Radio Topics

April, 1923

20 Cents

Popular! -for good reasons

RADIO enthusiasts wanted an expertly designed, moderate-priced set that any intelligent man or woman could operate. So we built the Popular, to sell at a popular price.

Just two dials to turn to find the stations broadcasting within a range of 500 miles. As you become more experienced you can reach out twice as far. You don't have to become an expert to operate this set to your complete satisfaction. But the more you know about radio, the better you will appreciate it.

The fine piano finish, mahogany case, moulded and shielded panel, Bakelite dials and splendid beauty of the Popular promises you a set you will be proud to own. And that promise comes true! It is the ideal set for busy folks who want the thrills of radio.

THE C. D. TUSKA CO., Hartford, Conn.

Popular No. 225

Tuska Regenerative Receiving Set

Tuska receiver, detector and 2-stage amplifier. Armstrong regenerative circuit, licensed under Armstrong, U. S. Pat. No. 1113149. Sensitive for long-range stations. Loud volume for nearby broadcasting. Clear, natural and undistorted tones. Can be used with phones or loud speaker.

Send for Catalog No. 14

TUSKA RADIO

TUSKA TRADE MARK RADIO

Radio Topics

An Illustrated Monthly Devoted to Radio

Volume III APRIL, 1923 Number 3

Radio is playing a big part in the movies these days. This is a scene from the Preferred Pictures Corporation film, "Thorns and Orange Blossoms." The player operating the Kennedy set is Kenneth Harlan, star of the picture.

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OAK PARK, ILLINOIS, U. S. A.

J. RAY MURRAY, EDITOR

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RADIO TOPICS is on sale the 10th of preceding month. Text and advertising forms close the 22nd of second month preceding issue.

Vol. III April, 1923 No. 3

Blocking the Radio Trust

DO not lose heart because the White-Kellog bill, which passed the House of Representatives January 31, got no further. Whether or not a strong "lobby" was responsible for its not reaching the Senate committee cannot be told except by those on the "inside."

However, Congress is not asleep. It is laying the groundwork for a Federal radio control law that will be more far-reaching than the White-Kellog measure and which will effectively prevent the formation of a "trust." Already an investigation is under way—headed by Representative Wallace White, the daddy of the first bill—which will inquire into the activities of the radio corporation and ascertain if they are or are not violating anti-trust statutes in the United States.

The radio bill has been put over until December, but its sponsors are not inactive.

Killing the Goose

THE American Society of Composers, Authors and Publishers, who have been shaking the movie theatre men down to the tune of 20 cents a seat per year for playing their music, now have turned their attention to broadcasting stations and want $5 a day from them.

It is estimated this would net them about a million dollars a year — for advertising their songs. Wouldn't you call that crust?

The theatre men are now fighting this unjust music tax. Are the American composers going to be short-sighted enough to kill the goose that lays the golden egg—advertising—for them via radio, also?

"Si" Listens In

THE folks down on the farm are no longer isolated and behind the times, thanks to the radio. They get the weather reports, the market news and the latest opera and dance music. The broadcasting of stock reports has become a very important thing to the farmer with wheat and cattle to sell. And he's taking every advantage of it.

Chicago is trying out the "silent night." Now, if the amateurs and spark hounds will only desist on Monday nights maybe the "silent night" will mean something.

Do the girls wear those radio boots so they can sidestep the damp waves, 'er what?

Editorial of the Month

Broadcasting Records

(Chicago Journal)

The broadcasting record for a woman's voice is claimed for a recent test covering 3,500 miles of space.

At Douglas, Alaska, on the night of January 6, Mrs. Robert E. Coughlin plainly heard "Mother Machree" being broadcasted from station PWX. The singer was Miss Harriet Williams, a member of the staff of the American consul-general in Havana, Cuba. The Cuban Telephone Company verified the record.

The distance, 3,500 miles, easily establishes the feasibility of broadcasting the human voice across the Atlantic ocean. Some allowance must be made for the wonderful atmospheric rarity of northern latitudes like northern Canada and Alaska in mid-winter. But, when atmospheric conditions are right, radio transmission from east to west, and vice versa, has already scored wonderful records.

One can appreciate only faintly what it means to those who are imprisoned in high northern latitudes in winter to be suddenly brought into intimate touch with the outside world. In lonely Hudson Bay Company's posts, in northern Canada, radio sets are now a portion of normal equipment. In the faraway hamlets that stretch almost to the Arctic circle the long winter nights are lonely no longer, for the radio brings music and oratory and news bulletins from the great world to the south.

We live in an age of marvels, but each development in applied science is only, apparently, the vestibule of a still more marvelous one. The regulation of "laws of the air" will bring order out of present crude experiments in broadcasting sounds. The scientific tuning of radio apparatus will preserve the most delicate shadings of the human voice through vast spaces.

Not so long ago it took days, weeks, or even months for intelligence from the outside world to penetrate hamlets on the outskirts of civilization.

Today the human voice, thanks to radio development, is becoming independent of railways, or post-offices, or even the electric telegraph. The air has lent wings to the human voice that defy space.

"Wired Wireless" to Solve Broadcasting Problem

COMPANY FORMED TO SELL BROADCASTED CONCERTS TO REGULAR SUBSCRIBERS—$60,000,000 CORPORATION

IS the question of "who is going to pay the artists who are nightly called upon to play at broadcasting stations," to be answered by the adoption of the plan sponsored by the North American Company? That some solution of this vexing problem must soon be arrived at every devoted radio fan in the country agrees.

Professional entertainers cannot afford to work for nothing, and the big companies have been sitting up nights trying to devise some system whereby they can get some return for this service besides the selling of receiving sets and accessories.

According to *Variety*, a New York theatrical weekly, this is the solution:

What will probably develop into the most gigantic radio undertaking yet is the plan now being developed by the North American Company, which is behind a "wired wireless" enterprise. It provides for centralized broadcasting stations, with the entertainment arranged by an official director. This service will be paid for by the radio subscribers, and, accordingly, will bring into demand talent from all spheres, which will be proportionately reimbursed for their services.

"It is the first official cognizance by the radio people that the talent must be paid for, and is to be considered as a very important factor in popularizing radio.

Plans Far-reaching

"The plans are so far-sweeping and ambitious that were it not for the fact that a corporation which has since proved its success in supplying heat and power to various cities and townships is behind it, it would sound like the colloquial 'pipe dream.' The North American Company has for its basis the licensed patents of Major-General George Owen Squier, chief signal officer of the U. S. A., now consulting engineer of the corporation. The wired wireless is merely a patented device whereby the overhead aerial, ground wire and storage and dry battery cells are eliminated; the mere plugging in on the ordinary electric light wiring circuit serves as the means to effect radio communication. The plan is to sell the radio instruments on the monthly installment basis, as the electric light companies sell electric toasters, irons, vacuum cleaners, etc. In addition, the small charge for the entertainment service is added to the electric bill at the end of each month.

"A system of attuning to various wavelengths will permit the subscriber to tune into any division desired. These divisions are divided as follows: Dance music, opera and symphony orchestra concert sermons and lectures, news reports anent sporting events, topical news of the day, weather and agricultural events, etc., and light entertainment.

Crystal and Tube Used

"Experiments conducted for two months with the Cleveland Electric Illuminating Co. have proved the practicability of this new radio innovation to the satisfaction of the North American Company. The latter, by its license arrangement with General Squier, has the privilege of sublicensing to anybody it sees fit. All that is necessary, technically, are a simple crystal set and vacuum tube receivers to facilitate loud speaking. The instrument itself is not much larger than the ordinary desk telephone, although a bit more bulky and clumsier in appearance. On it are the various dials to permit switching from one wavelength to the other.

"What effect on show business in general this new device will have is startling in its revolutionary possibilities. Typical advertisements, advertising radio receiving sets, reading something like, 'No need to dress up and go out in the cold and spend a lot of money and come home worn out when you can put on comfy clothes and slippers, sit by the fireside and let the best entertainers in the world amuse you,' is a fair idea of what radio may mean to the theater. The New Yorker or any inhabitant of a big city like Chicago. Boston or San Francisco has but little idea what a grip radio has on the country in general. Any medium-sized city under 50,000 population best reflects the citizenry's reaction to the new fad. The small town papers feature radio almost daily, and it is to them it will have its greatest appeal — and greatest drawback, from the theater's point of view.

Wall Street Interested

"Wall Street heard of the undertaking first more than a month ago and speculators plunged in the stock of the company, which was run up from $100 to $119 a share in a week or so before the public knew of the scheme. The high quotation has since been well maintained, indicating the belief in financial circles that the project promises important profits.

"The North American Company is a trading and holding corporation with a broad charter under which it can engage in a variety of businesses. It controls and aids in financing a number of street railway and electric light and power companies, including the entire railway and electric service system of Milwaukee and transit and electric service systems in St. Louis. It controls or is interested in the Detroit Edison, Kentucky Coal Co. and the Edison Company, Cleveland."

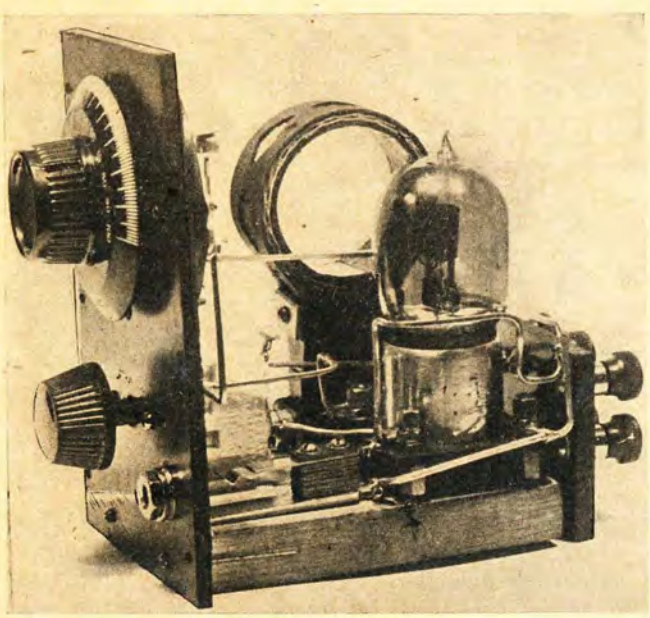
The "Ford" of the Radio Field

AT last we have the "flivver" receiving set. It is so called not because of its low cost—the crystal set still holds the record for that and low up-keep—but because of its compactness and long distance record.

The one shown here is the handiwork of W. E. Foster, 2308 Bryant avenue, Minneapolis. Minn., and cost in the neighborhood of $8 to build. It is about as simple in design as any single circuit set could be, with but one control the 23-plate condenser, and occupies the space usually allotted to one unit of an ordinary set.

Mr. Foster claims he has heard programs broadcasted from Louisville, Ky., Atlanta, Ga., Los Angeles, and Fort Worth, Texas. He states it is extremely sensitive and there's no doubt it will be popular with the radio fans who are looking for a simplified hook-up with a long range.

There are no superfluous parts to this "flivver" and it will no doubt be the means of assisting many ardent fans to graduate from the crystal set class to the one tube contingent.



(International Newsreel Photo)

Famous "Flivver Radio," which can be built at a cost of about $8. It consists of a vernier rheostat, one 50-turn honeycomb coil, a grid condenser, 23-plate variable condenser and tube.

Uncle Sam Issues New Radio Books

THE United States Signal Corps is issuing a series of radio pamphlets describing the principles and operation of radio apparatus, with particular reference to the types of apparatus employed in the radio service of the Signal Corps.

Probably the publication of this series which is best known to the public is Signal Corps Radio Communication Pamphlet No. 10, "The Principles Underlying Radio Communication." It is a book of over 600 pages, which contains more than 300 illustrations, and is an elementary text covering the principles of radio communication and the more important radio methods and apparatus. A copy may be purchased for $1 from the Superintendent of Documents, Government Printing Office, Washington, D. C.

"Wavemetres and Decremetres," Signal Corps Radio Communication Pamphlet No. 28, has recently appeared. It contains fifty-five pages and a number of illustrations, including photographs. It discusses the principles of the measurement of the decrement of damped waves. Detailed descriptions are given of the construction of the various types of wavemetres and decremetres employed by the Signal Corps and instructions for their use. A copy of Radio Communication Pamphlet No. 28 can be purchased for 10 cents from the Superintendent of Documents.

Court Decides Against "Bootleg" Tubes

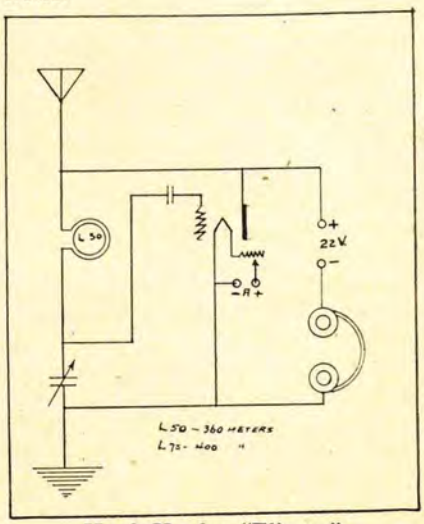
JUDGE AUGUSTUS N. HAND, in the United States District Court, for the Southern District of New York, recently handed down decisions in three patent suits brought by the Radio Corporation for infringement of the DeForest audion patents by the manufacture and sale of vacuum tubes for radio purposes. In all three cases Judge Hand granted preliminary injunctions asked for.

