

The General Radio Experimenter

VOL. V, No. 1

JUNE, 1930

WE CELEBRATE A BIRTHDAY

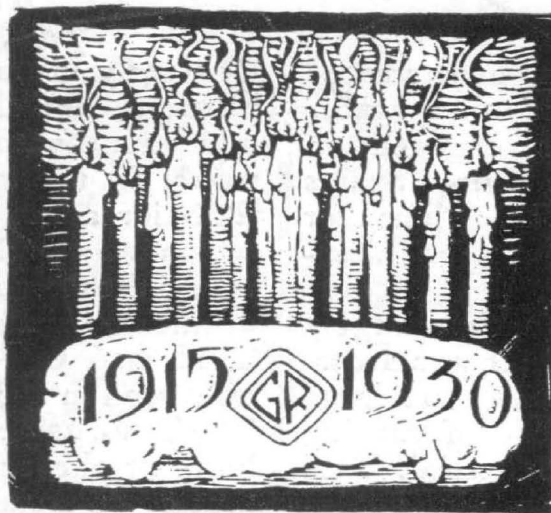
ON June 14, 1915, the Secretary of the Commonwealth of Massachusetts issued a charter to the General Radio Company, thereby founding a new organization for a new purpose, namely, the manufacture of measuring apparatus suitable for use at radio frequencies.

While the history of a pioneer company is interesting to those associated with the development of an art, it is boring to most people. Although no attempt will be made to give a detailed history of the General Radio Company, there are a few high spots that should prove of interest to all engaged in the radio art.

Almost the first General Radio customer was George E. Cabot, one of the founders of the Holtzer-Cabot Electric Company, and his purchases in the early days of the Company contributed materially to preventing its early demise because of insufficient income. He is still purchasing General Radio instruments, and in his very well equipped laboratory has a sample of nearly every instrument built by us.

The first experience of the General Radio Company with Dr. DeForest's "audions," the erratic ancestors of the present triodes, was in the fall of 1915, when an inventor of a talking movie scheme wanted an amplifier designed and built. This Mr. Freistatter had the idea that a narrow band of fine iron filings could be cemented to the edge of a movie film, and sound stored as a magnetic charge, as was done with a wire in the Poulsen telegraphone. We built a two-stage amplifier, which could be used to get enough energy from the microphone to magnetize the filings, and also to reproduce the output of the film on a

loud-speaker. The transformers designed for this amplifier were afterward sold in great quantities to experimenters. They were probably the first audio transformers, having closed cores, to be generally available for purchase. A frequency-response curve of such an early two-step amplifier would be very interesting to look at, but we suspect it would have little resemblance to that of a modern unit.





Building No. 1, erected 1924.
Building No. 2 which was erected in 1925 is similar to No. 1 but is one story taller.
Building No. 3 now under construction is similar to Building No. 2

in France. In that laboratory was Lieutenant, now Major, F. H. Armstrong, who was attempting to find a better method of radio communication. Requiring a condenser for use in one of his circuits, and having none available, he appropriated the laboratory standard. It was this circuit which worked, and thus, one of this Company's earliest condensers was incorporated in the first superheterodyne.

Hardly had the Company started and supplied a few pieces of apparatus to pioneer institutions engaged in radio research, when the United States entered the World War. Plans for new developments had to be abandoned.

From a small organization largely engaged in research work, it was necessary to expand the Company to a large production group, capable of turning out quantities of war material. This material included radio training equipment, field equipment, airplane sets, and in general, radio equipment required by the Signal Corps and the communications service of the Navy.

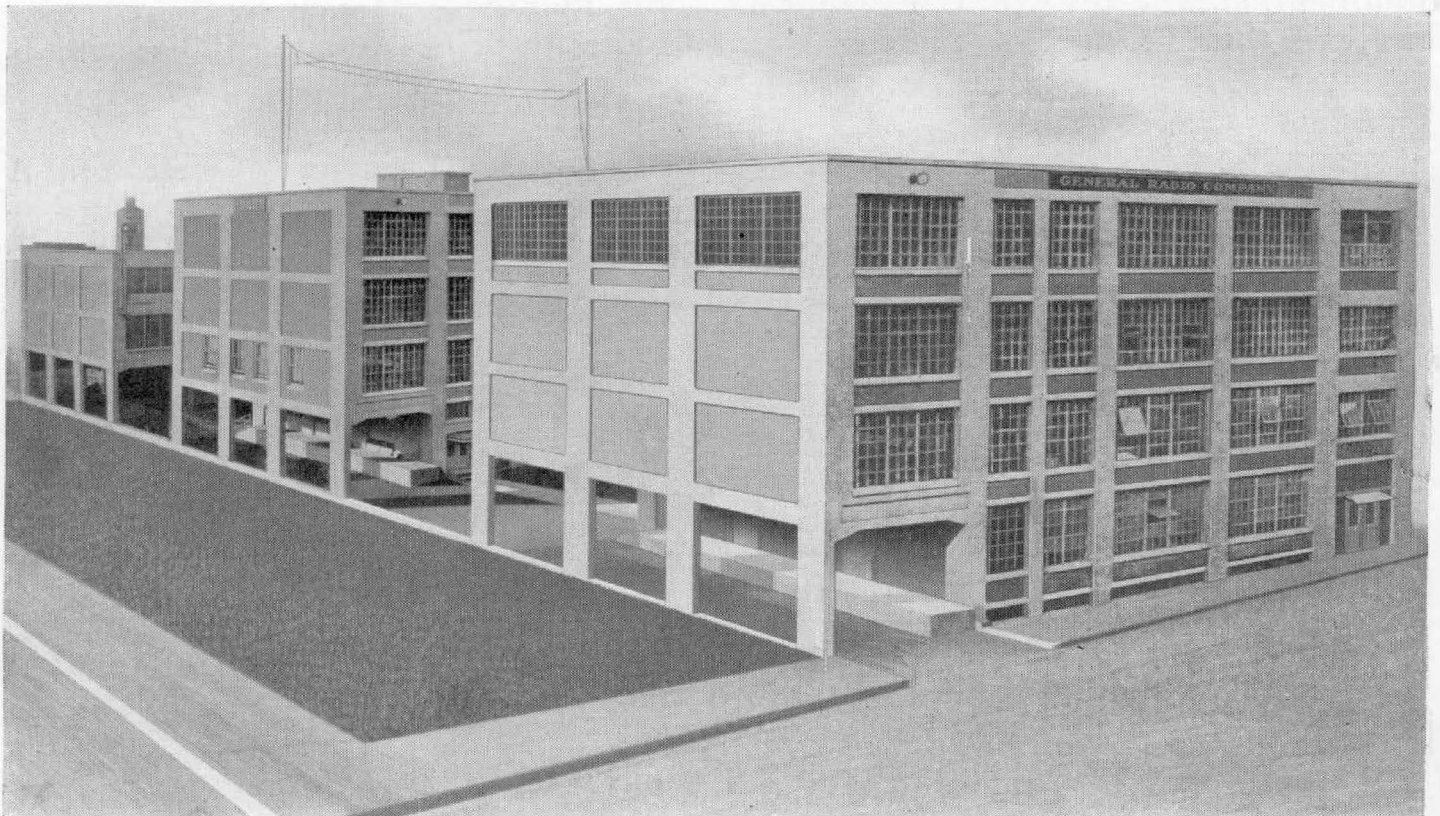
As a matter of history, it is interesting to note that in one of the first shipments of war material there were included some of the early type of standard condensers. One of these condensers found its way into the United States Signal Corps laboratory

Company returned to its original purpose, namely, that of developing and manufacturing laboratory apparatus. In the spring of 1919, William Dubilier asked us to design a bridge which he could use to measure accurately the capacitance and power factor of mica condensers. The result was the TYPE 216 Capacity Bridge, which is now used in a great many laboratories. The TYPE 222 Precision Condenser was built at the same time, and was the first commercial condenser having low losses and great precision of reading. It had a low-loss insulated stator, cone bearings, rugged construction, and a worm gear arrangement for close readings, features which continue to distinguish it. Mr. Dubilier still has in use the first capacity bridge and precision condenser of our make in his laboratory. Perhaps some day we shall be able to get them back for our contemplated museum!

