 vessels will have to be equipped with loose coupled oscillating circuits at a cost of $50,000.

Some Misleading Statements

There have recently been so many misleading newspaper statements in regard to the proposed Imperial wireless chain of stations to girdle the globe, that we feel it well to correct the erroneous impression no doubt gained by some that there was a probability that the British Government would not enter into the proposed contract.

Vague and misleading statements so persistently repeated perhaps may have created a feeling of uneasiness in the minds of those who are too far removed from headquarters to be able to regard such statements in their true perspective. As a matter of fact the officials of the English Marconi Company have expressed their full satisfaction with the statement made in the House of Commons by the Postmaster-General. They believe that the pressure of business at the end of the Session, together with the desire to give every opportunity for further information and debate, were alone responsible for deferring the ratification of the contract. The delay of two months in the actual construction of the stations was not of serious importance to the Company and in no way affects the continued satisfactory progress and development of its business. It will be recalled that in the last report and balance-sheet the Government contract was not considered in the results therein recorded.

Ever since it was first realized, several years ago, that the inventions and labors of Mr. Marconi and his assistants would eventually develop into one of the greatest international commercial organizations in the world, there commenced a fierce onslaught on the organization; renewed whenever important developments have been announced. While there is far too much important and remunerative work to be done by those responsible for the Marconi Company to give their attention to unfounded rumors and misleading statements, it was felt that a large number of inquiries received daily in consequence of these statements should be answered. The directors of the English Company have therefore issued a circular to shareholders in which the position was clearly explained.

It will be remembered that all the statements made by newspapers contained the opinion of the Postmaster-General, that outside of the Marconi Company no one had the experience necessary to build the proposed stations. In this connection one feature of the circular sent to shareholders should be interesting in that it expressed the assurance that

"Neither your Chairman, Mr. Marconi, nor the directors are in any way alarmed respecting the new companies which it is said are to be registered for the purpose of purchasing and working new patents, in respect of which, however, they are very fully informed."

There is perhaps no branch of science which lends itself more to alluring claims until put to a practical test than does wireless telegraphy, and it is not surprising that the success of the Marconi Company together with the universal development of its business, should suddenly cause to be discovered a number of inventors with "new systems" whose claims might appear attractive when placed before an uninitiated public through the hands of a promoter. It is well to bear in mind that outside the Marconi Company there is little knowledge and no experience of long distance commercial wireless telegraphy. This fact is borne out by the rumored interference of a recently erected high powered station under another system. It is also worthy of note that after possessing the acknowledged system it took Marconi and his able staff of engineers many years and hundreds of thousands of dollars before the difficulties of a continuous commercial service over long distances were mastered.

If one will stop to think upon hearing of occasional signals or messages transmitted and received over long distances with small power, it will be recalled that it is over ten years ago since Marconi was able, under favorable conditions, to transmit messages across the Atlantic using only ten kilowatts. He was then, however, very far from having mastered the difficulties of continuous commercial service. Two facts that should not be lost sight of are that a Marconi long-distance installation is covered by over 100 patents and that a system of wireless telegraphy consists of a large number of pieces of apparatus which, combined, enable a message to be transmitted and received. Many of the parts can be varied without in any way affecting the system. A possible variation of one or more of these, even if it were an improvement, is far from constituting either a new or improved system.

New wireless enterprises, should they be created, will necessarily pass through the same vicissitudes experienced by the Marconi Company, and in the course of years may or may not survive them. In any case, the Marconi Company with its very large and constantly increasing number of patents, its world-wide organization, established business and well-trained and experienced staff, directed by the inventor of, and the world's greatest expert in wireless communication, has a great lead which there is no reason to believe that they cannot maintain.

Libel Suit Opens

As we go to press word is received from Berlin that trial of the libel suit brought by Guglielmo Marconi and Godfrey C. Issacs, managing director of the parent Marconi company, against the newspaper *Welt am Montag* has begun.

The defendant is a man named Alfred Scholz, the so-called "responsible editor" of *Die Welt am Montag,* a scandal-mongering Berlin weekly.

Scholz, who was brought into court from the jail where he is already serving a sentence for violation of the press laws, is a German journalistic functionary known as a "jail editor," that is to say, he is employed by his paper for the purpose of serving any term of imprisonment which may from time to time be imposed upon it for slander or other penal offenses. "Jail editors" seldom have anything directly to do with the incriminating articles which get their papers into trouble.

Die Welt alleged in the issue of April 29 that the Marconi Company entered into an agreement with *The New York Times* to suppress the full story of the *Titanic* disaster for "a colossal consideration."

The chief witness for the plaintiffs was Harold Bride, who retold his experiences in the wireless room of the ill-fated ship, and his later efforts, in co-operation with Cottam, the operator of the *Carpathia,* to transmit the enormous accumulation of messages from survivors.

Counsel for the defense having alleged that Marconi admitted before the Smith committee in Washington that the company instructed the *Carpathia* operators to withhold their story, Bride declared that to the best of his recollection Mr. Marconi had admitted nothing of the sort. Two messages which the defense alleged were sent to the operators did not reach them, he said, until hundreds of messages from survivors had already been dispatched, and until the *Carpathia* was within one hour of New York Harbor. Bride further testified that he and Cottam had sent the names of 700 survivors, and that these messages had been caught by American warships.

The defense declared that this was a "new contention" which required investigation.

The hearing was then adjourned in order to enable the Marconi Company to submit a verified copy of the report of the Senate committee for the purpose of allowing the defense to make answer on the basis of the facts therein contained.

Government Aids Dealers

Just how considerate our Government has been of the rights of the amateur will no doubt be clearly demonstrated after the new law goes into effest on December 13th. That it will increase the activities and number of this class of wireless operator is being anticipated by dealers in wireless specialties who are already preparing for heavily increased sales of apparatus.

The New Naval Station at Arlington

Completion of the First of a Chain of Seven Powerful Stations Which Will Bring the Navy Department in Direct Touch With Our War Vessels at all Times

SCHEDULED to be placed in commission on the first day of November, the powerful wireless station immediately south of the military reservation at Fort Myer, Virginia, and within sight of the Capitol at Washington, has been a center of activity ever since its gigantic steel towers were completed some two months ago.

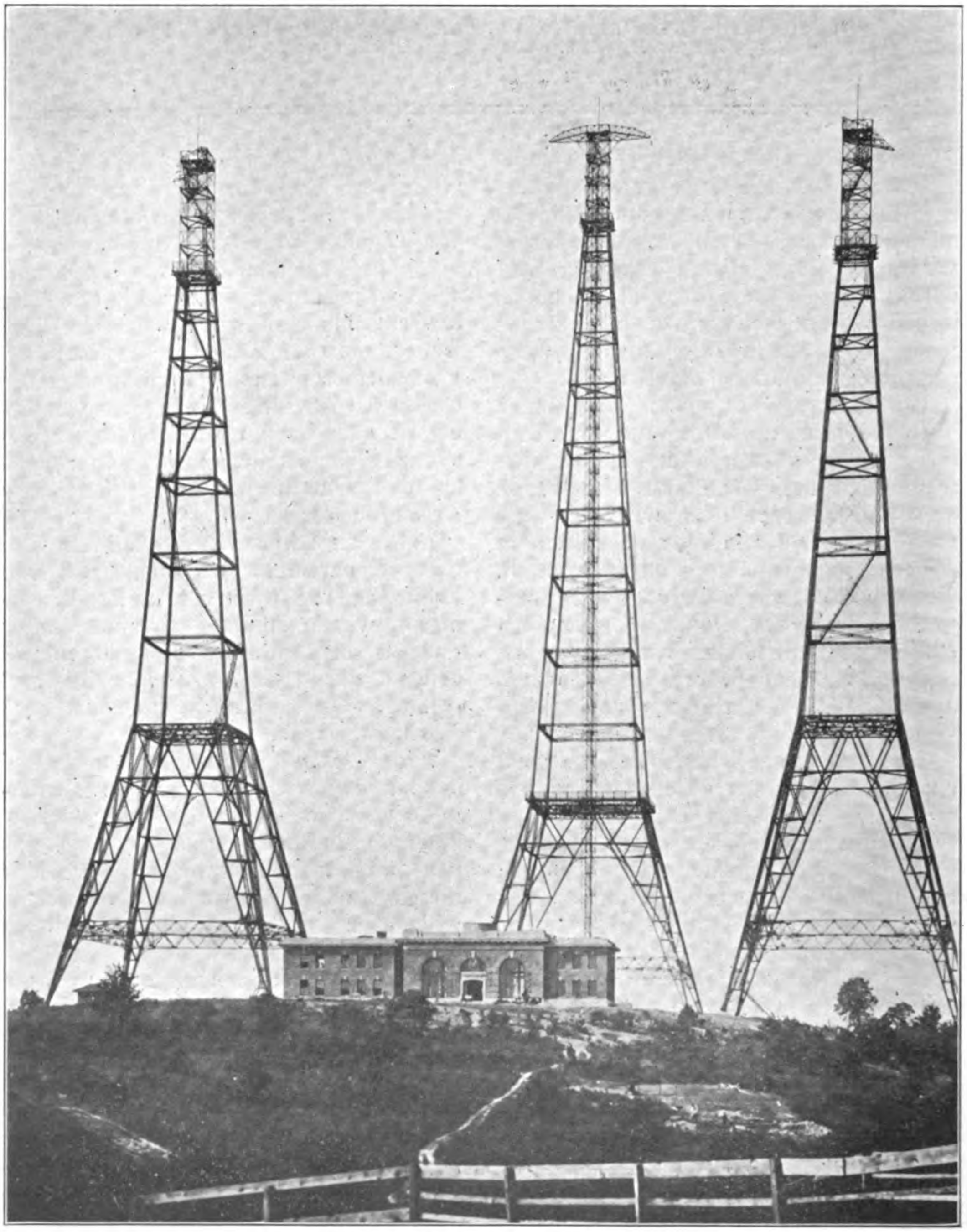
With a radius of 3,000 miles under ordinary conditions this new American naval wireless station claims the distinction of being the first of its type and power erected anywhere in the world, the first 100-kilowatt station in America, and the very latest word in Governmental radiotelegraphy. Soundproof, protected against vibration, equipped with telautographic apparatus, and as nearly stormproof as man can make it, the Arlington station represents the first step of the navy toward the establishment of a great chain of high-power wireless stations to girdle the earth and bring the Navy Department into direct communication with the fleet throughout the length and breadth of the seas. Unless a war vessel be in the Arctic, Antarctic or Indian Oceans, it will be at all times within the range of one of the seven contemplated stations, the other six of which are to be located at San Francisco, Honolulu, Manila, Guam, Panama, and Samoa.