The first of these suits was that of the Radio Corporation of America against La France Import & Sales Company, Inc., and others, who are manufacturing and selling a vacuum tube known as the "La France" detector and amplifier.

The second suit was against Harry Rosenthal and others who are manufacturing and selling a vacuum tube detector and amplifier known as the Perfection tube.

The third suit was against the Radio Guild, Inc., a dealer in the "Perfection" tubes.

One of the principal defenses urged upon the Court for a denial of the preliminary injunction motions was that Radio Corporation of America had no rights to maintain the suit because the DeForest Radio Telephone and Telegraph Company was the owner of the DeForest audion patents. This defense, as well as other defenses, was overruled by Judge Hand in granting the preliminary injunctions.



Hook-Up for "Flivver"

Photographs Sent by Radio

PORTRAIT OF PRESIDENT HARDING BROADCASTED FROM WASHINGTON TO PHILADELPHIA—PREDICTS MOVIES WITHIN YEAR

THE first successful transmission of photographs took place on March 3rd, a portrait of President Harding being placed in a camera-like outfit in the Naval Radio station at Washington, D. C., and was broadcasted to another camera-like apparatus 130 miles away on the top of the *Evening Bulletin* building City Hall Square, Philadelphia.

A group of newspaper publishers, scientists and the inventor stood about the radio receiving set and watched a blinking star cause a little hair strung across the camera lens vibrate. The brilliancy of the shadow cast upon a photographic negative slowly evolved into the complete picture of the Chief Executive.

Test Was Successful

The test was under the auspices of the North American Newspaper Alliance. The apparatus by which the picture was sent is the invention of C. Francis Jenkins of Washington.

Mr. Jenkins, who watched the demontration, believes within a

(International Newsreel Photo)

C. Francis Jenkins, inventor of photographic radio machine, holding one of the discs used to transmit photographs by ether.

year his apparatus will be sending motion pictures by the air. It is a simple step from the successful experiment of today, he is certain.

Experiments were attempted with three photographs, those of President Harding, Vice President Coolidge and Governor Pinchot of Pennsylvania.

President Harding's portrait was the only distinct one received. The fact that the Bulletin Building is in a business district, with tall buildings on all sides, hindered perfect reception. Every structure nearby acted as a ground, so that many blemishes in the picture were due to the imperfections in radio reception, which will be eliminated with the progress of the science.

An apparatus had been installed on the tenth story of the Bulletin Building. It was a big camera, divided in two parts, with the lens in Washington and the photographic plates in Philadelphia.

The Mechanism Described

On one of the box-like mechanisms was a device made chiefly from an ordinary automobile headlight bulb. Something analagous to a periscope was attached to this, a vibrating mirror, whose purpose was to reflect the photographic rays of light.

The next step in the process was to procure a card to fit over the lens.

A hole had been drilled about as wide as a pencil. An oblong slot several times longer than it was wide, was cut in the center of the card. An aperture remained, and it was placed so the center fitted over the hole.

A black hair was pasted lengthwise down the card. Two important factors were that the hair had to be black, and that it had to just pass over the small opening.

The little party stood about the apparatus. The room remained light. Soon a little star was seen sparkling through the hole.

Rays Trace Picture

A set of prismatic plates began to rotate. The shapeness of the light set the hair quivering. The quivering of the hair cast a shadow upon the opening. The prismatic plates kept the ray of light moving slowly. It passed down the negative and continued to do so again and again in parallel lines, a small fraction of an inch apart.

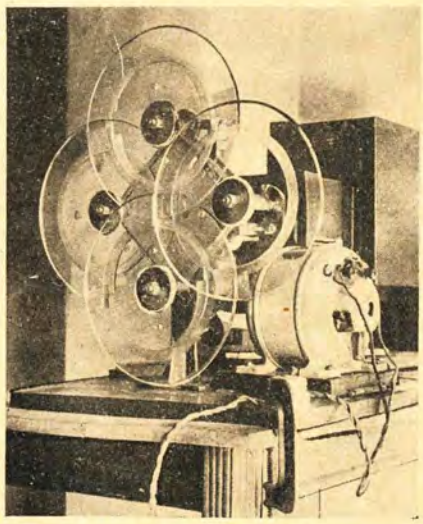
The portrait of President Harding was traced on the negative. The brightness with which the spark twinkled decided the intensity of the effect upon the negative which appeared when placed in the developing solution in the photographic dark room.

The theory was somewhat the same as that put in practice by every youngster—to place a coin under a sheet of paper, draw lines up and down over the hidden coin, take the sheet from the table, and behold, a perfect copy of the money, Indian's head or bull.

Printed From Negative

The sending was done from an ordinary photograph. At the receiving end the process was reversed. The picture when received through the air was printed from a negative in the ordinary manner.

All of the features of radio are preserved. The antenna used in receiving consisted of a single wire, with the camera-like box substituting for the headphones. The radio receiving apparatus consisted of a detector and amplifying unit of the type used by many amateurs.



(International Newsreel Photo)

Sending set of prismatic lens discs, invented by C. Francis Jenkins, successfully used to send photographs by radio.

Chicago Tries Out the "Silent Night"

ONE "silent night" a week was agreed upon recently by all the broadcasting stations of Chicago, and Monday was chosen as the night when every radio fan can go a-fishing for long-distance stations. The thing has proved a success so far and was greeted with enthusiasm by the countless thousands of receiver owners on the first night.

Alderman John Toman was the originator of the idea and through a canvas of fans conducted by the *Chicago Daily News* radio department it was found the idea met with popular favor. This is in line with "silent night" observed by Davenport, Iowa, and Atlanta, Ga.; also other cities in the East.

At a meeting of the council committee on gas, oil and electric light Feb. 20, E. A. Beane, United States radio inspector; Wilson J. Weatherbee, managing editor of station KYW; William S. Hedges, editor of radio department *Chicago Daily News;* Thorne Donnelly and Elliott Jenkens of station WDAP, I. Herriott of the American Radio League and J. J. Novak of RADIO TOPICS were present.

Another proposition is now before Chicago law makers, submitted by D. E. P. S. Miller, a West Side Chicago radio fan, asking for a staggered time schedule when all stations would keep silent. For instance, it is proposed the hours between 6 and 7 on Sunday be "silent," 7 to 8 on Monday, 8 to 9 on Tuesday, 9 to 10 on Wednesday, 10 to 11 on Thursday, 11 to 12 on Friday, and Saturday from 12 to 1 a. m., thus enabling the local fans to hear "the world in a week," as Dr. Miller expresses it.

Amateur Operators Suspended

The Department of Commerce, Bureau of Navigation, has recently suspended the licenses of a number of amateur operators for violation of the act of August 13, 1912, section 4, regulations 3, 4 and 15. Similar action may be taken against any other operator reported for violation of the radio law.

Operators are also warned that any change in the characterization of the radio apparatus or service of their station must be authorized by the Secretary of Commerce as required by regulation 70. This authority is given in the form of a new license showing the new characteristics of the station.

Broadcasts One-Act Plays

Radio fans of the United States will be entertained on the evening of April 17 with another feature attraction from Westinghouse station KYW. Since the entire production of "Shore Leave" was broadcast from Powers' Theatre, Chicago, several months ago Wilson J. Weatherbee and Walter C. Evans, director and chief engineer respectively of KYW, have endeavored to develop the broadcasting of spoken drama to meet the popular demand of the invisible audience for this form of entertainment. Their efforts have culminated in arranging through the co-operation of Jessie Boyce Landis, director of the North Shore Players' Company, a schedule of one-act plays to be produced from time to time in the studio of KYW.

The first of these is entitled "Bargain Day," and was arranged and directed under the personal supervision of Mrs. Landis. The part of the harassed husband will be played by Sidney M. Spiegel, Jr., who acted the role when the play was given in Chicago. The finale lead will be enterpreted by Jessie Royce Landis.

Like Cocoanuts?

WE have heard of all sorts of prizes for those who listen in on the nightly concerts from Cleveland, Chicago, Newark and other points, but the offer of Station WQAM, Miami, "Daily Metropolis," takes the cake.

To each of the first thousand listeners who reported hearing WQAM on a recent March evening, Florida-grown cocoanuts were mailed, post free. Did you get yours?

Station KYW is now widely known to be the first broadcasting station in America to have broadcast an entire drama directly from the stage of a theater, and the aim of the management is to give KYW's audience more plays and to make the station a theater without a stage.

New Meyers Tube on Market

Elman B. Myers of the Radio Audion Company, who is establishing new factory headquarters at Montreal, Canada, announces the discovery of a new filament which will be used in a tube for radio purposes which will be guaranteed for five years.

The average amateur who had at some time or other purchased the Myers Hi-Mu tubes can now return their used tubes together with $5 and receive one of these new Hi-Mu tubes, which, connected direct to either 110 volts D C or A C, requires no filters.

The tubes in appearance and general physical dimensions are the same as the former ones that were put out by the Radio Audion Company, of which Mr. Myers was engineer. Mr. Myers can be reached for the present at the Windsor Hotel, Montreal, Canada. The new tube sells for $10 and carries a five-year guarantee.

War Hero at WGY

Harry Sadenwater, one of the heroes of the air service of the United States navy, has been placed in charge of the technical operation of the broadcasting stations of the General Electric Company, including WGY at Schenectady, N. Y., and the projected station at San Francisco, Cal.

Two years before he entered the ranks of the radio engineering department of the General Electric Company Mr. Sadenwater was a lieutenant in the United States navy and was one of the few out of hundreds of volunteers selected for the hazardous flight of the NC flying boats NC-1, NC-2 and NC-4, across the Atlantic from Newfoundland to Portugal.

Long Distance Records Plentiful

Europeans Hear Concert From WOR, Newark, and North Pacific Inhabitants Hear KSD, St. Louis

SEVERAL long distance records were reported from various parts of the country during the past month. Probably the most noteworthy of these was the WOR test, when Miss Edith Bennett, of Concord, N. H., sang from the Bamberger station, Newark, N. J., and was distinctly heard in Paris, Stockholm, Antwerp, Italy and England.

Cablegrams have been flooding the New Jersey station since the test was made, February 24. The Paris edition of the New York Herald, in connection with which the test was made, reported the concert was clearly heard in Paris on a home-made set by George Bleu, and from Galliers, Brighton, England, a message read, "Received every word this morning. Translation perfect on a Burndett receiver."

English Real Fans

The special musical program which was broadcasted at midnight from WOR, of course reached England when their local stations were closed, but the test shows how thoroughly the British public has taken to radio, because in order to hear the program they had to sit up until 5 o'clock in the morning. Even the most ardent radio fan in this country would scarcely stay awake up to that hour for a record.

Another long distance record was established by station KSD of the St. Louis Post-Dispatch, St. Louis, Mo., when a program broadcasted from that station was picked up in the Aleutian Islands in the North Pacific.

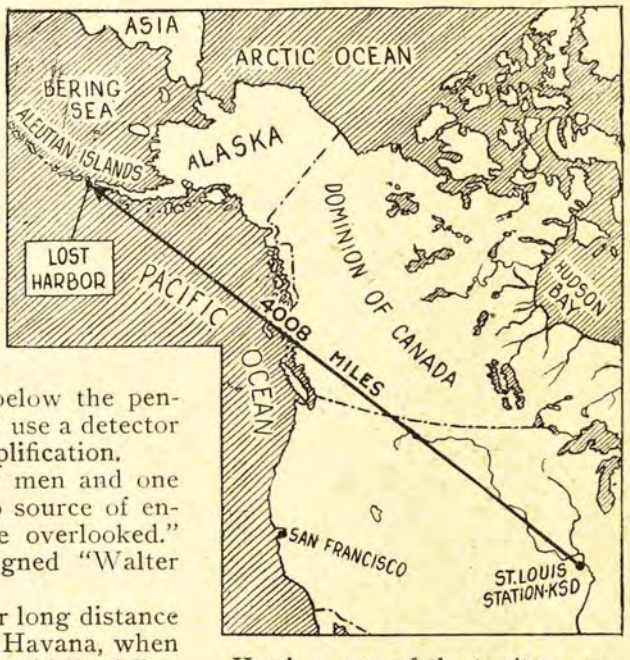
The lonely Pacific island where it was heard is 2,061 miles northwest by steamer from San Francisco and 1,700 miles in an airline from Seattle, Wash. It is estimated this concert from KSD traveled 4008 miles in a direct line from St. Louis.

Detector and One Step

The information was received from Lost Harbor, Alaska, and the letter in part stated: "Your program of Jan. 1 was received without noticeable fading for three-quarters of an hour. The station is located at the Olaska Sulphur Company's mines on Akun Island, the second of the Aleutian Islands, below the peninsula of Alaska. I use a detector and one step of amplification.