The post-war readjustment processes had just been completed when the furor of broadcasting broke out. Again the plans of the Company were put aside. The demands for equipment that could be assembled into radio receivers were so great that it became necessary to concentrate production activities on this class of material. The demand grew and continued to grow, until the Company found itself expanded to a greater extent than was necessary even during war time. This time, however, the expansion was different. It was not necessary that every effort be directed toward the production of equipment demanded by war conditions. While the expansion process went on, development work still continued. It was as if two companies had been set up under one roof. There was always the feeling that after the wave of novelty of broadcasting had passed over, there would no longer be a consumer demand for radio parts. It was anticipated that a new demand would come from new

companies, organized to manufacture receivers under mass production methods, and that this demand would be for production testing apparatus.

That this prediction was right was proved by the end of 1927. A three-year plan, covering the years 1928, 1929, and 1930, was laid out to take care of the transition that would come in the type of product manufactured by this Company. New methods of selling and new ratios between research expenditures and manufacturing costs had to be arranged. New types of research, new methods of manufacturing had to be planned. Finally, came the item of increased plant facilities to take care of these activities. This was left as the last step in the three-year plan. This step was taken on April 7, 1930, when ground was broken for a new unit which, when completed this fall, will increase the plant capacity by 60 per cent. A very substantial proportion of this unit will be devoted to engineering laboratories and the manufacture



The General Radio Plant



TYPE 105 Wavemeter. A pre-war frequency

issue of the *Experimenter* a bit of information pertaining to the people who take an important part in the affairs of the General Radio Company. As the *General Radio Experimenter* is an engineering publication, the sketches will be largely limited to those having contact with engineering activities. —

A few weeks after the United States entered the World War, there appeared at the offices of this Company a man who offered

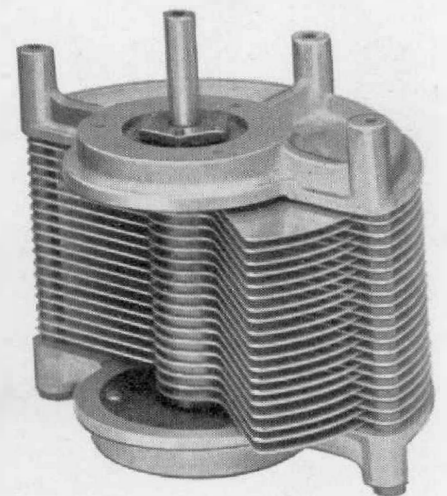
of items requiring special production methods.

It is not brick, nor mortar, nor machines, nor capital that makes a successful organization. It is the persons whose lives are associated with the organization who give it its existence. It seems thus fitting to include in this

his services to do whatever was possible to aid in the winning of the war. Knowing the position the General Radio Company occupied in the field of radio research, he felt that through it he would be best able to contribute his services. This man was Henry S. Shaw, now Chairman of the Board of Directors.



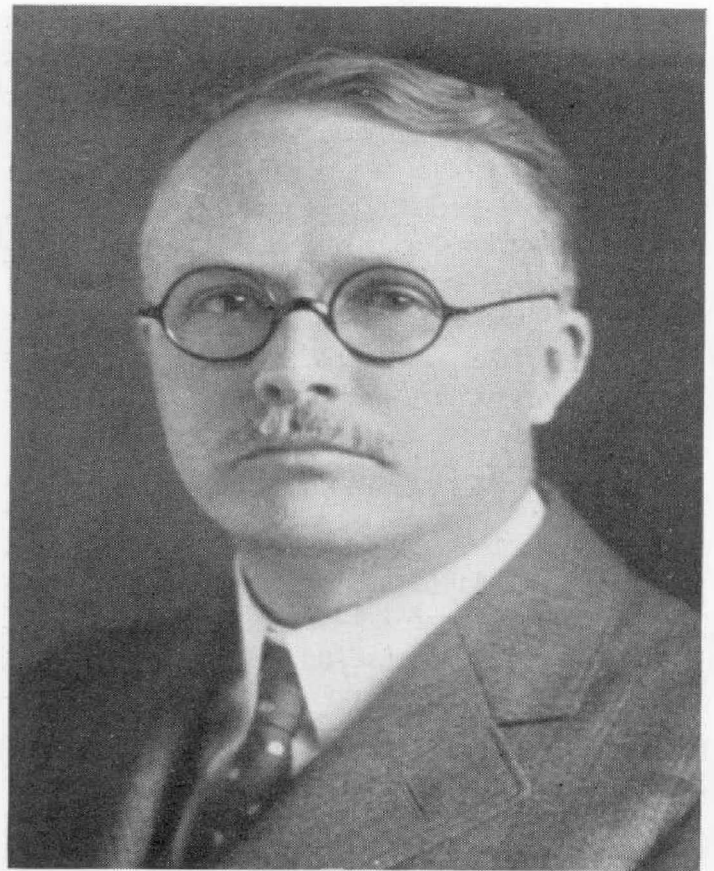
TYPE 101 Condenser. A 1915 pioneer in low-loss condenser design



Although primarily interested in science, and particularly in radio, Mr. Shaw had had considerable business experience, which experience proved to be of great value to the Company at a time when rapid expansion was necessary to meet war conditions. It was further largely due to his tireless activity and excellent judgment that the Company so successfully weathered the very trying days following the war, and the subsequent days of business readjustment. Mr. Shaw became Treasurer of the Company in January, 1918, and continued to hold that office until January, 1926, when he was elected Chairman of the Board of Directors, which position he now holds.

Mr. Shaw was born in Boston, November 29, 1884, and was graduated from Harvard University with the class of 1906. He is a member of the Institute of Radio Engineers, the American Institute of Electrical Engineers, and several other scientific societies. His interest in general business problems is evidenced by the fact that he is a director of a large Boston trust company, as well as several business corporations. Second only to his interest in science is his interest in natural history, particularly ornithology.

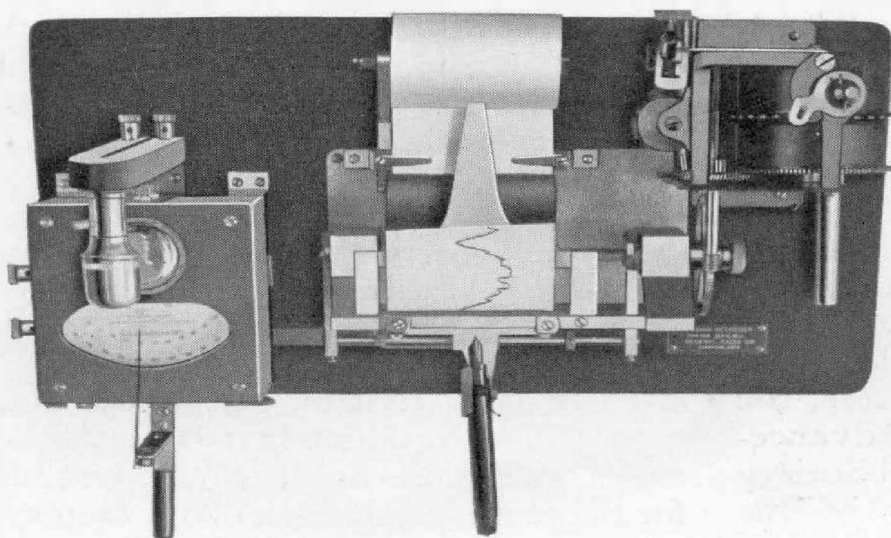
His scientific work has included studies of fading phenomena of radio



HENRY S. SHAW
Chairman of Board

signals, and for a score of years he has been interested in amateur radio, having operated early in 1924 what is believed to be the first crystal-controlled amateur transmitter. He is also interested in meteorology and other geophysical subjects.