Coupled with the British Government's wireless chain of stations to be erected by the Marconi Company and the German Government's station at Nauen, this system will cover the entire globe. From the Arlington station messages can be sent to vessels stationed beyond the Azores to the western shores of Europe, to Madeira, Cape Verde, the mouth of the Amazon, Panama, the Galapagos Islands off the western coast of Ecuador, and Magdalena Bay. The radius will embrace also San Francisco and the whole stretch of the California, Washington, and Oregon coasts, the lonely wastes of Upper Canada, Hudson Bay, and the southern nose of Greenland. The entire Caribbean Sea, all of the West Indies, most of Peru, all of Colombia, Venezuela, the three Guianas, and the watershed of the Amazon, to say nothing of all of the United States, Mexico, and the Central American republics will be within the range of the new Arlington station.

Similar stations will be built by the Navy Department at Panama and San Francisco, the former bringing Washington within striking distance, under a single relay, and also Rio de Janeiro, Buenos Aires, Callao, Valparaiso, and most of South America, whence Honolulu will be reached.

From Honolulu another station of similar power will relay messages to almost every part of the Pacific Ocean, Guam and Samoa, and these islands will have equally powerful stations through which Australia and Manila will be brought into direct radio touch with America.

The station at Arlington has been placed under the command of Lieut. Edwin B. Woodsworth, who will have charge of a force of twelve enlisted men who are to send radiograms to naval and merchant vessels throughout the North Atlantic and West Indian waters, as well as to all land stations in this country. At a designated hour daily messages covering official business with the fleet are to be radiated to American warships. Daily hydrographic reports, notices to mariners acquainting them with the existence of derelicts and icebergs or other information, will be sent to merchant vessels in the steamer lanes.



Photo, Underwood & Underwood.

A View of the Towers of the New Naval Wireless Station at Arlington, Va., the First 100 *Kilowatt Station in America. Its Estimated Range is* 3,000 *Miles.*

The general plan of the station consists of three steel lattice-work towers at the corners of a triangular foundation around a central receiving and sending station and power house. Of these towers the one at the western end is the tallest. It is 600 feet high, rising from a broad base like the Eiffel Tower, by means of four steel legs which are 150 feet apart at the ground, to a level of 150 feet, and then upward on graceful lines, like the Washington Monument. The two lower towers, standing northeast and southeast of the main shaft, and of similar design, but only 450 feet high, have struts which are 125 feet apart which slant in rapidly to the 150-foot level.

The three towers are connected at their tops by a series of wires from which the messages will be radiated. These same wires will pick up incoming messages. The Arlington antennæ are strung in a flat-top arrangement in the same plane but not parallel to the ground. A telegraph cable connects this aerial network of wires with the receiving and sending room within the power house.

Until the Arlington station was built, the largest one in American was that now in the service of the Marconi Company at Cape Breton, Nova Scotia, which was opened in the fall of 1907. The Cape Breton station consists of four towers, each built up to a height of 215 feet in the form of a square, the sides of which are about seventy yards.

To enable the Arlington station to have its contemplated sending radius of 3,000 miles a very powerful electrical plant is necessary. The synchronous spark system is utilized. The apparatus for generating this is placed in a large central transmitter, or machinery room, a building standing by itself between two double-story wings in which the operating rooms are placed, with living quarters for the detachment of thirteen men who will live constantly at the station, sleeping there as well as eating.

To avoid smoke, dust, and vibration the power for the operation of the plant is derived from the electric conduits of the city of Washington. This power drives a 200-horse-power electric motor, which in turn drives a 100-kilowatt, 500-cycle alternating generating plant. Two currents one of which is primary and of 100 volts, the other secondary and of 12,500 volts, are produced by this generator, the primary circuit being broken by the operator's key in the sending of messages.

The primary current passes into a novel transformer, which "steps up," and is increased into a high current of 12,500 volts in the secondary circuit, where the sparking takes place.

The two wings of the station are separated by short vestibules from the central machinery plant. These vestibules are wooden. The connections of the vestibules with the brick work are padded with linofelt which takes up the vibration from the machinery plant and avoids corresponding complications in the operating rooms. There are two of these rooms. One is occupied by the radio-operators, the other by those who man the telephone and telegraph wires connecting the station with the outside world. The radio-operators' room is unique. It is built somewhat upon the style of a huge refrigerator. It is absolutely sound-proof and when its door is closed the radio-operator on duty cannot be bothered by any sound from without or vibrations.

The only entrance into the radio-operating room is through a double refrigerator door. The room has no windows, is artificially lighted and ventilated. Even the air used in doing this is sound-proof, as it passes through a series of air ducts in which "baffle plates" are strung so as to baffle any noise that may attempt to creep with the ventilation into the radio operating room. These "baffle plates" keep the air silent. Within arm's reach of the radio-operator are control levers for use in shifting from the receiving to the transmitting switches while engaged in transmitting messages and during severe electrical disturbances.

A separate room has been set apart for use by operators of the land wires. Connecting it with the sound-proof radio-operating room is a telautograph. This is a small instrument by which a message written by the radio-operator while being received from the 650-foot tower is simultaneously reproduced by a mechanical pencil upon a second pad in front of the operator in the land wire operating room. As fast as the radio-receiver writes a message it is sent by the telautograph to the other operating room, where the outside operator relays it to its destination. When a message is to be sent by wireless it is not taken through the refrigerator door into the radio-operating room, but is laid down there by the outside operator through use of the telautograph.

The outside operating room does not have to be storm and vibration proof and is connected with the outside world in three ways: by public telegraph, and private and public telephone. There is a private telephone wire leading direct from this outside operating room into the Bureau of Navigation in the Navy Department. This avoids any leak of official messages through use of the city telephone service. Should anything happen to this official wire the plant has another telephone connection through the regular city switchboard. Within reach of the outside operator are keys connected with the telegraph systems of the Postal and Western Union companies, by means of which any wireless message may be relayed over land wires to any part of the United States.

As the Arlington plant, when in full operation under rules to be prescribed by the Department of Commerce and Labor and the Navy Department by Congressional sanction, will be allowed to handle radio messages for the commercial world and private individuals when not utilized to full capacity by the Government, these telegraphic connections are a very important feature of the station. It is also the only radio station that may now be built in Washington, since the new radio law bars the erection of any station within a radius of fifty miles which might interfere with the operation of the Arlington plant.

Learning the Codes

By J. C. S. Tompkins

Mastering a telegraph code is like learning a foreign language; it is not to be grasped within a week, or even a month. To become a good operator one needs about three hours' daily practice for at least a year.

But even if no practical use is made of it, the learning of a telegraph code will prove a helpful adjunct to our education, for any study that requires deep concentration cannot but be of some benefit to us. It might be well for those in charge of our public schools to give this subject some attention, since they include foreign languages in the curriculum, for the teaching of at least one code would no doubt materially develop the school boy brain. Too, outside of its usefulness in later life, a telegraphic code is much more easily learned by the young student than by the man of matured mind.

There are various devices on the market to assist one in becoming a telegraphic operator, all of which have been designed with the object of giving the student the benefit of constant practice—it is to be remembered that practice makes perfect.

The Omnigraph has a notched dial made to revolve by hand or motor power; the notches spell words in dots and dashes. The dials come in sets and are transferable, a full set will give the student excellent practice in receiving. Another automatic outfit runs prepared tape containing perforated messages between revolving wheels where brushes make the electrical contact. The latest thing on the market is a metal sheet coated on one side with insulating enamel, on which the code is engraved. In other words, the enamel surrounds the dots and dashes, these being formed of the metal plate itself, which plate connects with the sounder or buzzer to be operated. An ordinary steel pen is connected to the battery, which is in the circuit, by a flexible wire cord. When the pen is rubbed over five dots the sounder responds with the letter P, and then by running the pen over the enamel wherein is left a space of one dot, the letter E is sounded, then over dash, dot, and the letter N is heard. This arrangement can be connected with a transmitting relay and made to work either a wire or wireless circuit. With this instrument the operator can be truly said to "write" a message without any knowledge of the code.

The writer has a suggestion for the readers of THE MARCONIGRAPH, by which they may make a very compact student's outfit, practical for automatic sending by means of a relay. Get all the square brass rod you can and cut it with a hack-saw in one foot lengths. At both ends of each piece of rod file the square edges off until a quarter of an inch of the rods is made round. Then get some ribbon brass thin enough to drive nails through and lay a strip of about eight inches on a narrow strip of board. Do the same with two more strips, keeping two of the same length for later use. Then take the brass rods and lay them separately with the rounded ends resting on a brass ribbon strip. Then place each extra ribbon over the mounted ribbons and drive nails through to hold down securely the square rods, allowing ample play for turning them around. You have then four exposed sides to each rod.

The ends of the wooden strips should then be joined by other board strips and the whole frame securely fastened to a table. Then with pencil or ink mark off dashes and dots forming words, covering the spaces between with enamel paint, using a small brush to apply the enamel. On one set of exposed brass rod surfaces can be placed the Morse alphabet; then turning each rod, another exposed surface should contain a verse of poetry, and on the third set of exposed surfaces the Continental code. In the fourth set of exposed surfaces it might be well to use the same verse of poetry in the Continental code. Now by connecting any one of the brass ribbons with a buzzer which in turn is connected to a battery of several dry cells, and by attaching an ordinary pen to the battery by a flexible cord wire, and running the pen along the brass rods, any surface of which may be exposed, any quantity of excellent practice may be obtained.

If hexagonal rods can be purchased instead of square rods, six exposed surfaces may be had. Before making up the outfit it is best to remove all dirt and tarnish from both rods and ribbon by rubbing with fine sand-paper, giving clean surfaces to all parts. This will assure better electrical contact with less battery power than should the brass be left dull.

S. O. S. Call Brings Help

In tow of the steamer *Watson*, the coastwise line *Camino* arrived at the port of San Francisco recently, six days out from Portland, Ore., with a story of furious weather, danger and disablement. Thanks to the wireless telegraph, the period of suspense was short.