"There are sixty men and one woman here, so no source of entertainment can be overlooked." The letter was signed "Walter Lee."

Report of another long distance record comes from Havana, when it is stated the voice of Miss Mina Harriet Williams, a member of the staff of the American consul general, was distinctly heard in Douglas, Alaska, 5,600 miles away, by Robert E. Coughlin. The music was broadcasted by station PWX of the Cuban Telephone Company, and Mr. Coughlin reported he plainly heard the song "Mother Machree" being sung by Miss Williams.



Here's a map of the territory over which the music from KSD was heard —4,008 miles.

On the Stage

Radio is being recognized on the stage. In a new play, "Zeno," which recently played in Chicago, radio was used by a clever crook to open safes, help a fake medium and baffle the police.

Scene in the studio of Crosley Manufacturing Company, Cincinnati, Ohio (Station WLW). Left to right—Fred Smith, director; Jean Ten Have, violinist; Lucy de Young, contralto; Mrs. Thomas P. Williams, accompanist, and Karl Kirksmith, first cellist of Cincinnati Symphony Orchestra. The artists are from the artist faculty of Cincinnati Conservatory of Music.

Invented Many Radio Appliances

BENJAMIN FRANKLIN MEISSNER, who, since 1920 has been director of the phonographic research laboratory of the Brunswick-Balke Collender Co., left that post on February 15, 1923, to accept the position of chief engineer of the Radio Division for the Multiple Electric Products Co., Inc., Newark, N. J.

Mr. Meissner's ability gained recognition several years ago by his co-operation with John Hays Hammond, Jr., in the perfection of the Wirelessly Controlled Torpedo. In 1920 a system insuring radio secrecy was perfected by Mr. Meissner, he being the first to complete such a system recognized by radio engineers.

Mr. Meissner is the author of several books, "Radiodynamics" being probably his most widely known book. He has written many aricles for the Scientific American, Electrical World, the Aerial Age Weekly and other magazines, giving detailed description of various wirelessly controlled mechanics. Readers of these magazines will probably recall Mr. Meissner as the engineer who perfected "Seleno," the electric dog which was made to perform answering to the rays of a flashlight through the power of seleium tubes.

Several important radio inventions are credited to this noted engineer and radio expert. His most recent was the perfection of a light socket connection for radio sets to be used instead of an aerial. He also received considerable publicity two years ago when he recorded by wireless the opera "La Boheme" on a phonograph record in his laboratory five blocks from the Chicago Auditorium, where the opera was being sung.

During the recent world war he developed the Miessner Airfone for use in communication between pilot and student in the instruction of cadets.

Mr. Miessner's connection with the Multiple Electric Products Company, Inc., was effected through their Chicago representatives, the Mitchell Blair Company, 1429 Michigan avenue, Chicago.

HIRAM'S RADIO SET

Hiram Jones was not so slow, although he looked quite green; but he had ideas in his head about the things he'd seen. He took a trip to New York town and had a lot of fun, and while folks may have laughed at Hi—well, he was not so dumb. He went to all the burlesque shows and several cabarets, and vaudeville and music he saw in various ways. He rode in high-priced taxis and he traveled o'er the "L"; he even went down in the "Sub," although he said 'twas h—l. He saw most everything there that really was worth while, and though he was a "Reuben" he lived in royal style. "I know what I am going to get—a set of radio. I'll bring the city to the farm and have my own free show." Thus Hiram spoke, and straightaway bought a swell receiving set, and back at home he listens in and feels he's living yet.

The Farmer and the Radio

More Than in Any Other Industry, the Radio's Maximum of Usefulness Is Reached "Down on the Farm"

IN an interesting and instructive article prepared by F. M. Russell of the U. S. Department of Agriculture in the March Issue of *Farm and Fireside*, he has the following to say. The article is titled "Watch the Radio; It Is the Marvel of the Age," and contains the only complete statement made by Henry C. Wallace, Secretary of Agriculture.

Last September a southern Illinois farmer had two carloads of prime yearling steers finished for market. He could sell to the local buyer or ship to a rather unsteady market at the National Stockyards, Illinois. The local buyer's bid was about $10.50 a hundred, one of the best prices offered for a long time.

On the day he decided to take that price he received an early morning message from the operator of the local radio station that reports indicated a healthy advance in the price paid for prime cattle. Knowing that the radio information was reliable, and having only a short haul to market, the farmer got his cattle to the National Stockyards on the following morning. When sold, they brought $11.10.

Whereupon, this Illinois farmer became an ardent supporter of the radio as a means of getting timely information pertaining to agriculture, whether it be in the form of market quotations, weather reports, or short talks on farming subjects. He had long since become attached to the radio for the music and other entertaining features sent out daily. He saw in the radio an opportunity of receiving market information a few hours before other mediums could get it to him. And from his recent experience he knew that a few hours, or even a few minutes, might mean dollars and cents to him.

Wants Practical Information

From the standpoint of the farmer the enthusiasm which greeted the first radio has cooled. To him radio and its possibilities have settled down on a practical basis. It is true that he and his family have gotten a great deal of enjoyment out of the musical and entertainment features which are crowding the programs of the over five hundred broadcasting stations, but the agricultural field of the radio can only be successfully exploited when the stations and others concerned come to the realization that the farmer demands practical information pertaining to his chosen field.

"Since the community has learned that it is possible for us to get the latest market reports three times a day, there is hardly a day passes that some stockman does not telephone in from the country for the latest reports," wrote Glen R. Childress of Lancaster, Missouri. His letter is typical of hundreds received by the Department.

There are estimated to be between one and two million radio receiving sets owned in the entire country. There are more than five hundred broadcasting stations, many of which have permits to send out government weather, crop, and market information. This number is increasing daily as the stations are coming to realize the great demand from farmers for such information.

Many Stations Broadcasting

The Department of Agriculture early saw the possibilities of the radio. Today it is sending out weather, crop, and market reports from six radio telegraph and telephone stations of the Post Office Department, and from three high-powered radio telegraph stations of the Navy Department. Daily market rereports on the livestock, grain, cotton, hay, feed, fruits, and vegetables are broadcast over virtually the entire United States, and farmers located almost anywhere can receive them either direct or with the assistance of amateur operators.

The use of the navy stations at Arlington, Virginia, and at Great Lakes is part of an extensive plan to utilize existing government facilities in establishing a dependable, nation-wide system for broadcasting agricultural news by radio. The plan has been approved by the radio committee composed of representatives of the different government departments, and contemplates the use of high-powered stations at Arlington, Great Lakes, Puget Sound, San Francisco, and New Orleans; certain army stations, such as those located at Fort Bliss and Fort Sam Houston, Texas; and the present post office stations, which have been sending out daily reports from Washington, D. C., Omaha and North Platte, Nebraska, Rock Springs, Wyoming, and Elko and Reno, Nevada.

Under favorable static conditions both the Arlington and Great Lakes stations can be heard over the entire country, but under average conditions the range is about two thirds of the eastern part of the country.

Secretary Wallace Says:

The amazing development in the transmission of the spoken word by radio and the prompt adaptation of this discovery to the use and needs of the farmer mean much to the future of our agriculture. By the use of the powerful government sending stations and the over five hundred limited broadcasting stations, it will soon be possible for any farmer, no matter where he lives, to receive daily reports on the receipts and prices of grains, livestock and farm produce of all kinds. All that will be necessary is to install a receiving instrument.

The U. S. Department of Agriculture has taken an active interest in the development and use of the radio because we recognize it as a medium through which the farmers of the land can be kept posted on what they need to know concerning farm markets.

These market reports will be sent out by the Department through the Bureau of Agricultural Economics. By the use of radio, as well as telegraph and mail, it will try to keep the farmers of the land posted on prices and on marketing conditions.

HENRY C. WALLACE,
Secretary of Agriculture.

Extension of the service is restricted only because the leased wire system of the Department of Agriculture over which the reports are dispatched for broadcasting does not reach some of these points.

Reports as Press Items

The reports as sent out from the various government stations are sent as press items, except where it is indicated that they are sent in code form. Forms are necessary for copying reports sent by code, and these are available to any interested party. Just write and ask for them.

With the exception of federal stations practically all market, crop, and weather reports are sent out on 485 meters, while entertainment, news, etc., is broadcasted on 360 meters.

The following schedule is representative of those sent out by the Department of Agriculture, taken from Arlington schedule. Livestock receipts from five or more principal markets are sent out by code at 9:15 a. m. each day. At 10:00 a. m. the weather forecast is given. A market flash showing the early prices of hogs at Chicago and St. Louis is sent out ot 11:15 a. m., and at 11:20 a. m. the latest reports on fruit and vegetable shipments are issued. Fruit and vegetable market quotations and news is broadcasted at 1:40 p. m. At 2:25 p. m. crop reports and special market news are sent out, while the closing livestock prices are given at 3:45 p. m. On Mondays, Wednesdays, and Fridays, at 4:00 p. m., reports from feed and hay markets are given. The second weather forecast is scheduled at 5:00 p. m., the daily marketgram at 5:30 p. m., and the final weather forecast at 9:45 p. m.

Stole Radio Station Equipment

THIEVES sawed their way into a steel bar protected room at the Edgewater Beach Hotel, Chicago, recently and escaped with about $1,000 worth of paraphernalia assembled there for the new broadcasting station WJAZ. Passers-by who saw the thieves carrying away the loot to an automobile notified the police, but they escaped before the officers arrived. The equipment belonged to the Chicago Radio Laboratories.

Chicago to Have Unique New Station

ANOTHER large broadcasting station is soon to be added to Chicago's list of excellent radio entertainment points, according to R. H. T. Mathews of the Chicago Radio Laboratories. This new staion will be located in the Edgewater Beach Hotel, one of Chicago's finest hotels, located in the North Side residential district and right on the lake front.

The station has already been assigned the call letter of WJAZ and it will be known as the Zenith Edgewater Beach Hotel station.

Glass Studio

A novel feature of the new broadcasting station will be a "crystal room" or studio, to be built entirely of plate glass on the main floor of the popular hostelry. By this means the guests of the hotel and visitors will get a clear view of the artists at work, but there will be no outside interference or confusion.

The "crystal room" will be draped in red velour and be equipped with an indirect lighting system.

E. F. McDonald, Jr., of the Chicago Radio Laboratories will be in charge of the new station, with L. M. Clausing acting as operator, R. H. T. Mathews, assistant engineer and M. B. West in charge.

Fan-Shaped Antenna

A fan-shaped antenna will be used atop the hotel and the output will be 10 K. W. The generators are now being built for WJAZ of 4,000 volts capacity.

Among the artists engaged for the new station are Paul Beise and his orchestra, now playing in the main dining room of the Edgewater Beach Hotel. During the summer months the orchestra will play on an open platform for the benefit of the hotel guests and the thousands of listeners of WJAZ.

WDAP Has Amateur Night

An epoch-making event in the history of WDAP station in Chicago was held March 1, 1923, when it inaugurated an amateur night.

This amateur night in some sense of the word could be called "initial night," as the majority of the talent was appearing for the first time before the microphone of any broadcasting station. The current of congratulatory telegrams received has encouraged Messrs. Donnelly and Jenkins to continue this type of performances for their large radio family. Dates and evenings will be set for another amateur night soon.

Public opinion on the merits of talent or individual performances was varied, tc say the least. There were several judges chosen, among them being Mr. Stimpson of NAJ, Mr. Evans of KYW, Mr. Rompel of the Peerless Motor Company, Mr. Evans of Butler Brothers, and E. G. Brown of the Western Electric Company. The judges deemed it advisable to resign their positions a half hour later, due to pressing conditions which arose in the studio. Each of them was presented with Jewell instruments (either a thermal-ammeter or milli-ammeter) suspended from their necks by means of insulated cables, which was the only insulated part of the make-up.

The first number on the program was rendered by Harold White, a 7-year-old boy, who gave an imitation of George Beban in his monologue, "My Little Rosa."

RADIO TERMS

"A dry cell."

The How and Why of Broadcast Reception

Part 2

By G. Y. ALLEN

Westinghouse Electric & Mfg. Co.

HAVING seen the effect of the heavyside layer on the radio wave, let us next consider some of the possible reasons for limited range and weak signals that can be traced to the vicinity of the receiver.

Reasons for Weak Signals

In large cities, where there are a large number of high steel frame buildings, these buildings act as antennæ and absorb some of the energy remaining to affect the radio receiving antenna may be so small that signals from distant transmitters may not be received at all. The owner of a radio set living in the heart of a large city, therefore, such as New York City, may never be able to get as satisfactory results as his fellow citizen living in the less densely populated sections even with the most sensitive apparatus.

A similar condition may exist if the radio receiver is situated immediately at the base of a high hill. The hill may absorb much of the energy in the radio wave in the immediate neighborhood, leaving but a very small amount of energy to affect the antenna. Even if the hill does not actually absorb the energy, it may cast a radio "shadow" for some distance on the side opposite to that from which the radio wave is coming and thus prevent a strong signal being induced in the radio antenna.