When the General Radio Company started in 1915, Melville Eastham was elected President, and has been reelected every year since then, which is quite a record in radio manufacturing circles. His activities, particularly during the last few years, how-



TYPE 289 Fading Recorder.
A galvanometer and motor-driven recording tape used in studies of radio signal strength changes

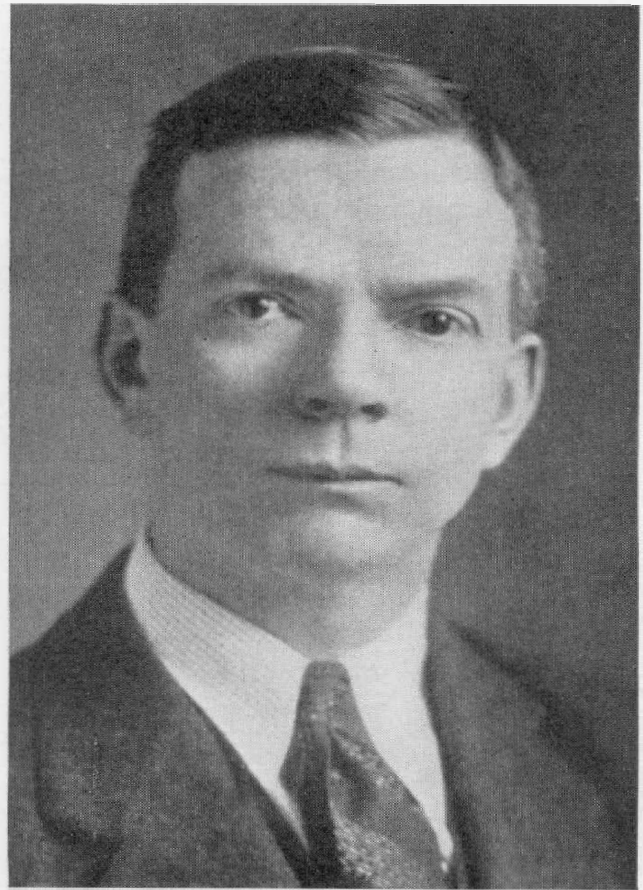
ever, are not properly described by his title, for he is rarely found at his presidential desk. His interests are almost exclusively in engineering work, and he may usually be found in his research laboratory, except during the summer, when he takes a long vacation, generally on the Pacific Coast or in Europe.

In the early days of the Company, he was instrumental in developing better variable air condensers having features which became almost universal, such as conical bearings, a moving dial in place of a moving pointer, and low-loss dielectric placed in a weak electrical field. He is the originator of the soldered-plate type of construction which has become so useful, particularly in condensers used at very high frequencies. His jig method of plate spacing has been an important factor in the production of uniform condensers with low assembly costs.

In 1919 the first TYPE 222 Precision Condenser with a grounded rotor was built. It used a worm and gear to make closer reading possible, and was almost exactly the same design that is still in use in most laboratories as a standard for comparing other condensers. The TYPE 216 Capacity Bridge for the measurement of small capacities was designed at about the same time, in connection with this precision condenser.

Mr. Eastham has been working during the last several years on beat-frequency oscillators, standard-signal generators, and other audio- and radio-frequency measuring equipment. Many of the simpler items of the General Radio line, such as sockets, rheostats, plugs, jacks, and others, are the result of his very practical turn of mind.

He was born in Oregon City, Oregon, on June 26, 1885, and is a Fellow of the Institute of Radio Engineers, the American Association for the Advancement of Science, the Acoustical Society of America, and a member of the



MELVILLE EASTHAM
President

American Institute of Electrical Engineers, the Optical Society of America, and the Radio Club of America. He was with the Clapp-Eastham Company, one of the early manufacturers of wireless equipment, from 1906 until the General Radio Company was founded.

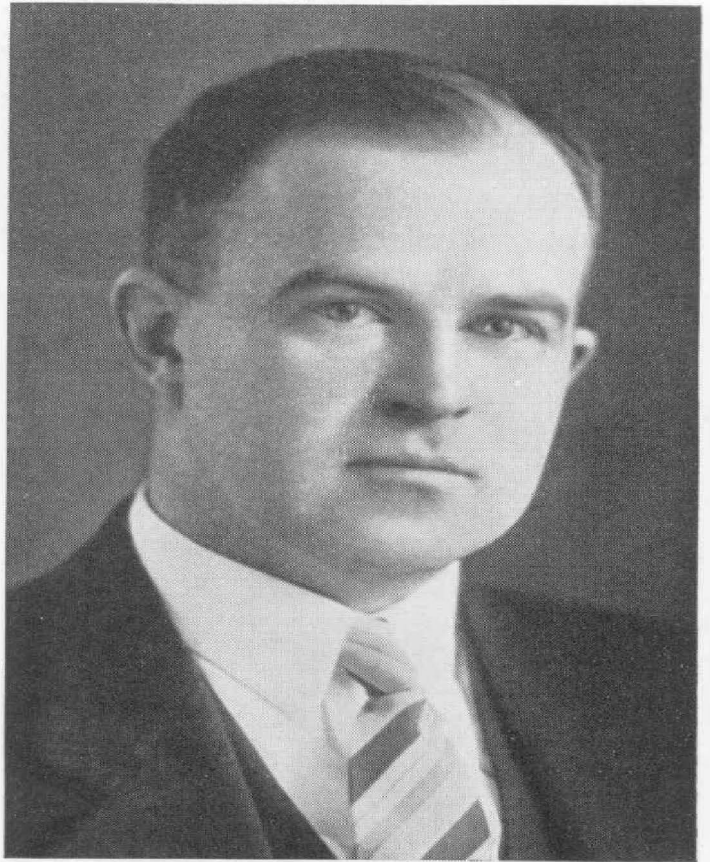
Mr. Eastham has been active for many years in the affairs of the Institute of Radio Engineers, and is at present its Treasurer. He is an ardent swimming enthusiast.

Another member who joined our organization during the war is our Vice President, Errol H. Locke. Although first associated with the Company in commercial activities, Mr. Locke was made Vice President in 1920, and for the past decade has been responsible for the entire production of our factory.

Born in Lexington, Massachusetts, on July 17, 1890, Mr. Locke has always made his home in that historic town, and has for a number of years been treasurer of the Lexington Historical Society, and is also a corporator of the Lexington Savings Bank. He is a graduate of Harvard University of the class of 1913. His hobby is the application of scientific methods to his Vermont dairy farm.

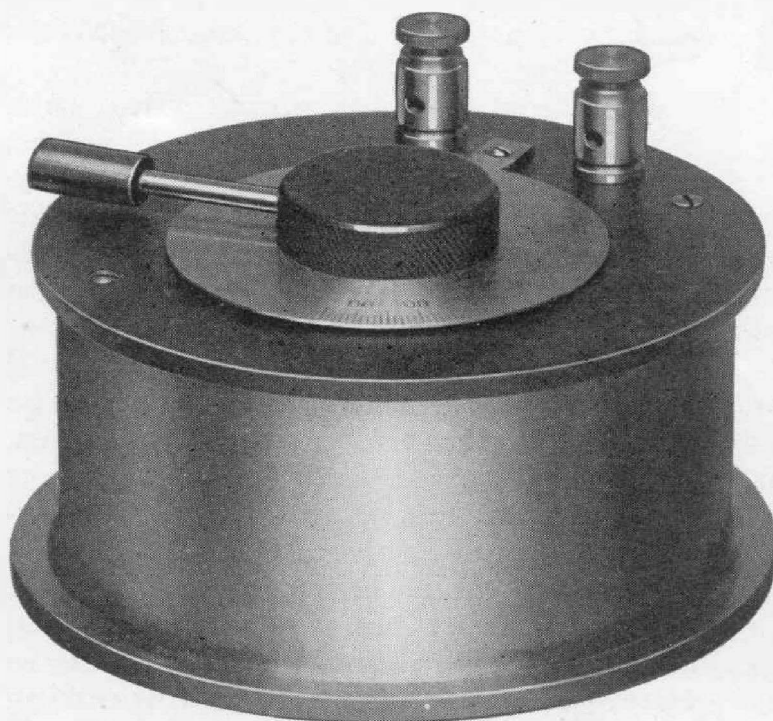
In May, 1917, an instructor in electrical engineering at the Massachusetts Institute of Technology, who was also an officer in the Coast Artillery Reserve Corps, was called to active duty. After two years of service in the United States and France, he received his discharge, and while waiting for the fall term to open to resume his teaching, he temporarily joined the General Radio Company. The work proved so attractive that he resigned his instructorship, and remained with the Company as an engineer. He was H. B. Richmond, who is now our Treasurer.