With eighty passengers on board, the *Camino* cleared from Portland. About 10 miles off Astoria, she ran into a stiff southeast gale, which increased in velocity to eighty miles an hour. Heavy seas swept the decks and the terrified passengers gathered in the saloon, praying and weeping.

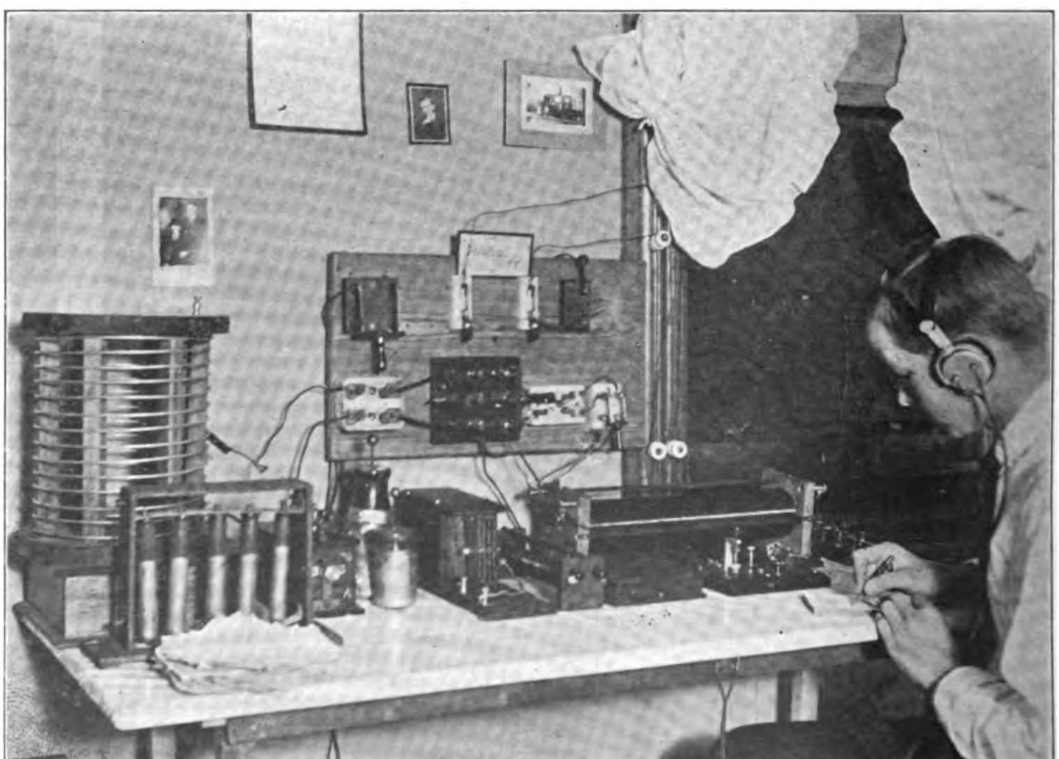
The gale raged all night. Every plunge forward lifted the ship's heels high out of water, and at 5.30 in the morning of October 19, the propellor dropped to the bottom of the sea from the broken shaft. At that moment the *Camino* was fifteen miles off shore, with the wind carrying her further to sea.

"S. O. S." the wireless spluttered and in a moment came an answer from the *Watson*. In three hours the *Watson* was standing by.

In this department the affairs of the various wireless clubs and associations will receive attention. Believing that all amateurs are interested in the experiments and research work of others the publishers plan to give readers each month distinctive items on the progress made by club members, thus offering all an exchange of ideas in organization and experimental matters and bringing students in closer touch with each other. To this end we will also publish a Wireless Club Directory. The names of the officers and the street address of the secretary are requested from all clubs. Notification of any changes should be forwarded at once. Short descriptive articles of experiments or new stations with distinctive features, accompanied by drawings or photographs, will be published.

In the hope of receiving messages from European stations, Robert Campbell, Harry Hersh and Robert Pareis, of Elizabeth, N. J., have been experimenting with kites.

Each night during the past few weeks they have been able to pick up messages from steamships hundreds of miles at sea or from land stations along the Atlantic coast. Close to the kite where the flying cord is attached is an aerial, formed of two pieces of wire; from the aerial dangles a thin wire to the ground. This does not interfere with the cord used to fly the kite. When the operator believes the kite to be high enough, he attaches the thin wire to a receiver and at once the words being flashed through



The Efficient Amateur Station Owned by Charles Harry, of Houghton, Mich.

the air cause the instrument to tick.

* * *

An experimental wireless circuit which will girdle the state of Washington is the ambitious project of Horace C. Peyton, of Spokane, and Clair Fulmer, of Washington, State College. The circuit will include stations at Walla Walla, Seattle, Tacoma, Pullman and Coeur d'Alene, in Idaho.

* * *

Wireless messages are being received from Covington, Tenn., through a system arranged by the Tri-State Wireless Association, of Memphis.

T. J. M. Daley, of the Memphis office, is associated with an oil mill at Covington and began sending flash messages to Memphis several days ago. He has ordered a complete wireless outfit to be installed in his Covington office.

* * *

Highly interesting and exhaustive experiments involving for the first time the use of the automobile in wireless telephony have recently been made by E. C. Hanson, of Los Angeles. The results obtained have created a sensation among the followers of this line of science on the coast, where Mr. Hanson is regarded as one of the most capable amateurs in the wireless field.

One of the most recent experiments was receipt on Lookout Mountain of a message sent over the ranges from Long Beach, thirty-five miles away. The car used was an R-C-H 1913 type, current being supplied by the lighting storage battery with which the car is equipped.

Strapped to front and back of the car were sectional poles supporting aerial wires and high voltage insulators tuned to definite wave. These were able to pick up the waves propagated through space at rate of one hundred and eighty-six thousand miles per second from the sending station, these waves impinging on the aerial wires on the car, oscillated through the primary coils of the tuner to the earth connection, thus setting up surges of electric energy of varying amplitude corresponding to the voice at the transmitting station. Vibrations in the secondary coil actuated a very delicate crystal detector, which in turn charged a condenser, and discharged through the delicate wireless telephone receivers, held to the ear of the occupants of the car. Every modulation and variation in tone from the transmitting station caused a similar synchronous current at the receiving station on the car, resulting in transmission of articulated speech and music through a space of over thirty-five miles from sending station to car.

So excellent were the results obtained and so pleased was Mr. Hanson that on the return to Los Angeles he predicted that it would not be long before wireless telephones would be regular equipment on automobiles.

Wireless Club Directory

Amateur wireless clubs and associations are requested to keep us posted in regard to any changes that should be made. New Clubs will be entered in the issue following receipt of notices in the form given below.

ARKANSAS

LITTLE ROCK—Arkansas Wireless association: G. A. Rauch, president; Edward Vaughn, 2622 State St., Little Rock, Ark., secretary and treasurer.

BRITISH COLUMBIA

VANCOUVER—Wireless Association of British Columbia: Clifford C. Watson, president; J. Arnott, vice-president; E. Kelly, treasurer; H. C. Bothel, 300 Fourteenth Ave., E. Vancouver, B. C., secretary.

CALIFORNIA

LONG BEACH—Long Beach Radio Research Club: Bernard Williams, 555 E. Seaside Blvd., Long Beach, Cal., secretary.

LOS ANGELES — Custer Wireless Club: Franklin Webber, president; Oakley Ashton, treasurer; Walter Maynes, 438 Custer Ave., Los Angeles, Cal., secretary.

NAPA—Aero Wireless Club: A. Garland, president; W. Ladley, vice-president; D. Beard, Napa, Cal., secretary and treasurer.

OAKLAND — Fruitvale Wireless Club: Joseph C. Brewer, president; Alan Downing, vice-president; Chrissie Eiferle, treasurer; Abner Scoville, 2510 Fruitvale Ave., Oakland, Cal., secretary.

OAKLAND — Oakland Wireless Club: H. Montag, president; W. L. Walker, treasurer; W. R. Sibbert, 916 Chester St., Oakland, Cal., secretary.

SACRAMENTO — Sacramento Wireless Signal Club: E. Rackliff, president; J. Murray, vice-president; G. Banvard, treasurer; W. E. Totten, 1524 "M" St., Sacramento, Cal., secretary.

SANTA CRUZ — Santa Cruz Wireless Association: Orville Johnson, president; Harold E. Sentor, 184 Walnut St., Santa Cruz, secretary and treasurer.

CANADA

PETERBORO, Ontario — Peterboro Wireless Club: G. B. Powell, president; C. V. Miller, vice-president; E. W. Oke, 263 Engleburn Ave., Peterboro, Ontario, Can., secretary and treasurer.

WINNIPEG, Manitoba—Canadian Central Wireless Club: Alexander Polson, president; Stuart Scorer, vice-president; Benj. Lazarus, P. O. Box 1115, Winnipeg, Manitoba, Can., secretary and treasurer.

COLORADO

DENVER—Colorado Wireless Association: William Cawley, president; Thomas Ekren, vice-president; W. F. Lapham, 1545 Milwaukee St., Denver, Colo., secretary and treasurer.

CONNECTICUT

NEW HAVEN—New Haven Wireless Association: Roy E. Wilmot, president; Arthur P. Seeley, vice-president; Russel O'Connor, 27 Vernon St., New Haven, Conn., secretary and treasurer.

WATERBURY — Waterbury Wireless Association: Weston Jenks, president; Alfred Upham, treasurer; H. M. Rogers, Jr., 25 Linden St., Waterbury, Conn., secretary.

GEORGIA

SAVANNAH — Wireless Association of Savannah: Philip C. Bangs, president; Arthur A. Funk, vice-president; Hugh Jenkins, treasurer; Lewis Cole, 303 Price St., Savannah, Ga., secretary.

ILLINOIS

CHICAGO — Chicago Wireless Association: John Walters, Jr., president; E. J. Stein, vice-president; C. Stone, treasurer; F. D. Northland, secretary; R. P. Bradley, 4418 South Wabash Ave., Chicago, Ill., corresponding secretary.

CHICAGO — Lake View Wireless Club: E. M. Fickett, president; R. Ludwig, treasurer; R. F. Becker, 1439 Winona Ave., Chicago, Ill., secretary.