Assuming that the radio wave has escaped all of the pitfalls that may have befallen it and that it arrives at the receiving antenna with considerable intensity, let us see what can be done to insure its giving loud response in the telephone head set or the loud speaker.

A number of good articles have recently been written on the construction of antennæ in recent issues of the radio periodicals and so this important link in the radio chain will not be greatly elaborated on. It will be assumed that if a strong signal arrives at the antenna, that a strong high frequency current will be set up in the antenna circuit.

Design of Antenna

One important point in the design of an antenna for use with a single circuit receiver may be touched upon with profit, however.

Considerable criticism has been leveled at the single receiver on account of its lack of selectivity. When two broadcasting stations are operating simultaneously in the neighborhood, a good single circuit receiver may be improperly judged in its ability to pick up one station at the exclusion of the other just because of an improperly constituted antenna.

For use with a single circuit receiver, an antenna must be short. It should not be more than 80 or 100 feet long. If a short antenna is used with a good single circuit tuner, it will easily be possible to separate two stations operating on waves differing only by 10 per cent. This is true even if the listener is very close to either station. Furthermore, when a vacuum tube regenerative receiver is used, this shorter antenna does not materially reduce the signal strength.

The thing of prime importance after the proper antenna is assured is the proper selection of the receiver. Under no conditions should a receiver with crystal detector be relied upon to operate over distances in excess of 25 miles from a broadcasting station of 500 to 1,000 watts power. From a 5-watt broadcasting station a crystal detector will probably not cover distances greater than five miles. It is true that old-time amateurs used to cover phenomenal distances using crystal detectors, but such a detector is peculiarly adapted to reception from spark transmitters and is not so well adapted to reception from telephone transmitters. Besides, many of these phenomenal records were made with very weak signals, the operator at times holding his breath so as to hear. A signal so weak is, of course, absolutely unsuited for broadcast reception.

Proper Receiver

If a receiver using a crystal detector is used and is properly applied, how shall the operator insure satisfactory operation?

In the first place, he must be sure that his tuning circuit is as good as can be made. Tuning coils with sliders are, generally speaking, the least efficient form of tuners. A tuning coil will not give good results if any of the turns touch each other or if the slider touches more than one turn at the same time. Variometers are by far the best form of tuners for short wave lengths such as are used for broadcasting. The better class of manufacturers of complete sets are now using variometers exclusively.

The detector of the set is one of the most important parts. The detector when properly adjusted acts as a kind of check valve, allowing current to flow through it in one direction only. Thus, the radio currents which oscillate so rapidly that they are inaudible to the ear flow through the detector in one direction only and are trapped when they attempt to reverse. A unidirectional current then flows through the telephone receiver varying in intensity in accordance with the transmitted speech wave and causing the telephone receiver to reproduce the sounds that were spoken by the broadcaster.

Various crystals are used by different manufacturers. Galena enjoys wide popularity on account of its extreme sensitiveness, but it has counterbalancing objectionable features that make it inferior in many ways to other crystals. It requires a very light pressure and is, therefore, easily knocked out of adjust-

ment. Furthermore, it is inclined to distort signals somewhat, due to its electrical characteristics.

The Pericon Detector

The pericon detector, using zincite for one crystal and chalcopyrite for the other, makes a very rugged and fairly sensitive detector. Zincite with metallic tellurium is used by one manufacturer with excellent results. The adjustment is not critical and there is practically no distortion. As zincite is a somewhat soft mineral, it will wear away if rubbed on the tellurium. Also, when tellurium is used as the other element, a black deposit will appear on the zincite, decreasing its sensitivity if the two crystals are rubbed together. This black deposit may be removed with a knife, but care should be used not to rub the crystals together any more than necessary.

The telephone head set used with a crystal detector should be of reliable make and of 2,000 ohms resistance or more. Although head sets are rated in so many ohms resistance, this factor is really an undesirable one and is used merely as a measure of the number of turns of wire on the head set. A large number of turns is essential for proper operation. During the early days of radio unscrupulous manufacturers wound their head sets with high resistance wire to meet the conventional demands for high resistance. Needless to say, these head sets were worthless. Here again the purchaser must buy apparatus from reliable manufacturers and rely on their integrity and honesty to produce a head set in which the resistance is a true measure of its sensitivity.

An amplifier may be used with a crystal receiver with very good results.

Vacuum Tube Receiver

For distance over 25 miles, the vacuum tube detector must be used, and, on account of the increased sensitivity, the regenerative circuit is almost universally used by those who construct their own sets and by manufacturers licensed under the Armstrong patents.

While the regenerative receiver is capable of better performance than the non-regenerative, if used properly it is also open to difficulties in manipulation if not properly understood. The atrocities committed by owners of this type of receivers can only be appreciated by those living in congested districts. Practically any time of the day or night waves sent out by improperly adjusted regenerative receivers can be heard and it will be only a matter of time when the regenerative receiver will be legislated against if proper care is not exercised by the radio user.

The added feature in the regenerative receiver is the tickler. It is usually controlled by rotating a knob. As this knob is rotated from minimum to maximum there are two distinct divisions in its effect. As the knob is rotated over the lower end of the scale, the overall effect is to reduce the resistance of the antenna. The average receiving antenna has a resistance of from 20 to 25 ohms and by careful adjustment of the tickler this can be reduced to a few ohms with corresponding increase of signal. Now if this point on the scale is passed, the receiver will send out weak radio waves which may be heard by all of the neighbors in the form of musical notes of various pitches.

A helpful analogy of the effect of the tickler is the following: Consider an automobile climbing a very long inclined platform that is pivoted at the center, the steepness of the incline would correspond to the resistance of the antenna circuit, the car corresponds to the unit of electricity, the torque on the rear wheels corresponds to the voltage created in the antenna circuit, and the speed on the car represents the current. Now assume that the platform is gradually tilted about the pivot until it becomes more nearly level. This corresponds to rotating the tickler knob toward its maximum point. When the platform is nearly horizontal the car will climb with considerable speed but with the application of little power. This condition is similar to the proper adjustment of the tickler for best results. If the platform is now tipped further the car will be running down hill, and will run itself with no application of power. This is similar to the condition reached in the regenerative circuit when the tickler is turned too far.

Adjusting Your Set

It is easy to tell when tickler has been turned to the point where the set is disturbing all listeners in the neighborhood. Generally there is a hissing noise in the head set which is much louder than that heard with the tickler on zero. Also, if the antenna binding post is touched with the moistened finger, a click will be heard in the telephone receiver both when contact is made and when the finger is removed.

If others in the immediate vicinity also have their receivers improperly adjusted, so that they are sending out radio waves, a musical note will be heard in the head set as the tuning knob is rotated, the pitch varying from above that which is audible to zero and back again to above audibility. Not only does the user of the local receiver hear these notes, but the particular receiver that is assisting to cause the musical note also hears the very same sounds.

This musical note is caused by the phenomenon known as "beats" and finds an analogy in sound in the pulsing of the sound from a pipe organ when two pipes supposedly of the same pitch are played simultaneously and when one of the pipes is slightly out of tune. In the case of radio, the high frequencies generated by the two radio receivers corresponds to the sounds produced by the organ pipes, with the outstanding difference that in the radio case, the rates of vibration of the electrical currents are far above the range of audibility, whereas, of course, in the sound analogy the rates of vibration of the air in the organ pipes are audible. The musical note heard in the radio head set corresponds to the pulsation heard on the organ. Fig. 6 illustrates graphically what occurs in the radio set.

The pitch of the musical sound in the radio head set depends on the difference between the two radio pitches or frequencies. Thus if there are a number of stations in the immediate neighborhood listening to a broadcasted concert and

(Continued on page 35)

The New Radio Law

HIGH spots of H. R. 13773, which passed the House of Representatives January 31:

Secretary of Commerce may refuse license to a radio "trust" or monopoly.

License stations transmitting to foreign countries.

Can revoke license of any company making unjust or unreasonable regulations.

Issue permits for new stations.

Prevents communication monopoly.

Classifies licensed stations and provides rules for prevention of interference.

The President assigns wave lengths to government stations.

Department of RADIO ENGINEERING

Radio Topics Institute

Nanko C. Bos, Chairman Advisory Board

Look for the Approval Seal

Such as the one just above which are furnished manufacturers whose radio merchandise has been tested and approved by the Institute Laboratory. We urge you to purchase only such apparatus, for it carries the guarantee of our organization.

Send all inquiries and material for test, calibration, or reconstruction to Radio Topics Institute, *Oak Park, Ill.*

Engineers Discuss Receivers

INTERESTING SESSION OF THE RADIO DIVISION OF CHICAGO ELECTRIC CLUB

ABOUT three hundred persons attended the March 6 meeting of the Chicago Electric Club in the Morrison Hotel. The evening was spent in discussions conducted by Mr. Forbes, who spoke on elementary principles, embodying the ways and means of radio transmitters.

Mr. Forbes pointed out the reason for some of the muddle that is constantly present by re-radiation of spark transmitters—namely, the three waves. This was the third lecture of Mr. Forbes, who is connected with the Forbes Radio Company, Chicago, and who also acts as instructor of elementary principles for the Chicago Electric Club.

Discuss Receivers

Mr. M. B. West, research engineer of the Chicago Radio Laboratory, spoke and illustrated the several reasons which are embodied in the manufacture of the present day radio receivers. Also delving into the scientific research that is necessary in order to bring forth a good receiver for the average person of today.

Several discussions were had and diagrams used showing the relative merits of the various circuits. When all is said and done the average person demands the old stand-by, the regenerative receiver.

Speaking along these lines Mr. West showed wherein the average person who purchases a radio receiver will wonder at times just what the reason is for his not getting certain stations located in the majority of cases on the utmost reception limits of any of the up-to-date receivers.

He pointed out where the antenna with a certain amount of resistance is coupled directly (conductively) to the inductance of the receiving set, wherein another resistance is predominant actuated by still another resistance of the grid condenser and grid leak. It was pointed out that the grid leak and grid condenser are of a very high resistance to the receiving circuit.

For the sake of illustration let us assume that the antenna, single wire and others, which the average person puts up, measures in the neighborhood of some twelve to thirty ohm resistance. This, then, coupled to the inductance, whose resistance varies from six to thirty ohms due to insulation between turns on the coil, insulation on the wire itself, and finally the tube upon which the wire is wound.

Cardboard Tube Helps

Mr. West pointed out where the plain everyday cardboard tube, coated with some transparent varnish or collodion, would materially help toward the reduction of this resistance.

Then the condenser across the inductance was discussed and it was shown that these condensers, in most cases when tested, proved to contain sufficient high frequency resistance to be discarded into the waste basket, some having a resistance of thirty ohms at the lowest range, or what is supposed to be zero capacity, or best working part of the condenser, then six ohm high frequency resistance at 180 degrees or maximum capacity. Mr. West stated the purchaser of variable condensers would have to look for condensers whose insulation between the movable and stationary plates is placed at the extreme ends of the plates in order to overcome

this high frequency resistance. In this we can readily see where the average person purchasing radio equipment without first studying it is at a loss sometimes to understand why Mr. Jones, his next door neighbor, is receiving better results with practically the same equipment that he is using. Let us say, for instance, Mr. Jackson is the man in trouble and Mr. Jones is the party of the second part.

Different Equipment Used

Mr. Jackson does not know that Mr. Jones has been experimenting around with different equipment and has brought his high frequency resistance down to a possible nothing and thereby is reaping the harvest, the reception of better signals, from greater ranges than Mr. Jackson, who is content to have and play with what he has.

It can be said for the novice that radio, since its inception, has been more or less of an experiment. There have been sets and circuits invented, but they do not work the same for this or that person as they would for us in the research laboratory.

We have tried at all times to maintain or confine our answers to questions to truth and unbiased opinions of research that is being worked every day.

A Department Store Show

Coyne School Well Represented at Rothschild's and Leiter Stores, Chicago

A NOVELTY of the recent Radio Shows held in Chicago at the Rothschild department store and the combined Leiter stores was the Coyne Trade and Engineering School exhibit.

This school was the only one represented and the management of both stores was well pleased with the display and efficient manner in which it was conducted. Immense crowds visited the radio shows every day and it is estimated over 800,000 radio fans visited the two stores during the exhibit.

The Coyne school furnished two radio engineers and several assistants. One of them gave fifteen-minute talks on radio construction throughout the day, illustrating various hook-ups on a blackboard. The assistants also answered all questions of the visitors and furnished them with tips on how to build their own sets.

There were hundreds of sets started during the two weeks' display and this not only created a demand for parts from other booths, but stimulated interest in the fascinating game of "building your own."

The Coyne school was known as the clinic or hospital for sick sets, and many poorly wired outfits were brought there and made

Students building their own sets at Coyne Booth.

ready for service under the direction of the Coyne experts.

"The radio school and clinic was one of the great features of the show," said S. E. Gross, who planned and put over the Rothschild exposition. "The place has been crowded by people of all ages and both sexes, seeking advice on radio hook-ups, or having their sets gone over to learn how to get the best results from them."