Mr. Richmond took over the commercial activities of the Company in

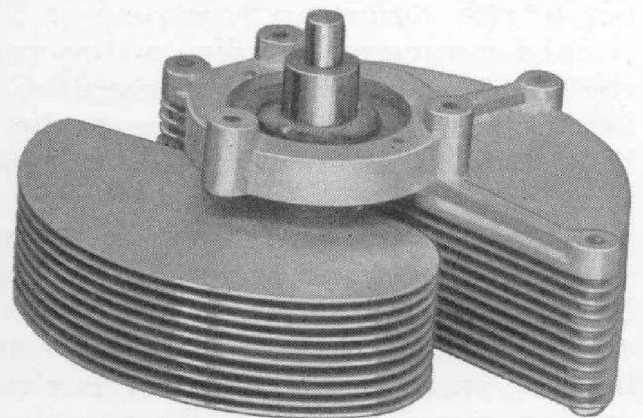


ERROL H. LOCKE
Vice President

the fall of 1920. On October 1, 1921, he was made Secretary of the Corporation, and in January, 1924, Assist-



TYPE 124 Condenser. A 1916 forerunner of popular priced low-loss condensers



ant Treasurer. Since 1926 he has been Treasurer of the Company, yet much of his time is devoted to the direction of its engineering policies.

Mr. Richmond was born in Medford, Massachusetts, on March 22, 1892, and was graduated from the Massachusetts Institute of Technology in



H. B. RICHMOND
Treasurer

the class of 1914. He is a Fellow of the Institute of Radio Engineers, a member of the American Institute of Electrical Engineers, and also a director of the Central Trust Company of Cambridge. For the past four years, he has been a director of the Radio Manufacturers Association, and just this month has completed a year as president of that organization. For a number of years, Mr. Richmond held a commercial first-grade radio operator's license, and has had an amateur radio station since 1908. While greatly re-

senting being called a New England farmer, one of his hobbies is flower-growing.

With the expansion of our engineering activities, it became necessary to obtain the services of an engineering executive, and in particular, one who had had considerable practical experience in the field of audio- and radio-frequency measurements. Where better could such a man be found than in the Bell Telephone Laboratories, which organization has contributed so many men to radio and allied industries?

After having spent twelve years in the Bell Laboratories on carrier telegraphy and telephony problems, on precision frequency measurements, and on television development, J. Warren Horton resigned in 1928 to join the General Radio Company as Chief Engineer.

A graduate in electrochemistry from the Massachusetts Institute of Technology, with the class of 1914, Mr. Horton continued there for two years on the instructing staff of the physics department. During the war he was engaged in problems relating to submarine detection, both in this country and at the U. S. Naval Headquarters in London.

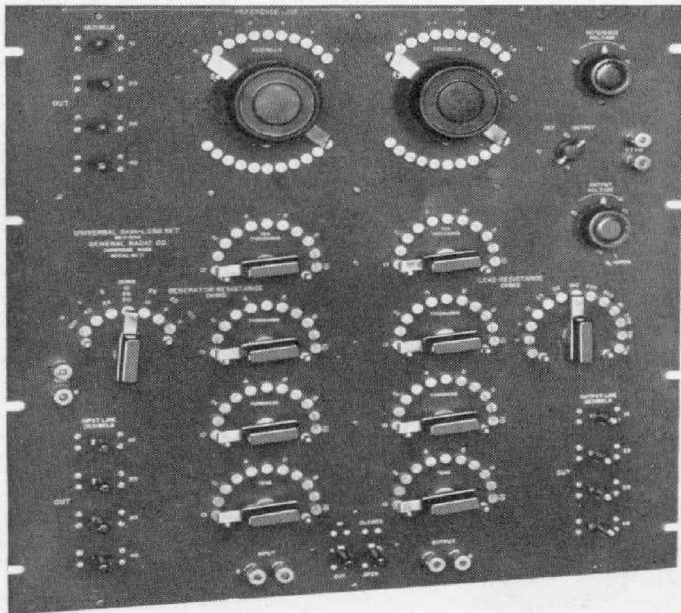
Mr. Horton holds membership in a large number of technical societies, being a Fellow of the Institute of Radio Engineers, the American Institute of Electrical Engineers, and of the Acoustical Society of America, as well as a member of the Physical Society, Society of Motion Picture Engineers, and others. Although now devoting a large part of his time to his executive duties, Mr. Horton still finds time to direct some personal development work, particularly on attenuation networks.

Assisting Mr. Horton is Lawrence B. Arguimbau. Mr. Arguimbau joined the Bell Telephone Laboratories in 1923, and his work was so promising



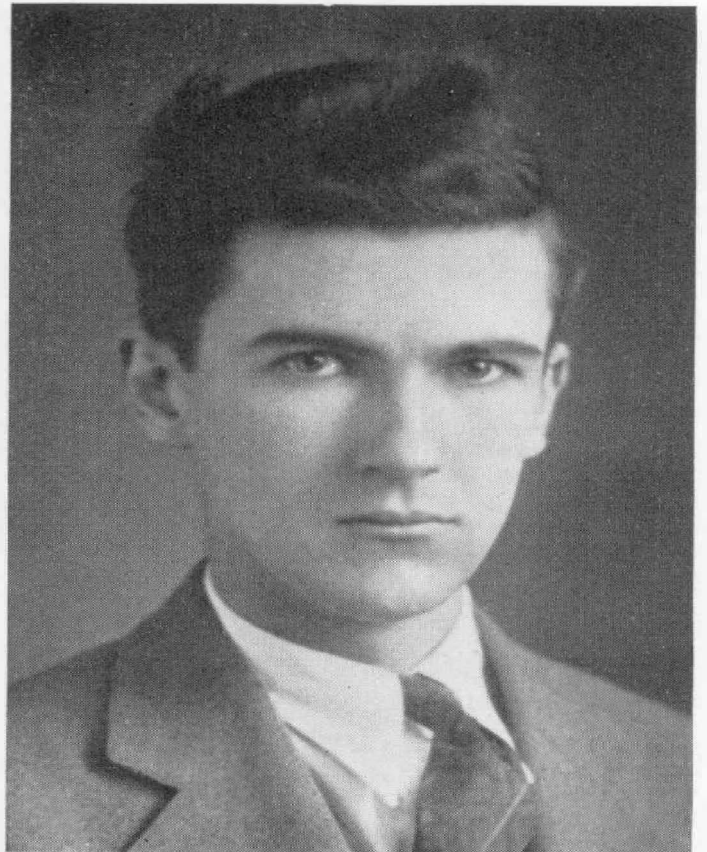
J. WARREN HORTON
Chief Engineer

that Mr. Horton, who was at that time with the Laboratories, felt that he should carry his studies further so as to



Universal Gain-Loss Set for determining transmission characteristics of circuits and component parts

include an engineering degree. He left the Bell Laboratories in 1926, and entered Harvard University, where he will be graduated in physics this year. During the four years he has been at Harvard, Mr. Arguimbau has spent his summers and much of the time



LAWRENCE B. ARGUIMBAU
Assistant Engineer

during the college year in our laboratories. His work has been quite largely on oscillator circuits with particular reference to their constants.

At the height of the home-built radio receiver days, every mail brought in large quantities of letters asking for information on receiver design. The task of answering this fan mail fell to Charles T. Burke. It is not alone in this field that Mr. Burke is proficient, for he has contributed much to the design of testing apparatus. In this latter field, particularly on equipment

for service men, he now specializes.

Mr. Burke joined the General Radio Company in June, 1924, immediately after receiving his Master of Science



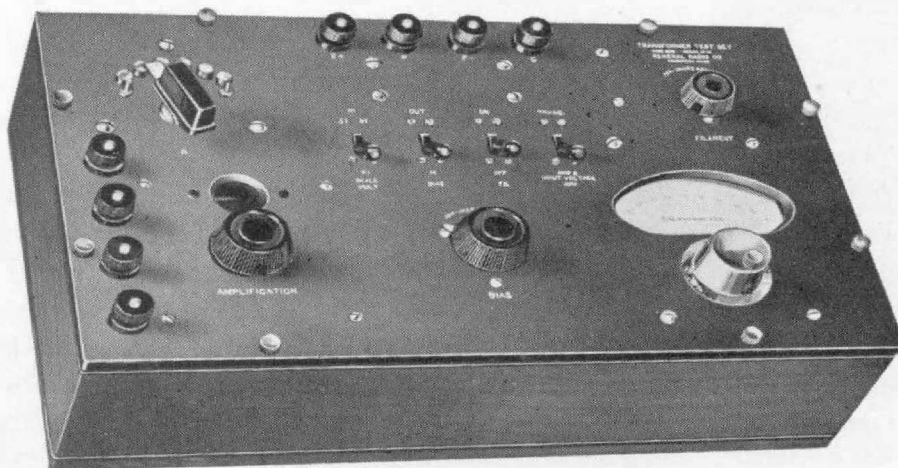
CHARLES T. BURKE
Engineer

degree in electrical engineering from the Massachusetts Institute of Technology. In the six years that he has been associated with this Company,