CHICAGO — Northwestern Wireless Association of Chicago: Rolf Rolfson, president; H. Kunde, treasurer; Edw. G. Egloff, 2720 Noble Ave., Chicago, Ill., secretary.

DE KALB—De Kalb Radio Transmission Association: Bruce Lundberg, president; Walter Bergendorf, vice-president; De Estin Snow, treasurer; Bayard Clark, 205 Augusta Ave., De Kalb, Ill., secretary.

INDIANA

FAIRMOUNT—Southeastern Indiana Wireless Association: R. F. Vanter, president; D. C. Cox, vice-president and treasurer; H. Hitz, Fairmont, Madison, Ind., corresponding secretary.

HOBART—Hobart Wireless Association: Asa Bullock, president; Charles Clifford, Hobart, Ind., secretary.

INDIANAPOLIS — Wireless Club of the Shortridge High School: Robert C. Schimmel, 2220 N. Penn St., Indianapolis, Ind., president; George R. Popp, vice-president; Bayard Brill, treasurer; Oliver Hamilton, secretary.

RICHMOND—Aerograph Club of Richmond, Ind.; H. J. Trueblood, president; Richard Gatzek, vice-president; James Pardieck, 320 South Eighth St., Richmond, Ind., secretary.

VALPARAISO—Alpha Wireless Association: L. L. Martin, president; F. A. Schaeffer, vice-president; G. F. Girton, Box 57, Valparaiso, Ind., secretary and treasurer.

KANSAS

INDEPENDENCE — Independence Wireless Association: Boyce Miller, president; Ralph Elliott, secretary; Joseh Mahan, 214 South Sixth St., Independence Kan., vice-president.

LOUISIANA

NEW ORLEANS — Southern Wireless Association: B. Oppenheim, president; P. Gernsbacher, 1435 Henry Clay Ave., New Orleans, La., secretary.

MARYLAND

BALTIMORE—Wireless Club of Baltimore: Harry Richards, president; William Pules, vice-president; Curtis Garret, treasurer; Winters Jones, 728 North Monroe St., Baltimore, Md., secretary.

MASSACHUSETTS

ADAMS — Berkshire Wireless Club: Warren A. Ford, president; William Yarkee, vice-president; Charles Hodecker, treasurer; Jas. H. Ferguson, 18 Dean St., Adams, Mass., secretary.

HAVERHILL — Haverhill Wireless Association; Riedel G. Sprague, president; Charles Farrington, vice-president; Leon R. Westbrook, Haverhill, Mass., secretary and treasurer.

ROSLINDALE—Roslindale Wireless Association: O. Gilus, president; E. T. McKay, Treasurer; Fred C. Fruth, 962 South St., Roslindale, Mass., secretary.

SOMERVILLE — Spring Hill Wireless Association: R. D. Thiery, president; H. P. Hood, Second and Benton Road, Somerville, Mass., secretary and treasurer.

SPRINGFIELD—Forest Park School Wireless Club: W. S. Robinson, Jr., president; William Crawford, R. F. D. No. 1, Springfield, Mass., secretary.

SPRINGFIELD — Springfield Wireless Association: A. C. Gravel, president; C. K. Seely, vice-president; D. W. Martenson, secretary. Club Rooms, 323 King St., Springfield, Mass.

WEST MEDFORD—Independent Wireless Transmission Co., Starr W. Stanyan, 76 Boston Ave., West Medford, Mass., secretary.

MICHIGAN

JONESVILLE — Jonesville Wireless Association: Frederic Wetmore, president; Webb Virmylia, vice-president; Richard Hawkins, treasurer; Merritt Green, Lock Box 82, Jonesville, Mich., secretary.

MINNESOTA

ST. PAUL—St. Paul Wireless Club: Thos. Taylor, president; L. R. Moore, vice-president; E. C. Estes, treasurer; R. H. Milton, 217 Dayton Ave., St. Paul, Minn., secretary.

MISSOURI

HANNIBAL — Hannibal Amateur Wireless Club: Charles A. Cruickshank, president; J. C. Rowland, vice-president; William Youse, treasurer; G. G. Owens, 1306 Hill St., Hannibal, Mo., secretary.

MONTANA

BUTTE—Wireless Association of Montana: Roy Tusel, president; Elliot Gillie, vice-president; Harold Satter, 309 South Ohio St., Butte, Mont., secretary.

NEW HAMPSHIRE

MANCHESTER — Manchester Radio Club: Homer B. Lincoln, president; Clarence Campbell, vice-president; Elmer Cutts, treasurer; Earle Freeman, 759 Pine St., Manchester, N. H., secretary.

NEW JERSEY

WILDWOOD—Wildwood Wireless Association: Russell Kurtz, president; Walter Nefferdorf, vice-president; J. Crozier Todd, treasurer; Chas. E. Rockstraw, Jr., 110 East Pine Ave., Wildwood, N. J., secretary.

NEW YORK

BUFFALO — Frontier Wireless Club: Chas. B. Coxhead, president; John D. Camp, vice-president; Franklin J. Kidd, Jr., treasurer; Herbert M. Graves, 458 Potomac Ave., Buffalo, N. Y., secretary.

GENEVA—Amateur Wireless Club of Geneva: H. B. Graves, Jr., president; C. Hartman, vice-president; L. Reid, treasurer; Benj. Merry, 148 William St., Geneva, N. Y., secretary.

GENEVA — Geneva Wireless Club: Charles B. Hartman, president; Charles Smith, vice-president; Benj. Merry, treasurer; Henry B. Graves, Jr., 448 Castle Ave., Geneva, N. Y., secretary.

MT. VERNON—Chester Hill Wireless Club: Waller Morgan, president; Richard D. Zucker, 46 Clinton Place, Mt. Vernon, N. Y., secretary.

NEW YORK — Gramercy Wireless Club: James Platt, President; John Gebhard, vice-president; John Diehl, treasurer; John Jordan, 219 East 23d St., New York, secretary.

NEW YORK—Metropolis Club: J. T. Smith, president; William E. Meyer, 131 West 60th St., New York City, secretary and treasurer.

NEW YORK—Plaza Wireless Club: Paul Elliot, president; Myron Hanover, 156 East 66th St., New York, secretary and treasurer.

NYACK — Rockland County Wireless Association: W. F. Crosby, president; Marquis Bryant, secretary; Erskine Van Houten, 24 De Pew Ave., Nyack, N. Y., corresponding secretary.

SCHENECTADY — Amateur Wireless Association of Schenectady: D. F. Crawford, president; L. Beebe, vice-president; C. Wright, treasurer; L. S. Uphoff, 122 Ave. "B," Schenectady, N. Y., secretary.

NORTH DAKOTA

FARGO — Fargo Wireless Association: Kenneth Hance, president; John Bathrick, vice-president; Earl C. Reineke, 518 Ninth St., Fargo, N. D., Secretary.

OKLAHOMA

MUSKOGEE—Oklahoma State Wireless Association: T. E. Reid, president; G. O. Sutton, vice-president; Ralph Johns, Box 1448, Muskogee, Okla., secretary.

OREGON

LENTS — Oregon State Wireless Association: Charles Austin, president; Joyce Kelly, recording secretary; Edward Murray, sergeant-at-arms; Clarence Bischoff, Lents, Ore., treasurer and corresponding secretary.

PENNSYLVANIA

LEETSDALE — Allegheny County Wireless Association: Arthur O. Davis, president; Theodore D. Richards, vice-president: James Seaman, Leetsdale, Pa., secretary and treasurer.

PITTSBURG—Greenfield Wireless Association: Edward M. Wolf, president and corresponding secretary, 4125 Haldane St., Pittsburg, Pa.

WILLIAMSPORT — Y. M. C. A. Wireless Club: Lewis Holtzinger, president; Christian Coup, vice-president; Robert Templeman, treasurer; Lester Lighton, 211 West Fourth St., Williamsport, Pa., secretary.

RHODE ISLAND

NEWPORT — Aerogram Club: J. Stedman, president; A. Hayward Carr, chairman Board of Directors; Albert S. Hayward, treasurer; Donald P. Thurston, secretary; Walter B. Clarke, 17 May St., Newport, R. I., corresponding secretary.

TENNESSEE

MEMPHIS—Tri-State Wireless Association: C. B. De La Hunt, president; O. F. Lyons, vice-president; T. J. Daly, treasurer; C. J. Cowan, Memphis, Tenn., secretary.

WISCONSIN

MILWAUKEE—Cardinal Wireless Club: K. Walthers, president; F. Dannenfelser, vice-president; Miss A. Peterson, South Division High School, Milwaukee, Wis., secretary.

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.

M. P. C. asks:

(1) Do I need a license for a receiving station according to the new law?

Ans.—Yes, a license is required if your set is sensitive enough to receive signals from another State.

(2) What is the range of my station; aerial 85 ft. high at one end, 60 ft. high at the other and 45 feet in length; loose coupler, variable condenser, fixed condenser, silicon detector and a pair of 500-ohm receivers?

Ans.—80 to 90 miles in daylight; 500 after dark.

(3) What is the wave length of my aerial which is the four wire type?

Ans—Wave length of your antenna is approximately 170 meters.

A. R. S., inquires:

(1)—What should be the capacity of the fixed stopping condenser used in detector circuits?

Ans.—It should have a capacity of .003 micro-farads.

(2)—What is the wave length of the Cape Cod station?

Ans.—1,500 meters.

(3)—Should amateurs to comply with the new law use direct or inductively coupled transmitters?

Ans.—Use inductive coupling as you can control your set far better Arrange it so you can vary the coupling between the primary and the secondary.

H. V. L. asks:

What is meant by the term "spark frequency," on wireless work?

Ans.—It refers to the number of sparks passing the spark gap per second in contradistinction to the natural time frequency of an oscillatory circuit. The spark frequency is a function of the frequency of the primary current of the transformer (in a resonant wireless system).

B. D. M. writes:

(1) I have a rotary spark of 12 in. diameter with 12 spark points, used with a 1-kw. set, but am unable to get musical tones. What can I do to remedy it?

Ans.—Either your gap is running too slow or the condenser capacity of your set is too high. The gap should travel 2,800 revolutions per minute and the condenser capacity cut down to less than one half that used with a plain spark gap.

(2)—What does the United States Government license examination cover?

Ans.—It covers the theoretical and practical side of wireless. That is to say, the applicant must understand wireless circuits as well as the theory regarding its operation.