Everything in radio from a binding post or cat's whisker, up to beautifully mounted and cabineted sets that cost as much as a big automobile was on display, and throngs swarmed about each exhibit continuously since the opening.

Coyne Booth at Rothschild radio show, which attracted hundreds of enthusiasts.

Perils of Movies Explained

Elmer Clifton, producer of a film called "Down to the Sea in Ships," now showing in New York, entertained thousands of radio fans from Station WEAF recently, telling of the perils endured in taking the Hodkinson picture. The picture was made in the Caribean Sea, and Mr. Clifton explained in capturing a 90-ton bull whale, one of the largest ocean monsters ever caught, it destroyed the ship's small boats and hurled the actors into the water.

Correspondence With the Institute

The Director of Radio Topics Institute will answer any questions puzzling radio fans in this department. Make your letters as short as possible, write on one side of the paper only, and give name and address. This is your department. Use it.

Myers Tubes for Amplification

MILWAUKEE, WIS.—TO THE EDITOR: Kindly let me know if Myers tubes can be used as an amplification. If so, would you be kind enough to send me hook-up? I have a 43-plate condenser, Kellog vario-coupler and two Thordson transformers.—F. P. Kryshak, 604 Grant St.

ANSWER: Myers tube can be used for audio frequency amplification. Circuit mailed you today.

Simplified Circuit Wanted

NEW YORK CITY.—The set you describe in January RADIO TOPICS on page 17 interests me. I would like to get it a little clearer, if possible, as I can't get used to the symbols used to tell each part. What I refer to is the hook-up. I have a WD-11 tube and have started a dozen times to build a set, but never got it hooked up right. I burned out one because I did not know the symbols. Kindly send me dope on positive and negatives of hook-up and advice on which side of the rheostat you hook up the detector tube.

I am sure if you continue with your book showing simple sets to make it will meet with the approval of people. I have a number of friends who, like myself, express the same opinion.—Louis Loerzel, 789 Ninth avenue, New York City.

ANSWER: We are sending you a simplified circuit of our short wave regenerative receiver. There are two connections from the rheostat which are taken into consideration in all wiring of radio diagrams. One is the finish of the resistance wire on the former and the other the slider itself. When you have completed the wiring on the set and are about to start to put on the batteries always watch that your rheostat is on the off position or at the other end of the wire, i. e., that end from which there is connection taken, then you will save yourself from burning out your precious vacuum tubes. We say that they are precious at six-fifty per—glass selling at three dollars a ton—some profit.

A plus mark on "P" on any battery means positive, sometimes marked in red color on a storage battery terminal. The carbon of the dry cell is the positive terminal, this is the center element of the battery. The zinc or outside element of the same dry cell is the negative.

We are trying to use simple language in writing our publication especially in the writeups for the construction of simple sets so that same can be constructed by the average person of little radio experience.

Making a Three Coil Set

Ioco, B. C.—I would like to make up coil as per your January issue of RADIO TOPICS and am writing for further particulars. The primary calls for 70 turns on first 7, thence on every tenth. The second switch shows 9 points. Do I increase the winding to get the 9 points or reduce the spacing?

Would the primary and secondary coil be satisfactory for a crystal set without tickler coil, and what would be the best hookup? Would like to build this way that I may complete later.—A. H. Martin, Ioco, B. C.

ANSWER: You can use this set with primary and secondary mounted alongside each other but there will be some loss of energy that otherwise would not be encountered if you were to use a straight-away vario-coupler. This can be used just the same and the only tuning will have to be done with the taps and condenser across the secondary of the inductance.

There is a mistake in the drawing of the number of points necessary with the inductance. Taps are taken from the first seven turns, then six taps are taken from each ten turns, that is, ten turns for each of the next six taps; this gives 67 turns; the first, center and last turns are not touched. The manufacturer of this set does not take taps from the start and finish of the winding but scrapes the wire back and solders his leads right to the wire on the coil, thereby eliminating a lot of unnecessary capacity between windings. That is taking leads back and forth from the cylinder to the panel. The wire is left solid on the cylinder.

Reinartz Circuit

MUNCIE, INDIANA: I am very much interested in the three-tube receiver employing the Reinartz circuit which is described in the February issue of RADIO TOPICS and would appreciate a little further information regarding same.

Will this receiver give satisfactory results using Westinghouse WD-11 tubes for both detector and amplifier? Also what would be the approximate range in miles of this set?

I would like to make this set in two units. One, the detector unit and the other the amplifying unit. Will you please give me the wiring diagram for each of these units? Also, what "B" battery voltages should be used for each unit?

In the instructions given for making the inductance the diameter of the form is given as 6" and the depth of the slots as 3". In that case the slots would all come together at the exact center of the form. Are these figures correct?

Can you give me the names of any manufacturers who have these inductances for sale?

Would a variable grid condenser improve the efficiency of this outfit?—Marshall L. Williams, 814 North Elm street, Muncie, Indiana.

ANSWER: The Reinartz tuner will give you distances up to 1,000 miles with two stages of audio-frequency amplification.

Use 22.5 volts on the plates of the WD-11 amplifiers as this is the specified voltage with these tubes. Possibly after you use them for your amplifiers you will discard them, due to the inherent noises that predominate when striking the table or cabinet in which they are mounted.

Complete inductances for the Reinartz tuner can be purchased through this publication or from the Lynn Radio Co., 606 Consumers Building, Chicago, Ill. at $2.50.

Whether or not a grid leak would improve this set depends upon the operator. Personally, we feel that a grid leak is surplus equipment on any radio set.

The depth of the slots in the form should be 2¼ inches instead of 3 inches, in answer to your third question.

That Two-Stage R. E. Set

TALLMADGE, OHIO: In February, 1923, issue of RADIO TOPICS, I notice an article covering "A Receiving Set with Two Stages of Radio Frequency Amplification." I am very much interested in the construction of a radio frequency receiving set and wish to make a few inquiries relative to the set described in the above mentioned article. Practically all of the names of the makers of the material used are given with the exception of the transformers. However, from the appearance of the radio frequency transformers in the illustrations, I assume that Cotoco R. F. transformers are used. Knowing that Cotoco people do not build complete sets, I am wondering just who designed the set you describe. It looks good. What audio-frequency transformers are used? The other parts described are of the best obtainable. Can the WD-11 tube is used?

Any further information you can give regarding this set which will help to construct it will be appreciated.—R. H. Wingert, Tallmadge, Ohio.

ANSWER: The full set as described on page 18, February issue, is of the Co-to-Coil Co., Providence, R. I. We do not doubt that this description was from a circular which the Coto-coil sent into this publication for general writeup. It has awakened a field of people and letters to this publication have been numerous. There is no doubt in our mind that the average person could not go astray if he ever contemplated the construction of this set from the diagrams as were shown. The audio-frequency transformers are their own.

The WD-11 tubes can be used for the radio-frequency amplifier as shown but the question arises to their use in the audio-frequency amplifier. Numerous readers state that they are very noisy in the audio-frequency amplifier, due to inherent noises from the elements and when the desk or table upon which the amplifier is standing is struck a ringing noise is heard. Any additional information can be had from the manufacturers of this equipment.

Telephone *vs.* Radiophone

By L. W. CHUBB,

Manager of the Radio Engineering Dept., Westinghouse Electric & Mfg. Company.

MANY of you have asked questions regarding the future of radio broadcasting service. Although it is impossible at this time to make any accurate prediction or answer all inquiries, it may be of interest to discuss some of the more common questions in order that you may better understand some of the present broadcasting conditions and what may or should be expected in the near future.

We are asked, "Will radio telephone supplant the wire telephone?" and "What are the limitations and applications of radio telephony?" Radio has been found to be most useful in carrying on telephone communication to and from moving stations, such as ships, aeroplanes and railroad trains; between isolated points, such as trans-oceanic stations, islands, camps, mines, forest patrols and in military operations. For most of such services there is not any effective means for direct and reliable telephone communication because of the inability of using, conducting or guiding wires.

In addition to these uses of Radio Telephony, for which there is no choice of method, there are many applications in which conversations can be carried on either by radio or wire line telephone. The choice of method will be determined by the relative cost; kind, quality and reliability of service required and upon several other factors all of which need not be considered in this brief talk.

The third and final classification of telephone service is that of the familiar public service now carried on by the great wire systems with their individual subscriber circuits leading to central stations connected together with trunk lines and affording direct and private operations of many many simultaneous messages. This great system of city telephones, we feel, will never be supplanted by radio telephony, chiefly because with radio the number of conversations which may be carried on simultaneously, is limited and there is lack of secrecy, lack of operative control, and lack of practical and economic methods of selection and calling.

The wire telephone service is an unusual economic commodity in that it does not follow the law of diminishing returns. Every telephone installed increased the value of the instruments in operation. This is not the case with radio telephony. Extensions of the radio system will reduce the value of service after but few operating stations have been installed in a given locality. This unfortunate limitation caused by interferences, lack of central control and inability of indefinitely increasing the channels of speech will probably never be overcome for telephone communications.

Compares Two Systems

From what has already been said it may appear to some of you that our modern radio system does not compare well with the wire telephone. This is true for individual, two-way communications, but is not true for one-way telephony, or what is known as broadcasting, the great application of radio telephony.

Because of the different field of application of the two systems several important features must be considered or any comparison of them will be of little value. Experience has taught us the laws of growth and development of the wire telephone system. To predict the future value and development of the broadcasting application of radio telephony we must keep in mind the great physical, technical and economic differences involved.

To transmit at distant points voice or musical messages, energy transformation from sound waves in air to electric or wireless waves which travel at high velocity, is resorted to. At the receiving station these waves are again transformed to audible sounds. If several messages are to be transmitted at one time without interference some means of selecting or separating the various signals is necessary.

In wire telephony, the sound is changed to and propagated as pulsating electric currents representing the sound, and selectivity is obtained by guiding the waves in a physical wire. In radio telephony additional transformations are used at each station. The mechanical energy of sound waves is changed to electrical energy then to radiant energy in the form of wireless or Hertzian waves which spread out in all directions.

High Frequency Waves Necessary

In radio, selection of one of several signals is obtained by using wireless waves of different length, or rate of vibration, and by tuning the receiving apparatus to pick out only the desired waves. The use of high frequency wireless waves which radiate in all directions, is both necessary and fortunate; necessary for selection in tuned circuit and because energy can be radiated only at high frequencies; fortunate because it allows the use of sensitive tuned electric circuits and because the radiation in all directions allows the reception of signals at any point within the range of the transmitting station.

These characteristic differences and further restrictions in the two systems make it obvious at once that the wire telephone is best suited to the extensive use of two-way telephone communication and the radio telephone will reign supreme for public broadcasting.

Radio broadcasting started by station KDKA over a year and a half ago, first spread as a fascinating fad and has grown beyond the present legislation and without consideration of the economic factors involved. It consists of two separate functions, transmitting and receiving, while wire communication combines these functions at each station. Owing to the limited number of programs which can be broadcast

(Continued on Page 32)

Elementary Electrical Principles

This Is the Fourth of a Series of Articles Written for RADIO TOPICS—It Deals With Power Calculations in Electric Lines

By Harvey Mitchell Anthony

WE have had several articles on voltage, current, and resistance. It is the aim of writer at this time to say a few words concerning power, carrying on from your study of the March article, and considering how the unit of power is handled in commercial electrical practice. You may wonder why these articles are just now being devoted to electricity rather than radio. You are radio men and, of course, are interested in the radio phase of electricity.

Remember, however, that radio is only advanced electricity, therefore you must be well acquainted with these big, broad underlying principles of general electricity before you venture into the technicalities of radio itself.

Several issues of RADIO TOPICS which will appear in the future will bring to you the concrete application of what the writer is now giving you. Getting ready for the future is the aim at this time. We are now discussing direct current and are dealing with Ohm's Law in simple circuits. When we come to the radio articles we will be dealing with alternating current, which involves the present principles. Then we will use Ohm's Law, not only as it is being used just now, but it will then have a few modifications.

Let's prepare, therefore, for what is to come, following each article very closely month after month.

In order to learn the calculation of power in electric circuits, it may be best to dive right into a problem and discuss the problem. This will show the various steps involved and we will waste no time. Let us say that we need a motor installation. This motor is going to furnish us power to operate a machine, for instance, a big lathe or an elevator which carries us up and down a tall building. It is not necessary to discuss the use of this motor. We are all familiar with the use of motors and the general principles of their operation in giving out power.

The first thing we encounter is the term "horse-power." In the early days when the steam engine was invented it was necessary to give it some kind of a power rating so that it could be said the engine was able to do a ceratin amount of work in a certain time.

* * *

The unit of power which was adopted was the "horse-power." The unit of time was taken at one minute. If the engine could do as much as the average horse could do in one minute, it was rated as a one horse-power engine. If it could do the same amount of work that could be performed by ten horses, the engine was rated at ten horse-power.