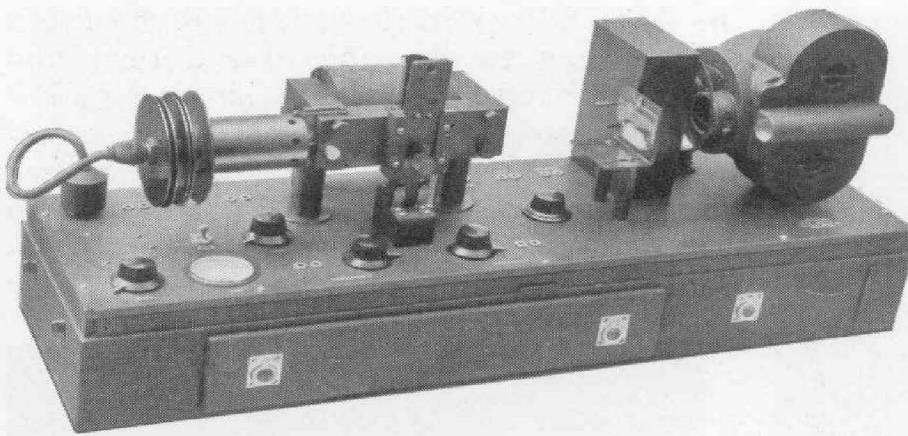
he has been its representative at radio exhibitions throughout the country, and has become known to a large part of the radio industry. He has also been active in the engineering activities of the Radio Manufacturers Association. Mr. Burke is a Member of the Institute of Radio Engineers, and an Associate Member of the American Institute of Electrical Engineers.

About two o'clock one morning out on a lonely country road, a police officer came upon a man who stopped about every hundred yards and tapped on the road with a hammer. It took much persuasion to make the officer of the law believe that the man he found was neither an escaped inmate of a neighboring asylum nor a member of a yegg gang, but only a physicist carrying out tests on his newly developed terraphone, later to be used in oil-locating surveys. The man was Horatio W. Lamson, the specialist in theoretical and applied acoustics of our engineering staff.

Mr. Lamson was graduated in physics from the Massachusetts Institute of Technology with the class of 1915, and in 1917 received a master's degree from Harvard University. During the war he was Assistant Radio Aide at the Charlestown Navy Yard, and later Chief Electrician, U. S. N. R. F., stationed at New London, where he



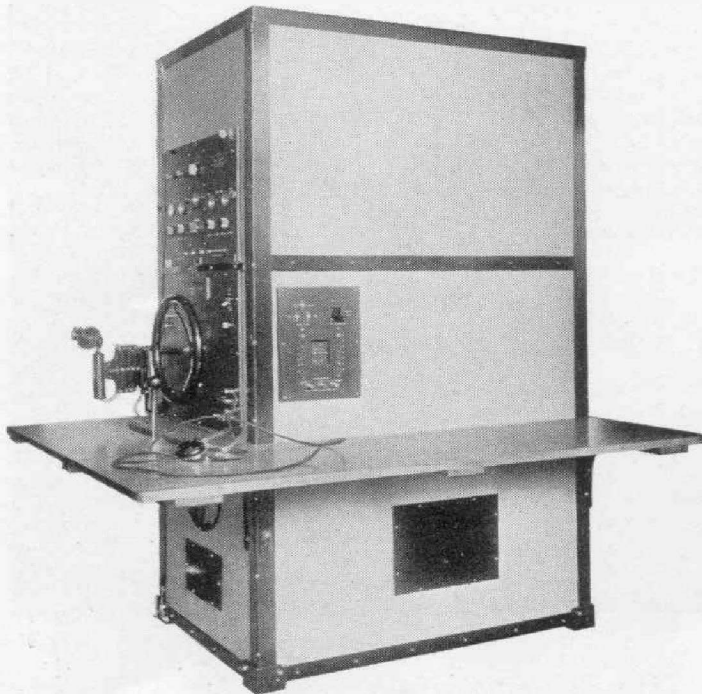
TYPE 355 Transformer
Test Set. An early ex-
ample of test apparatus



Recording Oscillograph
Used in oil-locating surveys

was engaged in research problems on submarine detection.

Since 1919, Mr. Lamson has either



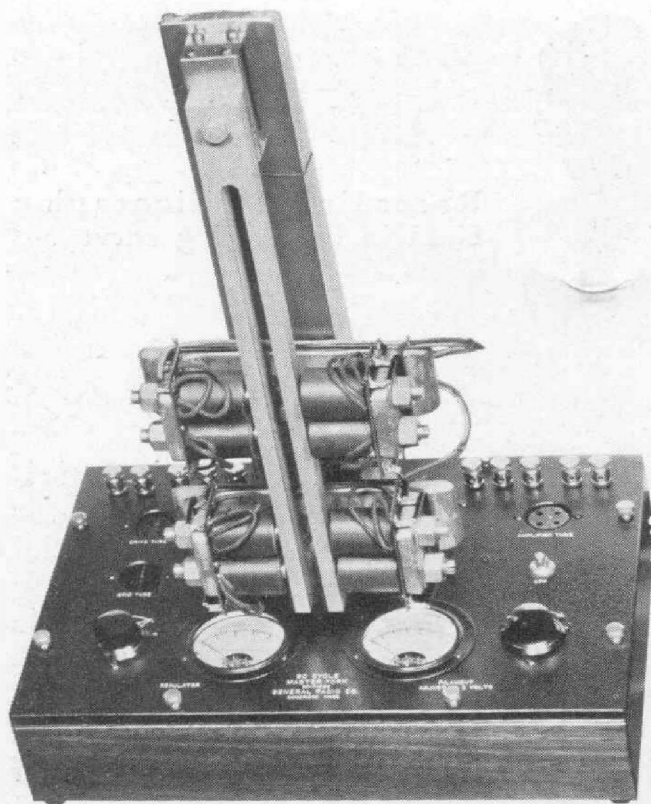
Submarine Detector for Coast Defense
installation

been associated with Dr. G. W. Pierce in his laboratories at Harvard University on problems in which the General Radio Company was interested, or directly with this Company. His work has covered a wide range of activities, but more particularly those pertaining to electro-acoustics and to frequency determination. He has developed subaqueous sound-ranging devices, geophysical survey apparatus, precision electrically driven tuning forks, and numerous allied equipment.

Mr. Lamson's amateur radio activities date back a score of years, and for a number of years he held a commercial first-grade operator's license, having been employed summers during his college training as a ship's radio operator. He is a Fellow of the Acoustical Society of America, a Member of the Institute of Radio Engineers, and of the American Institute of Electrical Engineers.



HORATIO W. LAMSON
Engineer



60-cycle Electrically-Driven Tuning Fork
of high precision

The engineer of our staff most familiar with actual radio operation, both from the commercial and from the amateur viewpoint, is James K. Clapp. Mr. Clapp not only has operated his own amateur station since 1909, but has been three years at sea as a regular commercial operator. During the Vermont flood of 1927, he organized a mobile radio group which went into the stricken region and rendered great assistance in establishing communication with the outside world. He spent two and a half years during the war in the U. S. Naval Communication Service, holding the rank of Ensign.