He must know the Berlin convention rules, the Wireless Act of August 13, 1912, and must understand thoroughly the operation of auxiliary wireless sets.

Details of New Wireless Regulations

THE Bureau of Navigation in the Department of Commerce and Labor has completed a set of regulations governing the use of radio-communication in accordance with the law recently enacted. The law and the regulations are to take effect December 13.

Following we print the new rules formed to carry out its provisions and those of the International Radiotelegraphic Convention:

The Department has established, for the purpose of enforcing through radio inspectors the acts relating to radio communication and the International Convention, the following districts with the principal office for each district at the custom house of the port named. (These districts supersede those announced in Department Circular No. 241, of September 5, 1912.

1. BOSTON, MASS......Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.
2. NEW YORK, N. Y.—New York (county of New York, Staten Island, Long Island, and counties on the Hudson River to and including Albany and Rensselaer) and New Jersey (counties of Bergen, Passaic, Essex, Union, Middlesex, Monmouth).
3. BALTIMORE, MD.—New Jersey (all counties not included in second district), Pennsylvania counties of Philadelphia, Delaware, all counties south of the Blue Mountains, and Franklin County), Delaware, Maryland, Virginia, District of Columbia.
4. SAVANNAH, GA.—North Carolina, South Carolina, Georgia, Florida, Porto Rico.
5. NEW ORLEANS, LA.—Alabama, Mississippi, Louisiana, Texas, Tennessee, Arkansas, Oklahoma, New Mexico.
6. SAN FRANCISCO, CAL.—California, Hawaii, Nevada, Utah, Arizona.
7. SEATTLE, WASH.—Oregon, Washington, Alaska, Idaho, Montana, Wyoming.
8. CLEVELAND, OHIO—New York (all counties not included in second district), Pennsylvania (all counties not included in third district), West Virginia, Ohio, Michigan (Lower Peninsula).
9. CHICAGO, ILL.—Indiana, Illinois, Wisconsin, Michigan (Upper Peninsula), Minnesota, Kentucky, Missouri, Kansas, Colorado, Iowa, Nebraska, South Dakota, North Dakota.

A radio inspector is authorized in exceptional cases to act outside of his district for the convenience of commerce. In such case he should communicate before or after acting with the inspector in whose district he has acted. Radio inspectors are authorized to communicate directly with collectors of customs and to co-operate with them in the enforcement of the law.

EXAMINATION OF OPERATORS FOR LICENSES.

The examination of operators for licenses prescribed in the following regulations will be held at the United States navy yards at Boston, Mass., Brooklyn, N. Y., Philadelphia, Pa., Washington, D. C., Norfolk, Va., Charleston, S. C., New Orleans, La., Mare Island (San Francisco), Cal., Puget Sound, Wash.; at the naval stations at Key West, Fla., San Juan, P. R., and Honolulu, Hawaii; at the Naval Academy, Annapolis, Md.; also at Fort Sam Houston, San Antonia, Tex., Fort Wood, New York Harbor, Fort Omaha, Nebr., Fort Leavenworth, Kans.; at the Army stations at St. Michael, Alaska, and Fairbanks, Alaska; also at the Bureau of Standards, Washington, D. C.; and by the Department's radio inspectors, at the custom houses in their districts and elsewhere by arrangement with them. Applicants for licenses should communicate in writing (Form 756) with the commandants or commanding officers of the navy yards or Army posts or Naval or Army stations named, or with the Director of the Bureau of Standards, or with the radio inspectors at the custom houses, to ascertain the day and hour when they can be examined. Additional opportunities for examination can be ascertained by communicating with the Department's radio inspectors at the custom houses or with the Commissioner of Navigation, Department of Commerce and Labor, Washington, D. C. The licenses to operators will be delivered at the places of examination.

The license provides that the holder shall take the oath for the preservation of the secretary of messages before a notary public or officer authorized to administer oaths.

REGULATIONS.

Part 1. Licenses—Apparatus.

A. APPARATUS EXEMPT FROM LICENSE.

The act does not apply either afloat or ashore to—

(*a*) Apparatus for radio communication which merely receives radiograms and is not equipped for sending.

(*b*) Apparatus for the transmission of radiograms exclusively between points in the same State, if the effect of such transmission does not extend beyond the State (so as to interfere with the radio communication of other States) or if the effect of such transmission does not interfere with the reception of radiograms from beyond the State (so as to interfere with the interstate radio communication of that State). The owner or operator of any apparatus who may be in doubt whether his apparatus, under this paragraph, is exempt from license may write the facts to the Commissioner of Navigation, Department of Commerce and Labor, Washington, D. C., before applying for a license.

B. SHIP STATIONS.

The apparatus for transmission of radiograms or signals on any vessel of the United States must be licensed if—

(*a*) The vessel is engaged in interstate or foreign commerce; or

(*b*) The apparatus transmits radiograms or signals the effect of which at any time extends beyond the State; or

(*c*) The apparatus interferes with the receipt of messages in any State from beyond such State.

For the purposes of the administration of the act, ship stations on vessels of the United States shall be of these classes:

Class A.—(*a*) Ocean passenger steamers which from October 1, 1912, and (*b*) Great Lakes passenger steamers which from April 1, 1913, are subject to the act of July 23, 1912, and are required to carry two operators and maintain a constant skilled watch.

Class B.—Cargo steamers which (on the Great Lakes from April 1, 1913, and on the ocean from July 1, 1913), with crews of 50 or more, are required to carry two operators, the second of whom may be a member of the crew certified as competent to receive distress calls, etc., maintaining a transmitting service during limited hours but a constant receiving watch.

..*Class C.*—Vessels voluntarily equipped with radio apparatus and not subject to the act of July 23, 1912, after October 1, 1912; April 1, 1913; or July 1, 1913, with no fixed hours of service, such as—

1. Passenger steamers, where the licensed capacity and number of crew combined are less than 50.
2. Cargo steamers with crews of less than 50.
3. Tugs and towing steamers, etc., with crews of less than 50.
4. Motor vessels.
5. Sailing vessels and barges.
6. Yachts.

C. Land Stations.

Apparatus for radio communication on land within the jurisdiction of the United States (excluding the Philippine Islands and excluding apparatus of the Government of the United States) must be licensed if—

(*a*) The apparatus is a means of commercial intercourse among the several States or with foreign nations; or

(*b*) The apparatus transmits rediograms or signals the effect of which at any time extends beyond the State; or

(*c*) The apparatus interferes with the receipt of messages in any State from beyond such State.

For the purposes of the administration of the act, stations on land are divided into two general descriptions, according to geographical location:

I. Coast or Shore Stations are stations which transmit messages to vessels at sea or on the Great Lakes or whose operations may affect the transmission of messages between ship and ship, or ship and coast. The principal purpose of the regulation of radio communication, international and national, is to secure the greatest efficiency of maritime communication through this agency, especially as a means of promoting safety to life.

II. Inland Stations are stations which do not transmit messages to vessels at sea or on the Great Lakes and whose operations can not affect the transmission of messages between ship and ship, or snip and coast. This may be due to their geographical location or to their range, dependent on power and aerial, or conditions. In some instances actual inspection may be necessary to determine whether a station should be licensed as a coast station or an inland station. An owner or operator in doubt may write the facts to the Commissioner of Navigation, Department of Commerce and Labor, Washington, D. C., when applying for a license.

As the time to prepare for the enforcement of the law and the means available are somewhat limited, the Department will give the first attention to coast stations, which are more important for the purposes of the act. As soon as practicable after the more important stations have been licensed, applications in behalf of inland stations will receive attention, and, when necessary, special arrangements for licensing will be undertaken.

CLASSES OF LAND STATIONS.

Both coast stations (the words "coast stations," "shore stations," and "costal stations" are used interchangeably) and inland stations are divided for the purposes of the administration of the act into the following classes:

1. General public service stations.
2. Limited commercial stations.
3. Experiment stations for the development of radio communication.
4. Technical and training school stations.
5. General amateur stations.
6. Special amateur stations.
7. Restricted amateur stations.
8. Special class—High-powered stations for exceptional distances.

DESCRIPTION OF CLASSES.

1. *General public service stations* are those open to general business between coast and ships or between land stations and include those operated by common carriers under the act of February 4, 1887, to regulate commerce, amended June 18, 1910. They are required to maintain a constant receiving service. ["Every coastal station open to general public service shall at all times be ready to receive messages of such wave lengths as are required by the Berlin Convention." (Sec. 4, First Regulation.)]

Wherever such stations do not insure a constant service, transmitting and receiving day and night without interruption, the Secretary of the Navy is directed to open naval radio stations to public business (Sec. 4, Eighteenth Regulation.) The Secretary of War is authorized by the act of May 26, 1900 (31 Stat., 206) to open Alaskan military stations to public service.

2. *Limited commercial stations* are not open to general public service and are licensed for a specific commercial service or services defined in the license.

3. *Experiment stations.*—The Secretary of Commerce and Labor is authorized by section 4 of the act to grant special temporary licenses "to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations." Applicants for such licenses should state any technical result they have already produced, their technical attainments, etc.

4. *Technical and training school stations* will be licensed in a separate class, according to the degree of technical training attained and imparted and to local conditions.

5. *General amateur stations* are restricted to a transmitting wave length not exceeding 200 meters and a transformer input not exceeding 1 kilowatt. (Sec. 4, Fifteenth Regulation.)

6. *Special amateur stations* may be licensed by the Secretary of Commerce and Labor to use a longer wave length and a higher power on special application to the Secretary of Commerce and Labor. Applications for this class from amateurs with less than two years experience in actual radio communication will not be approved. The application must state the experience and purpose of the applicant, the local conditions of radio communication, especially of maritime radio communication in the vicinity of the station, and a special license will be granted only if some substantial benefit to the art or to commerce apart from individual amusement seems probable. (Sec. 4, Fifteenth Regulation.)

7. *Restricted amateur stations,* within 5 nautical miles of a naval or military station, are restricted to a wave length not exceeding 200 meters and to a transformer imput not exceeding one-half kilowatt. (Sec. 4, Sixteenth Regulation.)

8. *Special class—High-powered stations for exceptional distances* are land stations designed (coast) to carry on transoceanic radio communication as between the United States and European countries, or between the Pacific coast and Hawaii, or from the United States over similar long distances at sea to another land station, or (island) to carry on radio communication overland over exceptional distances. Special licenses will be issued for such stations, and applications therefor will be addressed to the Commissioner of Navigation.