Then came the time for the invention of the electric motor and it soon became necessary to give this a rating. The horse-power was again taken as the unit, and if an electric motor could do the same amount of work in one minute that the steam engine could do in one minute, the electric motor was rated accordingly. That is, if the steam engine could do ten horse-power of work in one minute, and should the motor be substituted in the place of the steam engine and the same amount of work could be performed, the electric motor was rated at ten horse-power.

EDITOR'S NOTE: *In this article, which is a snyopsis of one of Mr. Anthony's lectures, he presents step by step the various factors entering into the study of power lines. The principles involved apply as well to radio circuits, although they do not relate to alternating currents.*

The first of this series of instructive lessons appeared in January, 1923, issue. There will be two more. Send answers to the questions at the end of each article to Electrical Editor, RADIO TOPICS, *1112 North Boulevard, Oak Park, Ill.*

If we apply to an electric motor line a pressure of 100 volts, we will find that there is a current flow of 7.46 amperes passing through the line wires leading to the motor. (The writer is neglecting efficiency for the time being; this will be brought out later.)) Since we have learned that power is measured in watts, and since watts is the product of the volts times the amperes, it naturally figures that in this case the power used will be 100 volts times 7.46 amperes, which equals 746 watts. This is the wattage, which is equivalent to one horsepower of electrical energy. In other words, it takes 746 watts to perform one horsepower of work and the motor taking this wattage may be substituted for the one horse-power steam engine and will produce equivalent power.

Let us simply bear in mind from now on that one electrical horse-power means 746 watts of electrical energy. Always remember this number as long as you study electricity. You will meet it many times. It is suggested that you refer to any good standard electrical text-book for a more comprehensive treatment of the unit "horse-power." It is impossible to say much in these few lines. Only the general idea can be given here.

Now let us take a specafic numerical example of a motor which is furnishing power. Let this motor be rated at five horse-power, direct current, 110 volts. This machine will do practically the same as five average horses, if these horses all pull together for one minute. Here is a very important point which you must learn now so as not to become confused with this idea of horse-power of a motor. This five horse-power machine is rated at five horse-power because this is the amount of work it can actually do; that is, this is the available energy at the pulley of the motor and is useful in doing work. But we must remember that it is impossible to actually get out of any kind of a machine as much as we put into it.

There are losses in a motor due to friction of the bearings and electrical losses in the windings. Therefore, it is nece ary that this point enter into our calculations for figuring power and power lines. You can plainly see that if we actually have five horse-power of useful energy at the motor pulley we must put into the motor a little more than five horse-power in order that some of this input may be used in overcoming these losses, yet having delivered at the pulley the motor rating.

If we got out of any machine just what we put into it we would have 100 per cent efficiency. This would develop perpetual motion and thus far there is no such animal and very likely it will never be born, at least not on this earth during our time.

* * *

Large motors are, as a rule, more efficient that small motors. It is obvious that a ten horse-power motor need not necessarily be of ten times the mass of copper and iron that is used in a one horse-power machine. The bearings need not be of ten times the surface, etc., so the real friction losses decrease as the motor horse-power increases. Think this over. It is not at all difficult to understand this. The average efficiencies of motors are as follows:

1 H. P., 70 per cent; 3 H. P., 75 per cent; 5 H. P., 80 per cent; 10 H. P., 85 per cent; 50 H. P., 90 per cent.

Now to go back to our motor example where we had the five horse-power to install. If we multiply 746 watts by 5 we have 3,730 watts. This motor output would not be expressed in watts, however; just simply five horse-power, but its equivalent is the 3,730 watts. We call this output. Now it is possible for us to find the input if the motor is 80 per cent efficient, the average as noted above for a motor of this

size. Write this formula carefully in your note-book:

$$\text{EFFICIENCY} = \frac{\text{OUTPUT}}{\text{INPUT}}$$

If you wish to make this into a little "nutshell" formula, write it like this:

$$\frac{\text{OUTPUT}}{\text{EFFICIENCY} \times \text{INPUT}}$$

Place your finger over the value you wish to find and multiply or divide accordingly. For instance, output equals efficiency times input; efficiency equals output divided by efficiency.

Let us find the input into this 5 H. P. motor. We know it will be necessary to put into it a little more than 5 H. P., because it is only 80 per cent efficient. Since input equals output divided by efficiency, we have in this case 3,730 watts (5 H. P.) divided by 80 per cent or 0.80. This gives 4,662.5 watts. Hence, we send into the motor 4,662.5 total watts, lose 20 per cent or 932.5 watts in overcoming friction and electrical resistance, and deliver the rest, or 80 per cent, to the pulley, 3,730 watts or 5 H. P.

Now, since we know the total wattage we must put into the motor, and since this energy is to be delivered at a pressure of 110 volts, it is very easy to calculate the current which the motor will receive.

Use the formula as explained in May RADIO TOPICS: Current equals watts divided by volts. We will here divide the input power by 4,662.5 watts by 110 volts and the answer will be 42.4 amperes.

If you were going to install this 5 H. P. motor and use the 110 volts pressure to operate it, you must look up in your wire table and find the size wire necessary to carry this current.

* * *

The National Electric Code specifies that the wiring to motors should be rubber covered, and the table gives the safe-carrying capacities of wires of all sizes. The wire to be used in this case will be No. 7, Brown & Sharp gauge, which will carry the above current without overheating. In most installations, when the load on the motor varies, a 25 per cent overload wiring is recommended by the rules, hence, if we wired for this overload we would wire for 53 amperes; this would mean a No. 5 Brown & Sharp gauge wire. It is best to wire for the overload and use the larger wire, for then the resistance of the line will be cut down and less power will be lost in the wires conducting energy to the machine.

The experienced electrician will always consider this idea of lost energy, for it means a great deal in operating expenses of a power line.

The writer will now lead you a step farther. We will discuss lost power in this circuit. We have found the size of wire necessary to pass a current of 42.4 amperes.

Let us see the result of using this wire. For the sake of bringing out the point we will use the No. 7 wire and not the No. 5. You can get in on the No. 5 wire calculation yourself a little later. Useful power and lost power are two different things. Of course, in our motor itself we had both useful and lost power. We had the useful power which was delivered to the pulley; the lost power being spent in overcoming motor losses. Now we have exactly the same thing in the line carrying the current to the motor. We put a certain amount of power in watts into the line at the service voltage, lose some of it in overcoming the resistance of the line, and have what is left to give to the motor. Thus the line itself has an efficiency factor.

* * *

Let us say our 5 H. P. motor is located 100 feet from the switchboard. The motor, we assume, is out in the factory where machinery is operated. Since the motor is 100 feet from the switchboard supplying the electric power, we must make a careful survey of this situation and be sure that the motor will receive its proper pressure of 110 volts at this distance.

Reviewing for an instant what the writer has explained about the resistance of wires carrying current, you will remember that length and cross-sectional area of wires are two very important factors. The longer the wire the greater will be its resistance; the smaller in cross-section the greater will be its resistance.

Now we will figure how much voltage we will lose by using wire size No. 7. Before we can find the voltage loss it will be necessary to find the resistance of the No. 7 wire. This involves another formula which you should also put down carefully in your note-book:

$$\text{Resistance} = \frac{10.8 \times \text{Length in Feet}}{\text{Circular Mils}}$$

This 10.8 is a constant for copper wire, and is the resistance in ohms for one mil-foot of copper wire at ordinary tempertaures. A mil is one-thousandth of an inch or about the diameter of a hair in your head. The mil-foot is this wire of one-thousandth inch in diameter and one foot long. Think about this for a moment, a copper wire about the diameter of a hair and one foot long. This little section of wire has the resistance of 10.8 ohms.

The length in feet of the power line does not mean the distance just one way, but the total length of the circuit. In this case for the wiring of the 5 H. P. motor, the motor is 100 feet from the switchboard where we are going to attach our line wires. Then the total length of this circuit will be 200 feet, since we must run the line to the machine and back again.

The circular mils in the formula means the cross-sectional area of the wire under consideration, which is in this instance the No. 7, the cross-sectional area being 20,816 C. M. You can find these circular mil areas by referring to any wire table for Brown & Sharp gauge, this being used in electrical practice when copper wires are employed for lines. By working out this formula we find the line resistance will be 0.1037 ohm.

* * *

Now we have accomplished a very important step, and this resistance value will enable us to find the voltage drop on the 200 feet of wire, also the power lost in watts. From this watt loss we will be able to determine the money loss, as will be shown. As for the voltage, loss, this is a simple process. Just use Ohm's Law.

Voltage equals current times resistance. We figured the current to be 42.4 amperes and the resistance to be 0.1037 ohm. Therefore the voltage drop in this line is 4.4 volts. This 4.4 volts means that it takes this much pressure to pass the current of 42.4 amperes through this resistance of 0.1037 ohm. This 4.4 volts loss in the line is not unusually large for this type of an installation, for often 5 per cent of the service voltage is permitted to be lost in the power leads to electrical machinery.

The point of it all is this—the motor must get its 110 volts if it operates up to its rated 5 H. P. If it does not get the 110 volts it will not deliver the 5 H. P. Hence, you can plainly see that if we lose 4.4 volts in the line wires it will be necessary to have this much added to the 110 volts which the motor is to receive. That is, the switchboard voltage must be 4.4 volts higher or 114.4 volts, the line using up the 4.4 and the remaining 110 going on to the motor brushes.

Now let's pass on to another step and study about the power in watts and see how this works out in this installation. A simple matter, indeed. Watts equal volts times amperes. So in this case the watts lost in the line will equal the amperes flowing in the line multiplied by the volts lost in the line, or 42.4 amperes times 4.4 volts, which equals 186.56 watts. Since you must lose this voltage of 4.4 in the line, and since you have to pay for it as energy loss, you can easily see why voltage drop is a matter of extreme importance in power installations.

If your power rate is 5 cents per

(Continued on page 34)

Malcolm MacGregor, the movie star, has music with his meals. He gets the latest over the radio every evening. (Metro Pictures Corp. photo.)

Fewer *and* Better Programs

NATIONAL CHAMBER OF COMMERCE FINDS PUBLIC WANTS FEDERAL LAWS TO END CONFUSION

FEWER broadcasting stations constitute the chief radio reform demanded by the American people, according to the results of a nation-wide inquiry conducted by the National Radio Chamber of Commerce in an effort to wipe out the evils existing in the radio industry. The investigation also revealed an insistent public desire for better programs, federal regulatory legislation to end confusion and to thwart selfish interests, and separation of public broadcasting stations from the experimental stations operated by amateurs.

The Chamber sent a questionnaire to persons representing all phases of the art from manufacturer to listener. The replies are analyzed in a statement made public by Ralph C. Watrous, former lieutenant-governor of Rhode Island and a member of the Chamber's special committee appointed to make a study of the broadcasting situation.

The Chamber warns that a serious economic question exists and asserts its purpose "to keep broadcasting within the hands of the public, to whom this means of new communication belongs. Passage of the White Bill giving greater power to the Department of Commerce is urged.

"The one outstanding problem is that of broadcasting," says the statement. "The response to the questionnaire was gratifying and pointed the way in several directions very clearly. Most prominent of all was the idea of 'fewer broadcasting stations with better programs.' No exact number of stations was generally recommended and this could not well be as the range of stations is so rapidly changing, both as to their efficiency and also to the steadily increasing receiving range of more efficient receiving sets. But that progress would be more rapid when we realize the necessity for fewer stations seems a perfectly safe deduction from the answers to the questionnaire."

Serious Economic Question

"The matter of 'better programs' seems to be very naturally related in the minds of those answering to the expense of furnishing really good programs, but it does not seem to matter who pays for it or how. The more people who can be served by a single station the less, of course, the expense per listener! This economic question is a very serious one and in the interests of the general radio public must be dealt with very carefully. However, of course, the people as a whole interested in radio must finally in some way pay the bill.

"Another matter clearly brought out by the questionnaire was that proper legislation should be enacted in Congress that would not only safeguard our Federal departments but give to Secretary Hoover's department the power to so regulate radio, and broadcasting in particular, that the greatest service shall be realized by the greatest number.

"It would seem that the questionnaire also clearly indicates a of line separation between public broadcasting stations from the stations operated largely in experimental work by our amateurs who served such a useful purpose during the war and who have done much constructive work. They must have a place, but their power and range must not be allowed to interfere with the public's use of this new means of communication to an unreasonable extent."

Wave Lengths Dealt With

"The question of wave lengths was dealt with in the questionnaire but this is a matter that will have to have much thorough study and any solution of this problem can only be covered temporarily as changing conditions will make necessary frequent changes in any provision inserted in the new law.

"The White Bill now pending in Congress provides for a Radio Council and the selection of this Council made in a way to really represent the whole radio public is about as important a matter as confronts us. We frequently hear the idea expressed that the more broadcasting stations the better,

(Photo By W. H. Dorr, Jr.)

Photo of Christian Strohm, who in 1859 traveled from Oldes Leben to Weimar, Germany, to hear the premiere of the opera which took Richard Wagner seven years to complete. Now, just sixty-four years later, Mr. Strohm, here in America, listens to the same opera, using a crystal set, broadcasted from station WIP, Philadelphia.

for a great number will sooner awaken the public to the impossibility of satisfactory service under a system of numerous stations.