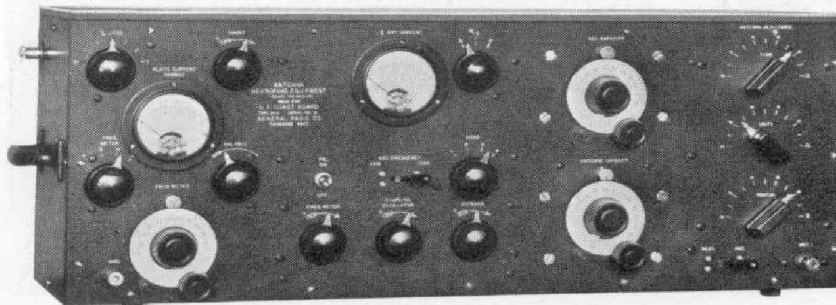
Mr. Clapp is devoting most of his time now to the accurate determination of frequencies. He is responsible for the present development and maintenance of our highly accurate frequency standards. In addition to this work, he has developed special equipment for measurement purposes for



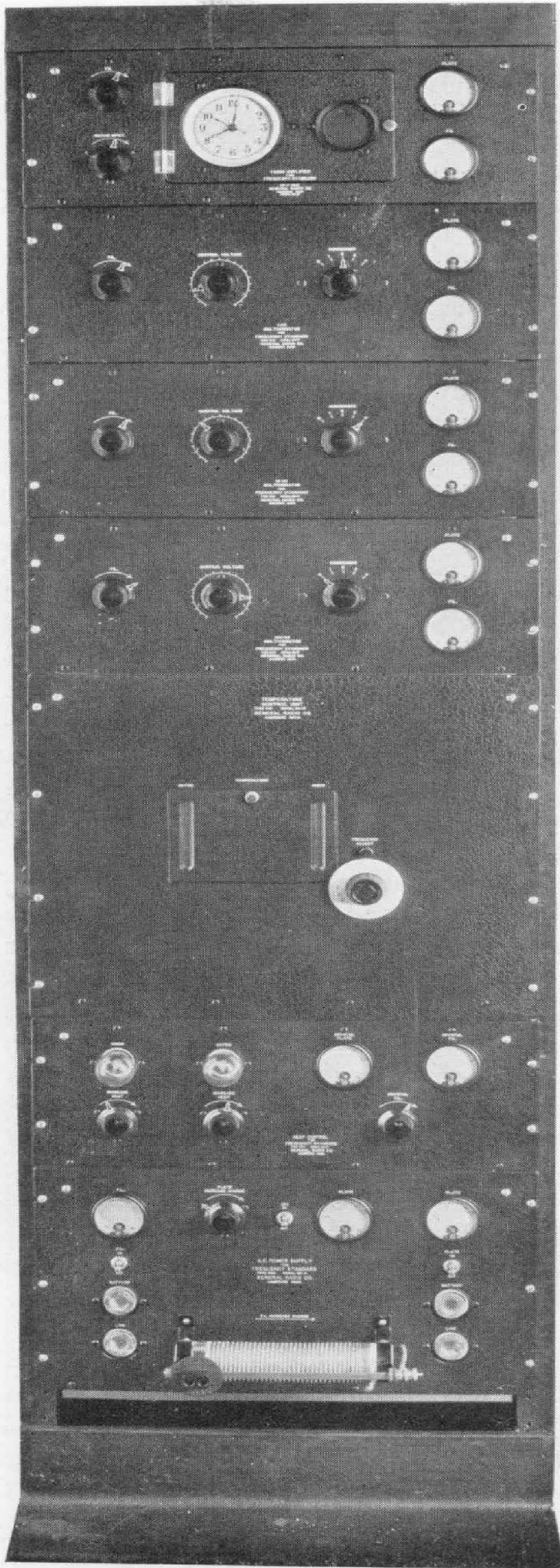
CHARLES E. WORTHEN
Assistant Engineer

the Navy, Coast Guard, and other governmental services.

Prior to joining this Company two years ago, Mr. Clapp was an instructor in electrical communications at the Massachusetts Institute of Technology,



Antenna-Measuring Equipment. A portable unit for studying antenna characteristics

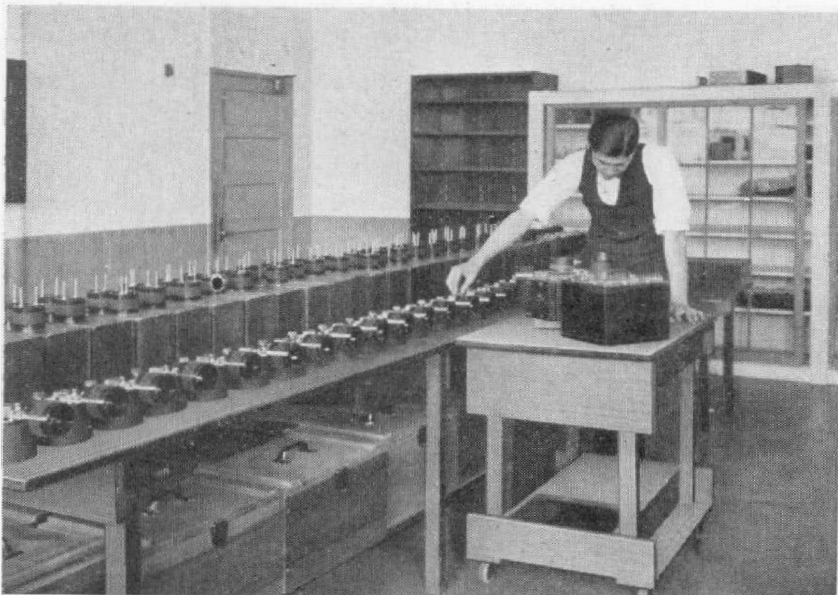


JAMES K. CLAPP
Engineer

from which he was graduated in electrical engineering in 1923, later receiving a Master of Science degree. He is a Member of the Institute of Radio Engineers, and is keenly interested in flying.

Assisting Mr. Clapp is Charles E. Worthen, who likewise is a graduate in electrical engineering from the Massachusetts Institute of Technology. Mr. Worthen came to us in June, 1928, immediately after graduation. In addition to the work done under Mr. Clapp's direction, Mr. Worthen has developed a 400-cycle tuning-fork oscillator, and made studies of paper condenser changes with age.

Piezo-Electric Controlled Frequency Standard which maintains an accuracy of within one part in a million. This is the General Radio Standard-Frequency Assembly



Individual calibration of
TYPE 358 Wavemeters

Like so many in our organization, Mr. Worthen has had amateur radio experience. He is an Associate of the Institute of Radio Engineers.

With the increased precision obtainable in audio- and radio-frequency

measurements, it became desirable to have as a member of our staff a man who through previous training and experience in the measurement field would be able to advance this art even further. Last October we were fortunate in obtaining the services of Robert F. Field, whose work in the measurement field is well known to radio engineers.

Mr. Field was graduated from Brown University in 1906, receiving a master's degree there the following year. He remained at Brown, teaching physics and electrical engineering, until 1915, when he left to take advanced work at Harvard University, receiving a master's degree in 1916. From 1918 until he joined the General Radio staff, Mr. Field taught at Harvard University. As Assistant Professor of Applied Physics he taught courses in communication engineering, specializing in electrical measurements.

During the war Mr. Field was engaged in research work pertaining to radio torpedo control and allied subjects. He is a Fellow of the American Academy for the Advancement of Science, a Member of the Physical Society, and an Associate of the Institute of Radio Engineers.

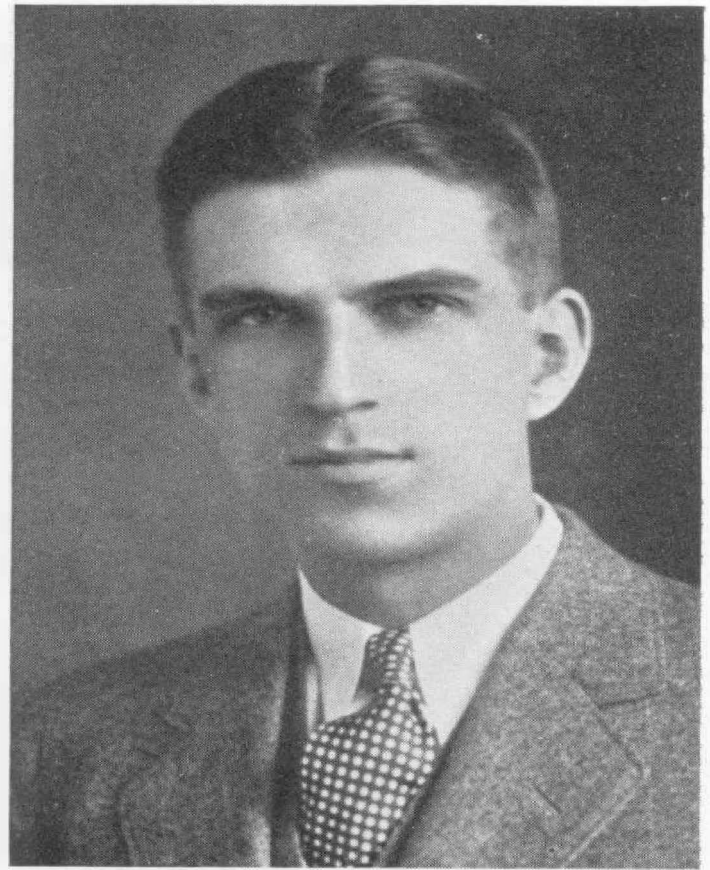


ROBERT F. FIELD
Engineer

Although joining our engineering staff but eighteen months ago, Arthur E. Thiessen has made an exceptionally wide acquaintance in the radio and talking motion picture industries. During the past winter, Mr. Thiessen made a lecture tour of eight sections of the Institute of Radio Engineers, besides several other extensive business trips. Largely through these contacts Mr. Thiessen has become known to many engineers in the radio and talkie fields.