Part 2. Licenses-Operators.

The third section of the act prescribes that every radio apparatus required to be licensed shall at all times while in use and operation be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labor.

Licenses approved and issued by the Secretary of Commerce and Labor to operators will be forwarded late in October to officers described under the head "Examination of operators for licenses" and will be delivered to successful applicants by examining officers.

[Note.—*Apprentices.*—Under the supervision of a licensed operator an apprentice or unlicensed person may learn the art by the actual use of the apparatus, but the licensed operator who fails to enforce obedience to the regulations by the apprentice or unlicensed person serving under his supervision is liable to penalties as if he had had himself violated the regulations.]

Operators' licenses are divided into the following grades:

I. Commercial:
1. First grade.
2. Second grade.
3. Cargo grade.
4. Extra grade.
5. Temporary permit.

II. Amateur:
6. First grade.
7. Second grade.

III. Technical:
8. Experiment grade.
9. Instruction grade.

The requirements which applicants must meet to secure licenses of the several grades and the scope and limitations of employment authorized by the licenses of the several grades are as follows:

I. Commercial.

First grade.—The applicant must pass a satisfactory examination in—

(*a*) The adjustment, operation, and care of the apparatus, including correction of faults and change from one wave length to another.

(*b*) Transmitting and receiving by ear at a speed of not less than 20 words a minute in Continental Morse (five letters to the word).

(*c*) Use and care of storage battery or other auxiliary.

(*d*) Knowledge of the international regulations applying to radio communication—at present the Berlin Radiotelegraphic Convention of 1906.

(*e*) Knowledge of requirements of the acts of Congress to regulate radio communication—at present secs. 3, 4, 5, 6, and 7 of the act of August 13, 1912.

(1) The commercial first-grade license qualifies the operator for employment at any ship or land station of any class.

(2) Every ship station of Class A must carry at least one operator having a valid commerial first-grade license, or, in the case of a foreign ship, having an equivalent foreign license.

[NOTE.—The requirements for this grade are the same as the international requirements imposed on operators of foreign ships by international regulation, except the knowledge of the use and care of storage battery or other auxiliary and of the act of August 13, 1912. Inspectors will allow a reasonable time to foreign operators on foreign ships to meet the additional requirements supplying them as promptly as practicable with copies of the act of August 13, 1913.

(3) Every ship station of Class A on a steamer carrying 100 or more passengers must carry at least two operators having commercial first-grade licenses or equivalent foreign licenses.

(4) Every coast station of classes 1, 2, 3, 4, and 8 must have at least one operator licensed as commercial first grade, and every coast station of classes 1 and 8 must have at least two operators licensed as commercial first grade.

(5) Every inland station of classes 1, 2, and 3 must have at least one operator licensed as commercial first grade.

Second grade.—The applicant must pass a satisfactory examination in all the subjects prescribed above for the first grade, with the exception that the minimum speed in transmitting and receiving shall be not less than 12 words a minute in Continental Morse.

(1) An operator licensed as commercial second grade, on subsequent compliance with the speed test for the first grade, may have his license raised to the first grade by the indorsement in red ink on the face of his license "Examined on [date] at [place] and passed first grade by [examining officer's signature]," or a first-grade license may be issued.

(2) Every ship station under Class A (except steamers carrying 100 or more passengers) must carry a second operator, having the commercial second-grade license, or higher, or an equivalent foreign license.

(3) Every ship station under Classes B and C must carry at least one operator licensed as commercial second grade, or higher, or an equivalent foreign license where such are issued. Class B covers cargo steamers and does not apply to the Great Lakes before April 1, 1913, or to the seaboard before July 1, 1913, so ample time remains for the issue of licenses abroad to second-grade operators on foreign ships.

Cargo grade.—Section 2 of the act of July 23, 1912, provides:

On cargo steamers, in lieu of the second operator provided for in this act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life.

Examining officers and radio inspectors are authorized to issue a certificate to the facts above enumerated in the case of a member of the crew or other person, and experience under this form will be credited by examining officers if the holder later applies for examination for a license.

Extra grade.—The Department desires to establish, if practicable, a corps of specially trained and trustworthy radio operators who may be available for Government service. For this purpose a special license will be issued to operators holding the commercial first-grade license, whose certificates of skill in radio communication, issued under the act of June 24, 1910, and licenses under this act record 12 months' satisfactory ocean service as shown by masters' indorsement. A special examination in the radio regulations of the United States Navy will also be required. The commercial extra-grade license will not be issued before the spring of 1913, and will be the subject of a special circular.

Temporary permit.—Section 3 of the act of August 13, 1912, provides:

In case of emergency the Secretary of Commerce and Labor may authorize a collector of customs to issue a temporary permit, in lieu of a license, to the operator on a vessel subject to the radio ship act of June twenty-fourth, nineteen hundred and ten.

The temporary permit is to be issued only in cases of emergency and will be valid for only one voyage. If practicable, the radio inspector should ascertain the applicant's qualifications before the collector issues a temporary permit. The collector will report in each case to the Commissioner of Navigation the circumstances which rendered necessary the issue of a temporary permit. Before December 1, 1912, special instructions to collectors concerning temporary permits will be issued.

CERTIFICATES OF SKILL IN RADIO COMMUNICATION.

Certificates, heretofore issued under the act of June 24, 1910, will not be valid substitutes for the licenses required by the act of August 13, 1912, on and after December 13, 1912. The holders of these certificates should present themselves to the examining officers and radio inspectors for examination and license under the new act. Examining officers are requested to give precedence, as far as practicable, to the holders of these certificates and to exercise their discretion in giving credence to the former examination on which the certificate was issued, and especially to give due credit to satisfactory service records indorsed thereon. Operators should retain these certificates, as they will prove useful in applications for licenses of the various classes and grades under the radio-communication act and in establishing claims to the benefits accruing to those in the service of the merchant marine of the United States.

II. AMATEUR.

General.—Amateurs, before applying fo rlicenses, should read and understand the essential parts of the Berlin Radiotelegraphic Convention and sections 3, 4, 5, and 7 of the act of August 13, 1912. The Department recognizes that radio communication offers a wholesome form of instructive recreation for amateurs. At the same time its use for this purpose must observe strictly the rights of others to the uninterrupted use of apparatus for important public and commercial purposes. The Department will not knowingly issue a license to an amateur who does not recognize and will not obey this principle. To this end the intelligent reading of the International Convention and the act of Congress is prescribed as the first step to be taken by amateurs. Copies of the two publications may be secured for this purpose from the Department's radio inspectors or from the Commissioner of Navigation, but they are not for public distribution.

First grade.—The applicant must have a sufficient knowledge of the adjustment and operation of the apparatus, and of the regulations of the International Convention and acts of Congress in so far as they relate to interference with other radio communication and impose certain duties on all grades of operators. The applicant must be able to transmit and receive in Continental Morse, but no speed rate will be prescribed. Applicants for licenses of this grade residing at or near any place where examinations are held will communicate with examining officers and will be examined and receive licenses of amateur grades. At places in seaboard States, remote from examining officers, applicants will file applications with the radio inspector, who will endeavor to arrange for examinations on his inspection trips.

Second grade.—The requirements for the second grade will be the same as for the first grade. The second-grade license will be issued where an applicant can not be examined or until he can be examined. An examining officer or radio inspector is authorized in his discretion to waive an actual examination of an applicant for an amateur license, if the amateur for adequate reasons can not present himself for examination but in writing can satisfy the examining officer or radio inspector that he is qualified to hold a license and will conform to its obligations.

III. TECHNICAL.

Experiment and instruction grades.—The operator's license for either of these grades is a commercial first-grade license, indorsed by the Secretary of Commerce and Labor with a statement of the special purposes for which it is valid. It should be forwarded to the Commissioner of Navigation with a recommendation, if practicable, from an examining officer or radio inspector.

Part 3. Applications for Licenses.

Licenses for the use and operation of apparatus for radio communication under the act may be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico. Licenses are required before December 13, 1912.

I. Ship Stations.

Applications for licenses for ship stations should be addressed to the Department's radio inspector at the custom house of the port whence the vessel usually departs. The application by the company operating the apparatus should state the name of the ship in respect of which the license is required. The radio inspector will then issue the Department's blank form of application for license to be filled in by the applicant and returned to the radio inspector with a statement when the ship will be in port and its radio apparatus may be thoroughly inspected.

Applications may be made at once at New York, Baltimore, New Orleans, and San Francisco for licenses for ships ordinarily departing from ports in those districts. Inspectors will be stationed as soon as practicable at Boston, Mass., Savannah, Ga., and Seattle, Wash. As the season of navigation on the Great Lakes presumably will close before December 13, measures will not be taken to license ship station on Lake vessels before the spring, unless in case of emergency.

Applicants for licenses for ship stations at ports where inspectors are not available may address the Commissioner of Navigation, Department of Commerce and Labor, Washington, D. C., who will forward the application blanks and arrange for inspection.

II. Land Stations.

Coast stations.—The several classes of coast stations will be considered for reasons already assigned in advance of inland stations, and applicants for licenses for stations in States not on the seaboard are especially requested not to make applications before November 1.

Applications for licenses for coast stations should be addressed to the Department's radio inspector, if there be one near the station; if not, to the Commissioner of Navigation, Department of Commerce and Labor, Washington, D. C.

Form 757 (application for license for land station) will be furnished by radio inspectors.

The application will state the class of the station for which a license is desired, with particulars to show its proper classification, approximate transmitting range with a similar station, and precise location (State, county, city or town, street and number, or, if outside of city or town limits, as exact a description of its locality as may be). A blank form for apparatus will be sent when Form 757 has been filed, and arrangements made for inspection if necessary. Requests for licenses for coast stations will be taken up in the order of classes, as indicated above, and in the order of date received only so far as the relative importance of stations will permit. Amateur applicants who state that they have read the Berlin Radiotelegraphic Convention and the act of August 13, 1912, will receive attention before those who have not.

Inland stations.—The issue of licenses to inland stations. as already defined, probably can not be undertaken before late in November. The procedure for application for licenses will be the same as for coast stations.