"This is absolutely wrong and the National Radio Chamber of Commerce believes that all that is needed is to call attention to the necessity of reduction and the American public will respond and make its wants known in no uncertain way.

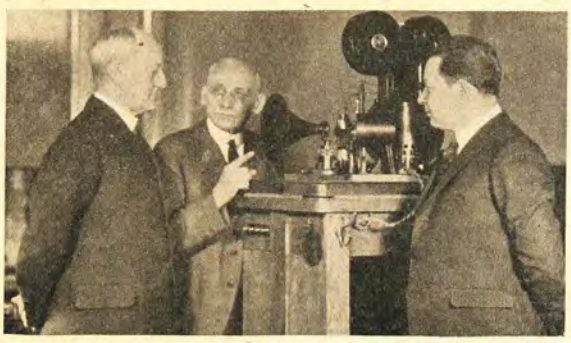
"It was made clear in the questionnaire that answers were not desired if they were to be given with the spirit and intent of favoring any group, class or corporation; but rather that the matter shall be so considered and the answers so given that it would be apparent the interests of the government and the entire radio public were paramount."

Much Data Gathered

The number of radiophone sets licensed by the Department of Commerce for transmitting purposes in the United States totals approximately 570, it was said. Data covering 340 of the broadcasting stations has been gathered by the Chamber in a study of transmitting range.

It was found that forty stations have a range of fifty miles, sixty-nine stations a range of 100 miles, seventy-three of 200 miles, forty-three of 300 miles, eight of 400 miles, sixty-one of 500 miles, eight of 700 miles, seventeen of 1,000 miles, nineteen of 1,500 miles, and two of 2,000 miles.

The Pallophotophone



Voices of prominent figures recorded forever on pallophotophone. Left to right: General Harbord, president Radio Corp. of America; C. A. Hoxie, inventor of the pallophotophone; David Sarnoff, vice president and general manager of Radio Corp.

IF you have tuned in to 370 meters recently and have picked up WGY you have probably been surprised at the purer and truer tone quality of music and speech from the General Electric Company broadcasting station. The answer is the Pallophotophone.

A new use has been found for the remarkable device which photographs sound on motion picture film and then reproduces the sound from the film. C. A. Hoxie, the inventor, has now devised a pick-up or microphone using the principle of the Pallophotophone reproducer.

The microphone is the link between the artist or instrument in the studio and the electrical circuit; it converts or transforms the variations of tone into corresponding variations of current. Microphones now in general use are constructed on the principle of the telephone transmitter in which the compression or expansion of granular carbon affect the electric current.

In the Pallophotophone pick-up a very sensitive diaphragm is set vibrating by sound. The movement of the diaphragm is communicated to a mirror three sixty-fourths of an inch square. A strong light strikes the dancing mirror which reflects the light beam at a sensitive light cell. The variation in the beam of light, caused by the vibration of the mirror varies the effect on the light cell and thus produces a corresponding variation in the electric circuit. Amplification is then obtained in the ordinary way by means of pliotrons.

The new pick-up eliminates the hiss which accompanies the use of the ordinary microphone; it is more sensitive and responds more readily and accurately to sound waves, capturing harmonics which would ordinarily be lost. A feature of the new pick-up is the weight of the moving or vibrating part. The diaphragm and mirror combined weigh one-tenth of a grain or half as much as the head of a common pin.

The Pallophotophone pick-up is now a permanent part of the studio equipment of WGY. Many letters complimenting WGY on the improvement of its tone quality were received after the program of January 30, when the play "Bought and Paid For," which was put out through the new pick-up, was presented.

Broadcasting a play from WGY, the General Electric Company broadcasting station, Schenectady, N. Y. Note the position of the actor with reference to the Pallophotophone pick-up, which is used by WGY instead of the ordinary microphone. The telephone head set used by the director is connected to an outside receiving set, and is so carefully padded that he hears no sound from the studio itself, but hears the play as though he were one of the great audience outside. The sign he displays in the picture is not usually used during the presentation of a play unless the cast includes actors not accustomed to play broadcasting.

What's Wrong With the Crystal Set?

A Humorous Letter From a Serious but Vexed RADIO TOPICS Reader—E. W. Cornelius Would Like to Hear From the 999,999 Other Crystal Set Owners—He Wants to Know if It's a Disease—What's Your Answer?

ERE'S one to play on your tambourine—it takes place at the gates of St. Peter:

St. P. "What kind of a radio set do you own?"

1st Man. "I have an eight tube regenerative set."

St. P. "You go over with the Presbyterians."

St. P. to 2nd subject. "What kind of a radio set have you got?"

2nd. "I have a single tube amplifier set."

St. P. "Fine, you go over with the Methodists."

St. P. to Me. "And young fellow, what kind of a radio set have you?"

Me. "I have a crystal set."

St. P. "You go over with the Christian Scientists, you only think you have a radio set."

This is not meant to be sacreligious in any way. It is only to show the attitude of the radio magazines over the entire country. The thousands of "crystal gazers" as you might call them are completely ignored. It seems they are willing to have us buy our crystal sets but after we get them they laugh at us. Show me the radio magazine that has remembered that there are so many of us poor beggars in existence that can't afford to buy a swell set and haven't the brains to make one. Remember I said there were others.

But let me start at the beginning. Once a lady bought her husband a canary bird for his birthday because she wanted one so badly, only I'm a man and it was a radio set instead of a canary bird. My wife wanted a radio set so in order to keep peace in the family and get something that I had wanted for a long time I bought her a radio set.

Well, friends, the first night when I brought that precious bundle home I had to get right out and put up the aerial. The moon and I prowled around until about midnight hooking things up and untangling the mess of wires. We did everything according to the instructions that came with the set, and if you never tried it let me tell you to read page 30 of any standard dictionary and then go out and put up your aerial. It will be just as good as following the printed instructions.

* * *

It took me just about two minutes to become a bug and I've been bughouse ever since. I measured distances for two hours in order to cut the wires correctly. I measured the distance between the top of the barn and ground personally. According to the bump on top of my head it was about twenty feet. And according to the instructions it should have been thirty feet. However, such a little incident did not dampen my enthusiasm one bit.

After I got the aerial up and returned to the house the entire neighborhood was on hand to listen in (on my crystal set.) Well, I sat down and, with a broad grin on my face, adjusted the phones. Well, I turned both dials and the switch for about an hour to no avail. I finally called up the broadcasting station to find out whether they were working or not, and was informed that they had been broadcasting for a few hours. That was enough for me. The poor neighbors had to go home feeling mighty blue.

The next morning I got up bright and early with a happy feeling on my chest, and made a dash for the corner newstand to buy a radio magazine which I knew would be full of information of great value to me in getting my set adjusted. There was no radio paper on the stand and the man asked me what kind of a magazine that was. Well, after chasing around for a while I got a copy of the "Windy City Radio." I dashed home all excited and started reading. The first few pages were advertising and I read every word of the ads. Then started something about "Audio-Frequency and Its Wherefor." After reading all about that I came to "Mr. Johnson Invents New Wiring System." After reading all of the free advertising for Mr. Johnson I came to, "Why Seven Strand Wire is Better Than Single Strand." I was delighted in reading all that stuff and swam through it to the back cover. But—my radio set didn't work yet and I hadn't read a word to help me make it work.

* * *

After reading the Windy magazine through a few times I tramped around for a few more hours and finally got, "Ether Waves." This magazine was just brimfull of interesting advertising and some editorials. I read and read from one end to another, but alas I failed to find such a thing as a crystal even mentioned. I read all about audio, radio, tubes, oscillation, and strangulation, but nothing about a cat's whisker, crystal or ground adjustment. Well, you can imagine that I was disgusted. I was convinced that the man who sold me my crystal set had put something over on me and sold me an antique.

The second day I grabbed all the newspapers and looked up "Questions and Answers," and there I found the same questions that the favorite magazines had answered for me. Well, I was sure loaded with Audio and Radio and some unkind words. I finally gave up and packed my set up and took it to a radio shop, one of these places where they know everything. The fellow looked at me as though I was insane and asked me if they were giving those boxes away somewhere. After a few minutes testing he unscrewed my ear phones and bent the plate a little and told me to go home, and some other place.

I finally got home and got my set hooked up, and after turning the dials I actually heard some music. I almost dropped dead, the shock was so great. The music was fine and the announcing was perfectly clear. After getting a few different local stations lined up I read over the radio magazines I had bought to see if I couldn't go on and learn something, now that I had the outfit working. But as many times as I read the magazines I didn't find a thing except a bunch of technical words about wires and this and that, that didn't mean a thing to me. Why couldn't one of the radio papers have the A B C's? Why couldn't one of the radio magazines tell that very often a slight adjustment of the phones is needed to put the set in operation?

* * *

What I want to know is this,—is a crystal radio set a serious disease? These great electrical engineers are the bunk if they can't make a common working fellow like me understand their language. I've been in the selling game a few years now and let me tell you if I pulled off the stuff that most of the radio writers do they'd have me in the pen. I think they don't want anyone to understand their English so they can get away with their stuff a lot longer. Just because I have a cheap crystal set do you fellows think I didn't have to crawl around the roofs and make the insurance company have heart failure? Do you think they give crystal sets away with every purchase of pork and beans? Or is it because the upkeep is so small that Blank Electrical Company can't sell enough accessories? Just because the Blank Electrical Company attaches a radio set to your bed post so you can stay there all day and tell the magazines nice stories about their ten dollar tubes, do you think that I with my measly crystal set am not entitled to as much space in the Gazook Gazette as you are?

I called on a high powered radio engineer employed by a radio magazine to find out certain things about my crystal set. He said, "Why don't you get a radio set? Then you wouldn't have to come to me." Correct he is. If we all had "radio sets" we wouldn't need the engineers of the magazines and they could read the morning papers without being bothered by flivver owners. Then as a parting knock he said, "You know the old fogies who were kicking about the

telephone and saying it wouldn't work because there was no hole for the sounds to go through, in the wires, are now kicking because there's nothing around the hole."

When I got home and sat down in between programs I looked over the radio section to find that in Chicago we are to sing a new popular song, "Silent Night, Quiet Night. All is Calm But Not So Bright." Oh, well, it's a good thing because now we can go to bed with a clear conscience, except that we are worrying about whether our neighbor with a "radio set" is listening to Honolulu or Corned Beef Hash.

* * *

Now that I'm through let's hear from the other 999,999 crystal set owners and what they have to say for themselves. And if any of the world wonder TECHNICAL RADIO ENGINEERS can engineer enough courage to defend themselves I would like to hear from them. I will stand correction on any mistake I have made and I'm sure that the Radio Topics who have been kind enough to print this would be glad to forward all letters to me whether they have explosives or not, E. W. Cornelius.

P. S.—Remember now that I have showed you "Techs" the respect of putting your title in capital letters.

The Noble Battery

The battery with a constitution. The Noble battery is constructed along the up-to-date battery engineering lines.

This battery is supplied to the public in either a wooden case or moulded rubber case with base, to protect your home furnishings against acid damages.

The positive and negative grids are "Triple Oxodized," and insulated with the best of Port Oxford Cedar, thereby permitting the battery to maintain a low internal resistance, leading to a high momentary discharge, if such is a

necessity, when employing two, three or four vacuum tubes and loud talking device. Even with this high momentary discharge, no buckling of the plates is experienced.

The Noble battery of the wooden case outside, has three rubber jars for the individual cells, while the moulded rubber variety, each cell is moulded in shape at the factory, necessitating only the separators between the positive and negative elements.

Each Noble battery is made to last for eighteen months, sealed with "Leak Proof Terminals" and each battery jar is subjected to a dielectric test of 6,000 volts to insure against soft spots or defects which would impair its insulating qualities and cause premature failure of the cell.

Each jar contains the "Micrometer Tested" separators and made of the finest resawed cedar, the perfect separator material. In all Noble batteries, slightly thinner negative plate permits the use of separators a full 1-64 of an inch thicker than those ordinarily employed. This added thickness provides extra resistance to wear, and eliminates one of the most common causes of internal short-circuits.

The Noble battery plates have three reasons for being better:

A. Interlocking grid. A triumph of mechanical perfection. Interlocking ribs hold the oxides in a vise-like grip, and prevent shedding and plate disintegration.

B. Strength-Endurance. The extremely hard center of the "Triple Oxide" plate gives it unequaled rigidity and endurance, and reduces the possibility of buckling.

C. Super-Activity. By a secret and exclusive manufacturing process, the surface of Noble plates are maintained in a highly porous, semi-soft condition. This insures maximum speed and capacity.