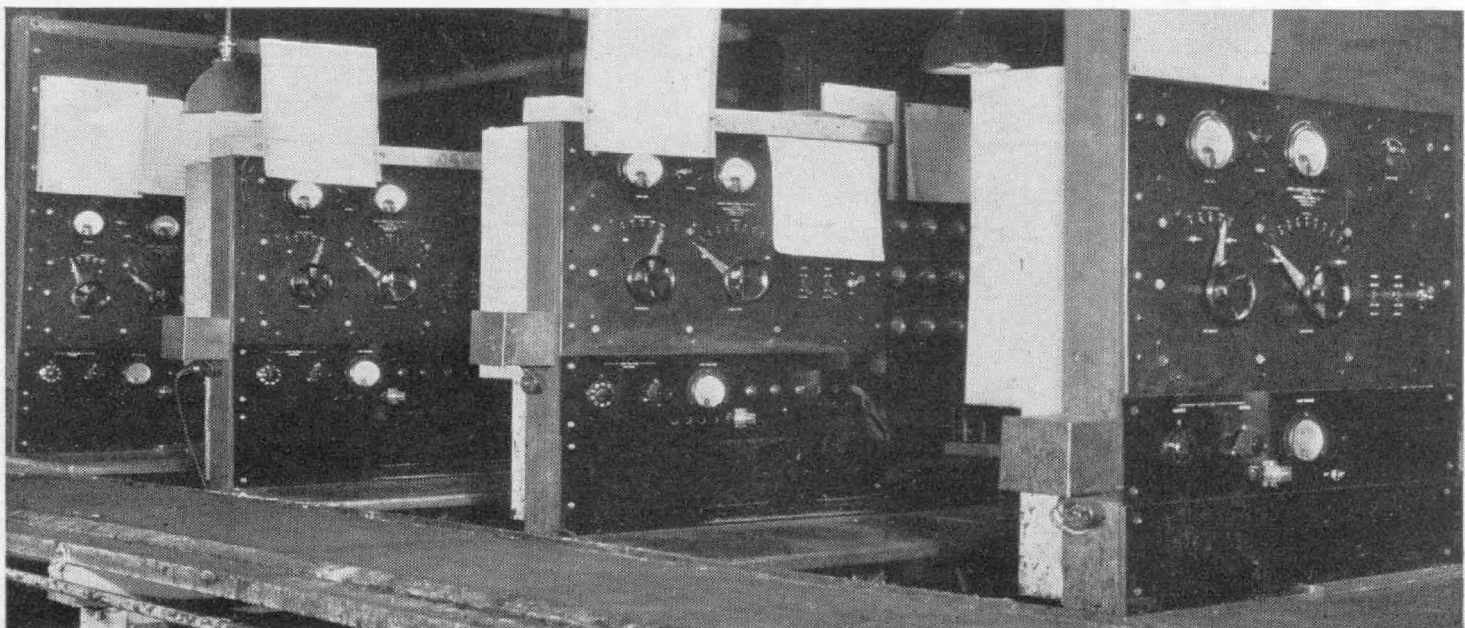
After being graduated with the class of 1926 in electrical engineering from Johns Hopkins University, Mr. Thiessen joined the Bell Telephone Laboratories staff, leaving there in December, 1928, to join our organization. He has been particularly interested in magnetic alloys and amplifier work. During the past year, he has, however, been devoting his time largely to the development of equipment for production testing of radio receivers and audio amplifiers, as well as special apparatus used in talking pictures.

Mr. Thiessen is a Member of the Institute of Radio Engineers. He is a former radio amateur, whose station was well known to Pacific Coast amateurs.



ARTHUR E. THIESSEN
Engineer

Technical literature requires a technical editor. It is, therefore, fitting that we should have as editor of the



A section of the audio-amplifier test installation developed for the Victor Talking Machine Company for production inspection tests on completed amplifiers



JOHN D. CRAWFORD
Engineer

General Radio Experimenter and of our catalogs and engineering bulletins, one trained in the field of communication engineering. Our editor, John D. Crawford, is an electrical engineering graduate of the Massachusetts Institute of Technology with the class of 1927. Until joining the General Radio Company early in 1929, Mr. Crawford was Assistant Managing Editor of *The Technology Review*, an engineering journal published by the M. I. T. Alumni Association.

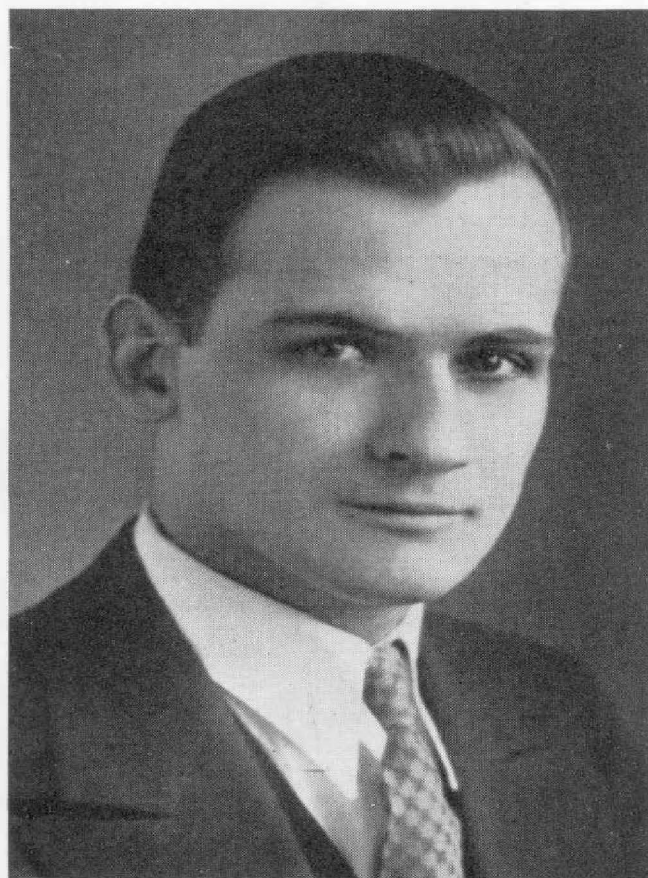
Mr. Crawford was at one time a radio amateur. He is an Associate of the Institute of Radio Engineers.

Another member of our Engineering Department who received training at the Bell Telephone Laboratories is Arthur G. Bousquet, who joined our staff last year. Mr. Bousquet was graduated in electrical engineering

from Tufts College in 1928. He is devoting much of his time with us to studying our regular instruments, to determine their characteristics, under limiting conditions of operation.

Mr. Bousquet is an Associate of the Institute of Radio Engineers, and has recently become interested in amateur radio activities.