III. Forms.

(*a*) The several forms of applications and licenses for apparatus and operators, according to classes and grades, will be printed and issued to examining officers (through the War and Navy Departments) and to radio inspectors at an early day. The licenses will be numbered serially. Each series will be accompanied by instructions indicating when copies or abstracts are requested or directed to be made for the use of the Commissioner of Navigation.

(*b*) To prepare, print, distribute, and fill out the licenses for apparatus throughout the country will require some time, and applicants are advised in advance that a month may elapse between the application for a license and its issue. Applications for operators' licenses in the vicinity of examining officers will probably be acted upon, as a rule, in less time.

IV. Commercial Operators.

Applications for operators' licenses of the several commercial grades should be addressed to examining officers or radio inspectors, who will arrange for examinations as under the wireless ship act of 1910. Where the applicant is not within reasonable distance of an examining officer or radio inspector, he may forward his application with a statement of facts to the Commissioner of Navigation. The Commissioner of Navigation will endeavor to arrange for a test of the applicant's qualifications, but as the Department's resources are limited, such a test can not be promised in all instances, especially before the inspection system has ben more fully established in the spring.

V. Amateur Operators.

(*a*) Amateurs in the seaboard States should write to the examining officer in their vicinity for Form 756 (application for operator's license) and to the radio inspector in their vicinity for Form 757 (application for license for land station). If the application for operator's license is also made to the radio inspector, both applications should be forwarded in the same envelope.

(*b*) Amateurs in the inland States will follow the same course, but they are requested to be patient, as licenses probably can not be issued to them as operators or to their apparatus before November or December. Where application has been made for a license and the Department has not been able to act, through lack of time, steps toward imposing penalties of course will not be taken.

Amateurs in doubt as to where or how to apply for licenses may address the Commissioner of Navigation.

Part 4. General Observations.

1. All persons communicating with the Department or any of its officers on the subject of radio communication should keep copies of their letters, as the replies will refer to them.
2. Wome nare eligible as applicants for licenses of any class or grade upon the same conditions as men.
3. Service Regulation VI of the Berlin Convention provides that "No station on shipboard shall be established or worked by private enterprise without authority from the Government to which the vessel is subject. Such authority shall be in the nature of a license issued by said Government." Stations on foreign ships will be licensed by their governments, respectively. Inspectors will report to the Commissioner of Navigation stations on foreign ships not so licensed.
4. The lists of call sigals which may be obtained from radio inspectors and the Commissioner of Navigation will show the location of naval and military stations, referred to in the act, particularly in the tenth, twenfth, thirteenth, sixteenth, and eighteenth regulations.
5. Operator's licenses should be framed and posted in the radio room, and licenses for stations should be accessible at all times to inspectors.
6. These instructions may be amended and supplemented from time to time.

About the middle of November it will be possible for the firt time to establish with precision the longitudes of America and Europe in their relation to each other by the exchange of wireless signals between the great station at Arlington Va., and the Eiffel Tower in Paris and other European stations.

Hitherto European and American time has been established by cable, allowances being made for loss of time in transmission and it has been fixed only three times, in 1866, 1870 and 1872.

Notable Patents

William Spiegel, of New York City, has brought out an apparatus for radiotelegraphic signaling in the upper atmosphere.

The inventor has this to say regarding the device:

It is well understood that with wireless telegraph apparatus the range of action is increased as the height of the antennæ is increased, but such height is limited both on land and on shipboard by structural considerations.

My invention comprises a special form of kite for maintaining such antennæ at a very high elevation.

In view of the perfection of flying machines and their proposed use in warfare, it becomes important to devise means for obtaining information of the approach of such machines at night time and of destroying the same. As it is well known that sounds travel far in the quiet rarefied regions of the atmosphere, I propose to mount a telephone transmitter on a kite or kites, and connect same with the ship or fortification below, so that the noise of the motor of an approaching aeroplane can be heard at a great distance and its position located and means for destroying it put into operation.

The best form of apparatus at present known to me embodying my invention is illustrated in the accompanying drawing in which,

Figure 1 is a front view of a kite. Fig. 2 is a side view of said kite with telephone attachment. Fig. 3 is a diagram of two kites arranged in tandem with telephone and wireless attachments. Fig. 4 is a detail of an automatic switch controlling the circuit for telephone and wireless apparatus.

Throughout the drawings like reference characters indicate like parts.

1 is a kite of any suitable form having a folding parachute attachment 2 attached to it. The kite is managed by a double cord, one strand 3 of which is connected in any suitable manner to the kite, and the other strand 4 of which is connected to the parachute so that tension on it will unfold or open the parachute. Preferably, sliding guide loops 5 hold the two strands within a regulated distance one of the other.

Fig. 1.

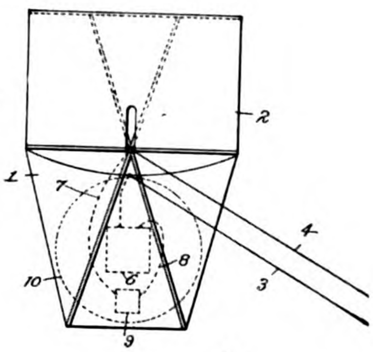
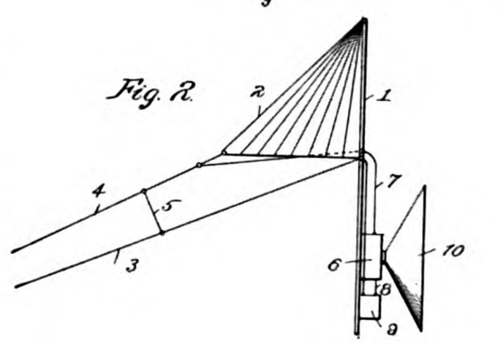


Fig. 2.

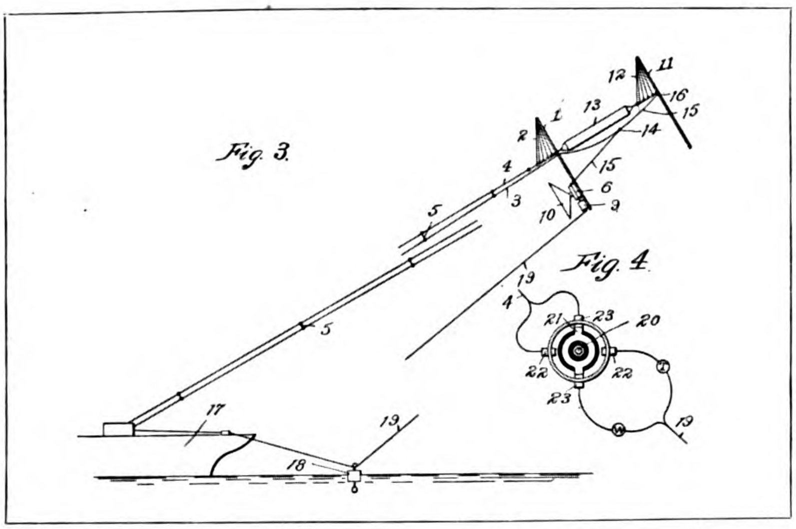


The action of the kite so far described is that when tension is applied to the strand 3 of the kite string the kite may be flown and managed in the ordinary way, while if strand 3 is left loose and tension is applied to strand 4 when the kite is in the air, the parachute 2 will open and help to retard the kite in falling in case the wind should decrease in velocity.

To the parachute kite so constructed or to systems of them I propose to apply various devices for sending or receiving signals and other sounds through the upper atmosphere and doing other work. Thus in Fig. 2, 6 represents a telephone transmitter mounted on the kite with its terminal 7 connected to cord 4 which in this case is made a conductor, while its other terminal 8 is connected through a detonating device in the dynamite cartridge 9, to an extension of strand 3, of the kite cord which is also made a conductor. 10 is a horn or sound collector collecting the sound waves from one direction to concentrate them on the telephone diaphragm. With this device the operator on the ground can listen for the sound of a flying machine motor and judge of its distance from the kite. This would be particularly useful at night. When the sound indicates that the machine is near enough to the telephone, a current sent through strands 3 and 4 will detonate the dynamite cartridge and destroy the flying machine.

To the parachute kite may also be attached the antennæ of a wireless telegraph apparatus, so obtaining an unusual height of exposure for such antennæ. Such an apparatus is illustrated in Fig. 3, where 11 is a second kite having its parachute 12 connected to kite 1, by the antennæ 13. The cord 3 of the first kite passes through it and has a button 14 on the other side. From the point 14 the cord 3 continues as a conductor 15 passing through a block or ring 16 on kite 11, back to the parachute 12. The conductor 15 continues to the ground, or ship 17, as shown at 19. If used in connection with a ship 17, it is preferably passed through a float 18 to prevent its fouling the ship's rigging. The telephone transmitter 6 and dynamite cartridge 9 may then be mounted on kite 1 as before and connected to conductor 15—19. Cord 4 which is connected direct to parachute 2, and through antennæ 13 to parachute 12, is made of conducting material.

In operating this apparatus both parachutes are collapsed when the tension is on card 3, and said parachutes are opened when the tension is on cord 4. When the circuit from the wireless sending apparatus on the ship is put in circuit with conductors 4 and 15, the wireless apparatus can be used. When this circuit is opened and a telephone receiver on the ship is put in circuit with wires 4 and 15 the telephonic circuit is complete.



A convenient mechanism can be employed to periodically cut in the telephone circuit and cut out the wireless so that when the operator is using the wireless he will be periodically interrupted and the telephone warning on the approach of a flying machine given to him. Such a device is indicated in Fig. 4, where 20 is the shaft, 21 a switch operated thereby over contacts 23, 23, connected to the wires 4 and 19 through a wireless apparatus W, and contacts 22, 22, connected with wires 4 and 19 through a telephone receiver T.

The Marconi Wireless Telegraph Co. of America has issued an announcement that since November 1st, 1912, the former message rates via the enumerated coastal stations have been canceled and in place thereof through word rates (wireless and landline) with a minimum charge for ten words, are effective. The cable system of counting and charging is to be used throughout, the address and signature being counted and charged for, but every message which contains less than ten words must be charged for in the same manner as if it contained ten words. The wireless rate via coastal stations has been fixed at 20c. per word, with the exception of Siasconet, where the rate has been fixed at 25c. per word, and South Wellfleet (high power station), where the rate has been fixed at 50c. per word. To these rates have been added the landline word rates to and from all points in the United States of America as set forth in the following table of through rates.