In addition to the work of our own staff we have been fortunate in having had the consulting services of two well-known physicists, namely, Professor G. W. Pierce, of Harvard University, and Professor Walter G. Cady, of Wesleyan University. For the past decade, we have had the advice of Professor Pierce on a variety of problems. He has been our consultant on subaqueous sound work, circuits for piezo oscillators, magnetostriction

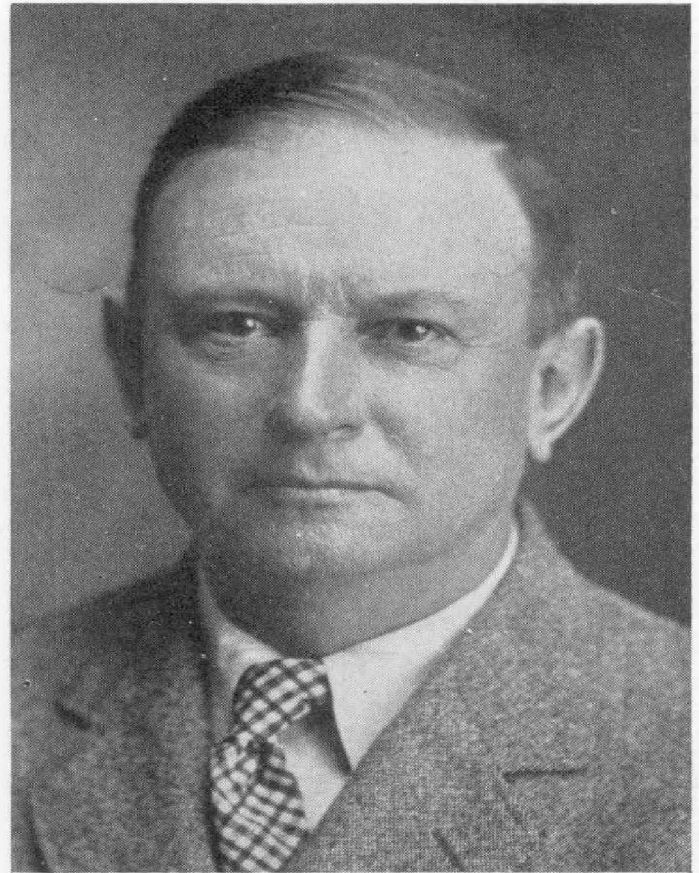


ARTHUR G. BOUSQUET
Assistant Engineer

apparatus, and at the present time, we are working with him on the development of supersonic apparatus. We have rights under his patents and applications in these fields.

Professor Pierce received his doctor's degree from Harvard University in 1900, and except for a period of study at Leipzig, has been teaching there ever since. He is now Professor of Physics, and Director of the Cruft High Tension Electrical Laboratory. He is the author of textbooks on radio subjects and of numerous technical papers. His membership includes a large number of technical societies in several of which he holds the highest grade. He is a past president of the Institute of Radio Engineers.

The work of Professor Cady has largely made it possible for us to become so actively engaged in the field of supplying quartz crystals as fre-



DR. G. W. PIERCE
Consultant



DR. WALTER G. CADY
Consultant

quency standards. Professor Cady was a pioneer in this field and through his consulting services and the issuing of rights under his patent, we have been able to develop and manufacture quartz crystal standards.

Professor Cady received his doctor's degree from the University of Berlin in 1900, and after two years as magnetic observer with the U. S. Coast and Geodetic Survey, joined the staff of Wesleyan University, where he is now Professor of Physics. He is the author of many papers on theoretical and applied physics. Professor Cady holds the highest grade of membership in several technical societies.

After the electrical engineers have developed breadboard models of apparatus, a complete experimental model must be made. This work is handled in an experimental shop under the direc-

tion of Harold S. Wilkins, our mechanical engineer. On Mr. Wilkins, the link between engineering and production, rests the responsibility of checking all apparatus for mechanical details before releasing it for production.

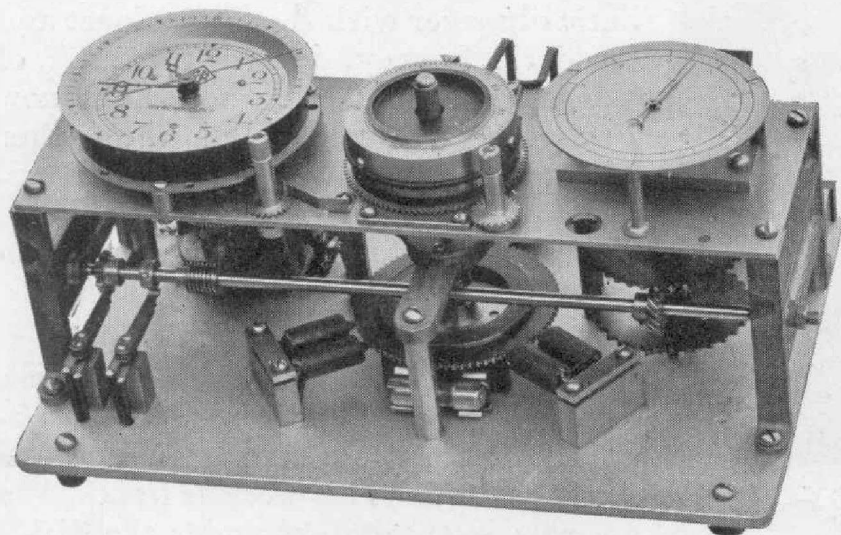
Mr. Wilkins was graduated in electro-chemistry from the Massachusetts Institute of Technology with the class of 1914. His work has been quite varied but always on problems relating to mechanical and electrical engineering. It has covered such fields as storage batteries, woodworking machinery, electrical apparatus, oil burners, electrical refrigerators, and other household appliances. Since he has been with us he has developed gear mechanisms for a synchronous motor-driven clock for accurate time comparisons, and a recording oscillograph for special uses.

During the war Mr. Wilkins was with the Chemical Warfare Service, now holding the rank of Captain in the Chemical Warfare Reserve Corps. He is a member of the American Chemical Society, the American Electro-Chemical Society, and of the Society of Automotive Engineers. During his collegiate days he was a sprinter well known in the New England Inter-collegiate meets and still retains his interest in outdoor sports.



HAROLD S. WILKINS
Mechanical Engineer

When a customer complains — and such things have really happened — about the delay in the delivery of some special order item, we look to “Mac” to straighten out the matter. Paul K. McElroy, with title of production engineer, operates a shop within a shop. In order that drawings and pro-



TYPE 511 Syncro-Clock with special micro-dial which permits time-interval comparisons to be made within 0.01 second



PAUL K. McELROY
Production Engineer

cesses may be approved before regular factory production starts, the first production samples of new instruments are made in this special shop. Here also special items in small quantities are made. In short, it is the liaison between engineering and production.

Mr. McElroy's collegiate training was interrupted by the war, during which he was stationed at the Ordnance Proving Ground, Aberdeen, Maryland. After the war he returned to Harvard University, graduating in physics in 1920. A year later, after obtaining a master's degree, he became associated with the General Radio Company on problems pertaining to the construction of submarine detectors.

Although perhaps to the discomfort of his neighbors, Mr. McElroy's hobby is playing the saxophone. He is a Member of the Institute of Radio Engineers.

After establishing contact between an engineer desiring measuring apparatus, and our Engineering Department, the efficiency with which the order is handled depends on the Commercial Department. That there may be an understanding of engineering requirements, Charles E. Hills, Jr., a graduate in electrical engineering of the class of 1921 of Northeastern University, has been chosen our Commercial Manager.

After a brief training in laboratory work with a large electrical company, Mr. Hills joined the General Radio Company in 1922. Before taking over his duties as Commercial Manager, he was associated with the production office in order to become familiar with production methods as well as the requirements of his own department. Mr. Hills is an Associate of the Institute of Radio Engineers.



CHARLES E. HILLS, JR.
Commercial Manager

SMALL LABOR TURNOVER



KNUT A. JOHNSON
Our Senior Employee

The manufacture of scientific apparatus, such as ours, requires not only skilled workmen, but men familiar with the particular construction of our instruments. It is, therefore, only fitting to find that the first man to join the General Radio organization is still with us. He is Knut A. Johnson, a skilled machinist who is now in charge

of a department devoted to special items, whose manufacture is not adapted to routine production methods. It is in this department that individual items are manufactured to meet some unusual requirements of a customer.

Through vacation and holiday pay, through a profit-sharing bonus plan, and above all, through good working conditions, we try to keep labor turnover at a minimum. That this plan has been successful is evidenced by the fact that even with the increase in the number of employees, 15 per cent. of the shop personnel have been with us over ten years; 34 per cent. between six and ten years; 3 per cent. between three and six years; and only 48 per cent. less than three years.

Only male help is employed, except for the office personnel. Of the men in our office, a majority have been here over five years, while the purchasing agent and the chief draftsman are on their second decade. All the officers have been with the Company for over ten years.

A five-day working week was inaugurated in 1919, while group insurance wholly paid for by the Company was placed in effect two years prior to that. The employees operate by themselves a Mutual Benefit Association and also a Credit Union.

The General Radio *Experimenter* is published monthly to furnish useful information about the radio and electrical laboratory apparatus manufactured by the General Radio Company. It is sent without charge to interested persons. Requests should be addressed to the

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