Between all Offices Below / And Ships via Coastal Stations at	New York City, N. Y. Sea Gate, N. Y. Sagaponack, N. Y.	Point Judith, R. I. Boston, Mass. South Wellfleet, Mass. (Short Distance)	*South Wellfleet, Mass. (High Power)	Siasconset, Mass.	Atlantic City, N. J. Cape May, N. J.	Philadelphia, Pa.	Baltimore, Md.	Norfolk, Va.	Hatteras, N. C.	Charleston, S. C.	Savannah, Ga.	Jacksonville, Fla.	Tampa, Fla.	Key West, Fla.	Mobile, Ala.	New Orleans, La.	Galveston, Tex. Port Arthur, Tex.	Los Angeles, Cal. San Francisco, Cal. San Pedro, Cal. Eureka, Cal.	Seattle, Wash. Astoria, Ore. Marshfield, Ore.	Friday Harbor, Wash.
Alabama	$0.26	$0.27	$0.57	$0.38	$0.26	$0.26	$0.26	$0.25	$0.27	$0.25	$0.25	$0.25	$0.25	$0.30	$0.23	$0.25	$0.25	$0.29	$0.29	$0.33
Arizona	.29	.29	.59	.40	.29	.29	.29	.29	.31	.29	.28	.29	.29	.34	.29	.28	.27	.26	.28	.32
Arkansas	.26	.27	.57	.38	.27	.27	.26	.26	.28	.26	.25	.25	.26	.30	.25	.25	.25	.29	.29	.33
British Columbia	.29	.29	.59	.41	.29	.29	.29	.29	.31	.29	.29	.29	.29	.34	.29	.29	.29	.26	.25	.29
California	.29	.29	.59	.40	.29	.29	.29	.29	.31	.29	.29	.29	.29	.34	.29	.29	.28	.24	.26	.30
Colorado	.28	.28	.58	.39	.28	.28	.28	.28	.30	.28	.28	.28	.28	.33	.28	.28	.26	.28	.28	.32
Connecticut	.22	.22	.52	.33	.24	.24	.24	.25	.27	.26	.26	.26	.27	.31	.27	.27	.28	.29	.29	.33
Delaware	.23	.24	.54	.35	.24	.22	.22	.24	.26	.25	.26	.26	.27	.31	.26	.26	.28	.29	.29	.33
District of Columbia	.23	.24	.54	.35	.24	.22	.22	.24	.26	.25	.25	.26	.26	.31	.26	.25	.28	.29	.29	.33
Florida (ex. Key West)	.26	.27	.57	.38	.27	.27	.27	.25	.27	.25	.25	.23	.23	.25	.25	.25	.26	.29	.29	.33
Georgia	.26	.26	.56	.37	.26	.26	.25	.25	.27	.25	.22	.25	.25	.30	.25	.25	.26	.29	.29	.33
Idaho	.29	.29	.59	.40	.29	.29	.29	.29	.31	.29	.29	.29	.29	.34	.29	.29	.28	.26	.25	.29
Illinois	.25	.26	.56	.37	.25	.25	.25	.25	.27	.26	.26	.27	.27	.32	.26	.26	.27	.28	.28	.32
Indiana	.25	.25	.55	.36	.25	.25	.25	.25	.27	.26	.26	.26	.26	.31	.26	.26	.27	.29	.29	.33
Iowa	.26	.27	.57	.38	.26	.26	.26	.26	.28	.26	.27	.27	.27	.32	.27	.27	.27	.28	.28	.32
Kansas	.27	.28	.58	.39	.27	.27	.27	.27	.29	.27	.27	.28	.28	.33	.27	.27	.26	.28	.28	.32
Kentucky	.25	.26	.56	.37	.25	.25	.25	.25	.27	.25	.25	.25	.26	.30	.25	.25	.26	.29	.29	.33
Louisiana	.27	.27	.57	.88	.27	.26	.26	.26	.28	.25	.25	.25	.25	.30	.25	.22	.25	.29	.29	.33
Maine	.24	.23	.53	.34	.25	.25	.25	.25	.27	.26	.27	.27	.27	.32	.27	.27	.28	.29	.29	.33
Manitoba	.28	.28	.58	.39	.28	.28	.28	.28	.30	.28	.28	.28	.28	.33	.28	.28	.28	.29	.28	.32
Maryland	.23	.25	.55	.36	.24	.23	.22	.24	.26	.25	.25	.26	.26	.31	.26	.26	.28	.29	.29	.33
Massachusetts	.23	.22	.52	.33	.24	.24	.24	.25	.27	.26	.26	.26	.27	.31	.27	.27	.28	.29	.29	.33
Michigan	.25	.25	.55	.36	.25	.25	.25	.25	.27	.26	.26	.27	.27	.32	.27	.27	.27	.29	.29	.33
Minnesota	.26	.27	.57	.38	.27	.27	.27	.27	.29	.27	.27	.27	.28	.32	.27	.27	.27	.28	.28	.32
Mississippi	.26	.27	.57	.38	.26	.26	.26	.25	.27	.25	.25	.25	.25	.30	.25	.24	.25	.29	.29	.33
Missouri	.26	.27	.57	.38	.26	.26	.26	.26	.28	.26	.26	.26	.27	.31	.26	.26	.26	.28	.28	.32
Montana	.28	.28	.58	.39	.28	.28	.28	.28	.30	.28	.28	.28	.28	.33	.28	.28	.28	.28	.27	.31
Nebraska	.27	.28	.58	.39	.27	.27	.27	.27	.29	.28	.28	.28	.28	.33	.27	.28	.26	.28	.28	.32
Nevada	.29	.29	.59	.40	.29	.29	.29	.29	.31	.29	.29	.29	.29	.34	.29	.29	.28	.25	.26	.30
New Brunswick	.25	.25	.55	.36	.25	.25	.25	.26	.28	.26	.27	.28	.28	.33	.28	.28	.28	.29	.29	.33
New Hampshire	.23	.23	.53	.34	.24	.24	.24	.25	.27	.26	.27	.27	.27	.32	.27	.27	.28	.29	.29	.33
New Jersey	.22	.24	.54	.35	.22	.22	.24	.25	.27	.26	.26	.26	.27	.31	.27	.27	.28	.29	.29	.33
New Mexico	.28	.28	.58	.39	.28	.28	.28	.28	.30	.28	.28	.28	.28	.33	.28	.28	.26	.28	.28	.32
New York	.23	.24	.54	.35	.24	.24	.24	.25	.27	.26	.26	.26	.27	.31	.27	.27	.28	.29	.29	.33
New York City	.22	.23	.53	.33	.23	.23	.23	.25	.27	.26	.26	.26	.27	.31	.27	.27	.28	.29	.29	.33
North Carolina	.25	.26	.56	.37	.25	.25	.25	.25	.27	.25	.25	.25	.25	.30	.25	.25	.26	.29	.29	.33
North Dakota	.28	.28	.58	.39	.28	.28	.28	.28	.30	.28	.28	.28	.28	.33	.28	.28	.28	.28	.28	.32
Nova Scotia	.25	.25	.55	.36	.25	.25	.25	.26	.28	.26	.27	.28	.27	.33	.28	.28	.28	.29	.29	.33
Ohio	.24	.25	.55	.36	.24	.24	.24	.25	.27	.26	.26	.26	.26	.31	.26	.26	.27	.29	.29	.33
Oklahoma	.28	.28	.58	.39	.28	.28	.28	.27	.29	.27	.27	.28	.28	.33	.26	.25	.25	.28	.28	.32
Ontario	.25	.25	.55	.36	.25	.25	.25	.26	.28	.27	.28	.28	.28	.33	.28	.28	.28	.29	.29	.33
*Oregon	.29	.29	.59	.40	.29	.29	.29	.29	.31	.29	.29	.29	.29	.34	.29	.29	.28	.25	.25	.29
Pennsylvania	.23	.24	.54	.35	.24	.23	.24	.25	.27	.26	.26	.26	.26	.31	.26	.26	.28	.29	.29	.33
Philadelphia	.23	.24	.54	.35	.22	.22	.22	.25	.27	.26	.26	.26	.26	.31	.26	.26	.28	.29	.29	.33
Quebec	.25	.25	.55	.36	.25	.25	.25	.26	.28	.27	.28	.28	.27	.33	.28	.28	.28	.29	.29	.33
Rhode Island	.23	.22	.52	.33	.24	.24	.24	.25	.27	.26	.26	.26	.27	.31	.27	.27	.28	.29	.29	.33
South Carolina	.26	.26	.56	.37	.26	.25	.25	.25	.27	.22	.25	.25	.25	.30	.25	.25	.26	.29	.29	.33
South Dakota	.28	.28	.58	.39	.28	.28	.28	.28	.30	.28	.28	.28	.28	.33	.28	.28	.27	.28	.28	.32
Tennessee	.25	.26	.56	.37	.25	.25	.25	.25	.27	.25	.25	.25	.25	.30	.25	.25	.26	.29	.29	.33
Texas	.28	.28	.58	.39	.28	.28	.28	.28	.30	.26	.26	.26	.27	.31	.26	.25	.23	.28	.28	.32
Utah	.28	.28	.58	.39	.28	.28	.28	.28	.30	.28	.28	.28	.28	.33	.28	.28	.28	.26	.27	.31
Vermont	.23	.23	.53	.34	.24	.24	.24	.25	.27	.26	.27	.27	.27	.32	.27	.27	.28	.29	.29	.33
Virginia	.24	.25	.55	.36	.25	.25	.24	.22	.24	.25	.25	.25	.25	.30	.25	.26	.27	.29	.29	.33
Washington	.29	.29	.59	.40	.29	.29	.29	.29	.31	.29	.29	.29	.29	.34	.29	.29	.28	.26	.23	.27
West Virginia	.24	.25	.55	.36	.24	.24	.24	.24	.26	.25	.25	.26	.26	.31	.26	.26	.28	.29	.29	.33
Wisconsin	.26	.26	.56	.37	.26	.26	.26	.26	.28	.26	.27	.27	.27	.32	.27	.27	.27	.28	.28	.32
Wyoming	.28	.28	.58	.39	.28	.28	.28	.28	.30	.28	.28	.28	.28	.33	.28	.28	.27	.28	.28	.32