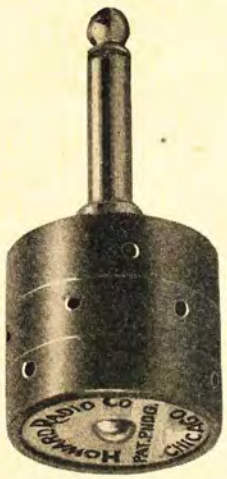
The Howard Multi-Terminal Telephone Plug

The Howard multi-terminal telephone plug will accommodate from one to six pairs of telephone receivers, either individual receivers or pairs of receivers with an instantaneous connection.

The multi-terminal telephone plug with a purpose.

The following combinations can be had when using the Howard multi-terminal plug: 1, single pair of telephone receivers; 2, two pair in series; 3, two pair in parallel; 4, two pair in series and one pair in parallel; 5, two pair in parallel and one pair in series; 6, three pair in parallel; 7, two parallel pairs, of two in series; 8, two parallel pairs of two in series with one pair in parallel with the combination; 9, three parallel pairs of two in series.

With this combination and with one of the Howard multi-terminal plugs on hand the embarrassment of telling your friends to wait a few minutes for hooking up of the



old style of plug is eliminated. Proving a very big friend to you, your friends and the pleasure derived from making immediate connections thereby.

The Howard multi-terminal plug is handled by all up-to-date dealers and jobbers.

WGY Vesper Services

Every Sunday afternoon a little group of people assemble in the radio studio of WGY in the midst of the towering factory buildings of the General Electric Company at Schenectady, N. Y., and vesper service, including organ selections, hymns, scripture reading and sermon, are conducted. The group in the studio is small, but many thousands in city and country participate in the devotions.

These services not only enter many homes but they are multiplied by means of receiving sets and loud speakers and made to furnish the religious inspiration of other gatherings in distant places. For example, the Railroad Y. M. C. A. at Oneonta, N. Y., no longer arranges for a special afternoon service, but instead receives WGY, and according to a letter from the general secretary, A. C. Lange, "These services come through very clear and are enjoyed by all who attend."

Proper Antenna for Tuning

By F. CONRAD

Assistant Chief Engineer, Westinghouse Electric & Manufacturing Company.

I WONDER how many tonight will hear my voice from Station KYW alone and how many will hear it with a babel of other sounds. If you hear it alone, it may be due to the fortunate circumstances of my having the floor alone, so to speak, or it may be that you have more or less solved one of the problems that confront the radio broadcast listener. This problem is to hear a desired station at will and without intrusion from undesired ones. The ability to hear a desired station alone, or "selectively," as it is called, depends in part on the receiving apparatus and in part on the antenna system to which it is connected.

Many of you believe that the better the antenna the better the signals. This is true, but it does not necessarily mean that the best antenna is the largest. The function of the antenna is to transfer to the receiving apparatus the electric forces which are set up by the waves being transmitted through space. This receiving apparatus must discriminate between the electric forces due to the radio wave it is desired to receive and the forces due to the undesired waves, among which are the waves from "Dame Nature" herself, or "static," as they are called.

Importance of Selective Receiver

The selective receiver is one that offers a high resistance to the flow of current which would be set up by the electric forces from undesired waves, and offers a low resistance path for the flow of current due to the electric forces from the waves it is desired to receive. In other words, it permits you to hear the stations you wish to hear, and to tune out those you do not wish to hear.

The receptive ability of an antenna is, in general, determined by the height of its horizontal portion above the ground, or, stated differently, the strength of the electric forces induced in an antenna by the radio waves is proportional to the height of this antenna. Therefore, to tune out or discriminate between different waves, the selectivity or resisting power of the receiver to interfering waves would have to be increased as the antenna height is increased, while to receive an equal signal from a desired wave the resistance in the receiving set to this desired wave would have to be decreased as the antenna height is decreased.

Experiments have shown that when the antenna height is increased and a receiver, such as crystal-detector set or a tube set not using regeneration, is used, the signal at first increases but soon reaches a maximum strength, which cannot be exceeded by further increase of antenna height. This height is such that the electric forces set up by the incoming wave is sufficient to drive through the receiving apparatus the full current strength which is equivalent to the received signals. To express it in another way, this maximum current is that which would itself set up the same strength of radio wave around the receiving antenna as is induced by the transmitting antenna sending out the signals it is desired to hear.

Tube Reduces Resistance

A vacuum-tube receiving set, in which the principle of regeneration is employed, tends to reduce the resistance to the flow of current from a wave corresponding to that for which it is tuned. Therefore, if a regenerative receiver is used, with an antenna in an ideal location, it will be found possible to maintain the maximum strength of signal, even with a reduced antenna height. However, as the same resistance will be maintained by this receiver against undesired waves the reduction of height will therefore give a greater selectivity. Of course, in general practice it usually will not be possible to obtain quite the same strength of signal with the low as with the high antenna, as there is a certain amount of absorption or loss near the ground which tends to reduce the possible signal strength.

Should the location be such that the antenna is perfectly clear and free from surrounding objects, the low one will be found to be practically equal to the high one, when a regenerative receiver is used. But should the antenna be located where it is considerably shielded, as where it is surrounded by high buildings, it is possible that the signal strength will be greatly influenced by height. In this latter condition, it will probably be necessary to make up for the poor selectivity of the high antenna by using a somewhat elaborate receiving apparatus. Under the conditions surrounding the average residence district, it usually is possible, with care in the location of

Paris Has Radio Maids

ACCORDING to recent dispatches, the radio is supplanting housemaids in Paris. George Ernchette, president of the French society for the Study of Wireless, is replacing the servants in his home by radio, from Eiffel Tower.

Every day at 6 a. m. a wireless wave from the tower starts an alarm clock on his dresser, opens the windows of his bedroom and pulls back the shutters. An electric stove is started by the same wave, the chocolate is heated and is electrically controlled and never boils over.

The news of the day is disseminated from a loud-speaker as he eats his dinner, official time is given him by radio, and all clocks in the house are operated by wireless.

M. Ernchette declares next winter he is going to heat his house by wireless waves from Eiffel Tower.

the antenna, to maintain good signals, even though the height is considerably less than with the scheme generally employed of attaching the horizontal wire to some point near or on the roof of a two-story house.

Inside vs. Outside Antenna

The actual selectivity required divides itself into two classes or conditions of service; one in which it is desired to discriminate between two relatively nearby stations of approximately equal signal strength but separated by some interval of wavelength, the other where it is desired to discriminate against a nearby station and receive from a distant one, the signal from which would, of course, be very much weaker than that from the nearby station. For the first condition, it will be found that with the average regenerative receiver, ample strength will be obtained from an antenna which is not over ten or fifteen feet high, or it may even be entirely within an ordinary living room. The second condition, however, is a much more severe one and requires either a location where an antenna of not over fifteen or twenty feet high will not be unduly shielded, or where the lesser selectivity of a high antenna will be counter-balanced by a more elaborate and selective receiving set.

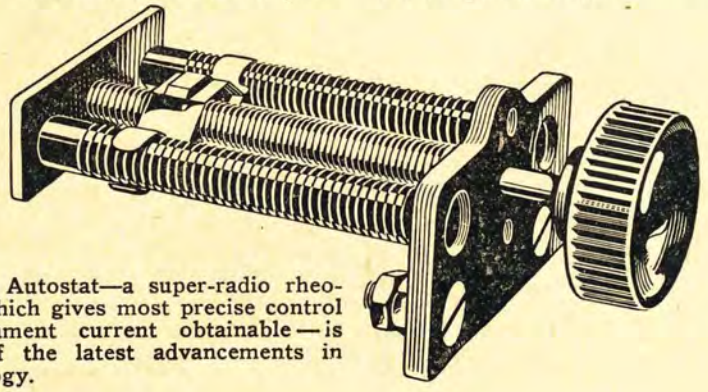
Here's a New Filament Control

COMES this month the Autostat, a new rheostat, manufactured by the Automatic Electrical Device Company, Cincinnati, Ohio. It represents the most radical advancement in radio filament control presented in some time. The manufacturers claim for it many advantages over the old style of rheostat.

The Autostat will give a precise control of the filament current, it is said, with the turning of the knob a hair's breadth. There were forty complete turns of the knob between the maximum and the minimum resistance.

Its construction is radically different, too, from the common rheostat. Two parallel mounted, wire-wound, fireproof resistance tubes are connected in a series by a micrometer operated slider—the length of wire in circuit depending upon the location of this slider. It is claimed that one full turn of the Autostat knob produces finer tuning than a hair's breadth adjustment on any other, and that it brings in distant stations loud and clear and tunes in those elusive stations that heretofore have remained unheard.

It gives uniform change in resistance with each turn of the knob, possessing practically "zero" resistance at full-on position. It is compact in size, neatly mounted, and requires less space than the others. Furthermore, it is one of the most economical rheostats on the market, inasmuch as only one Rheostat is necessary to control two amplifying bulbs. It can also be used with six volt or WD-11 detector tubes, or one 5 watt power tube.



The Autostat—a super-radio rheostat which gives most precise control of filament current obtainable—is one of the latest advancements in radiology.

New U V 201-A-Tube

NEW and improved Radiotron type UV-201-A, superior in many respects to the UV-201 tube, and designed to supersede the latter, has been announced by the Radio Corporation of America.

While in outward appearance UV-201-A resembles UV-201, with the exception of a slight discoloring of the bulb, the new tube incorporates several new and distinctive features.

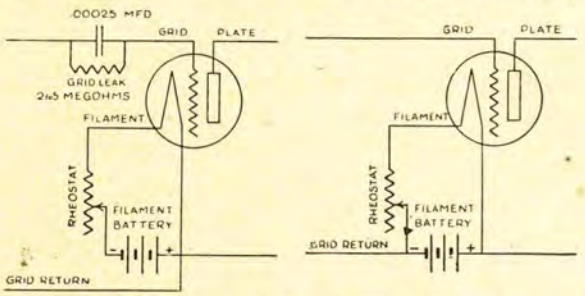


Fig. 1 is the hook-up detector, and Fig. (right) shows hook-up for amplifier for the new UV-201-A tube.

One of the outstanding features of the new tube is its special filament, which requires about 1.0 ampere with a 6 volt battery source for the production of normal filament emission.

The latest tube, however, contains a new and improved filament, requiring only one-quarter of an ampere (.25) at five volts across the terminals of the filament, and with this current the filament emission averages about five times that of the UV-201 tube.

High Exhaustion

Aside from its superior filament properties, the new tube is exhausted to an exceedingly low pressure. A high vacuum is recognized as representing one of the most important factors in the design of vacuum tube amplifiers, and every effort has been made in the case of UV-201-A to completely expel the gases from the bulb. The successive stages in the exhaustion of the new tube are carried out with extreme care so as to insure satisfactory performance.

During this process of exhaustion a mirror-like film collects on the inside wall of the glass bulb, which remains after the exhaustion is completed. The translucent film should not lead the owner to believe that the tube is defective. This slight discoloring does not interfere with the operation of the tube in any way.

New and Novel Radio Patents

NOVEL CONTROL DEVICE

(Patent No. 15,538, Re-issued to Edwin H. Colpitts, of East Orange, N. J., under date of Feb. 13, 1923.)

This invention relates to the control, for signaling and other purposes, of a large current obtained from the output circuit of a thermionic amplifier.

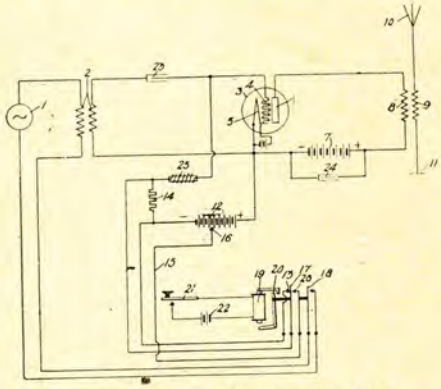
The object is to reduce the power consumption to a minimum or small value and to obtain a maximum output from a given amount of apparatus.

The results are obtained by so arranging the circuit that the space current flows in the amplifier tubes only during the time that signal impulses are being sent.

The figure of the drawing shows one arrangement of circuits by which the desired result is obtained.

Referring to the figure, 1 represents a generator of high frequency oscillations of low power, which is connected to the primary of a transformer 2; the secondary of said transformer being connected to the input circuit of a thermionic amplifier 3; the electrode 5 of said amplifier being the heated element and the electrode 4 being the usual grid. The output circuit is connected from the plate electrode 6 through the inductance 8, the battery 7 and the filament 5. For signaling purposes, the inductance 8 is inductively connected to the inductance 9, which in turn is connected to the signaling system.

Connected to the input terminals of the amplifier and in parallel to the secondary of the transformer 2 is a circuit containing a battery 12, which is the usual battery for determining the potential applied between



Control Device for Wireless Signaling

the electrodes 4 and 5. In this invention, battery 12 has a sufficiently high voltage to reduce the space current flowing between the electrodes 6 and 5, from the battery 7, to a zero or a relatively small value. In order to transmit signaling currents, it is necessary to reduce the voltage impressed on the input circuit sufficiently to permit the flow of the normal space current. In order to accomplish this the following arrangement has been found useful: A switch or key 13 is placed in the circuit of the battery and a large resistance 14 of several thousand ohms or more is placed in shunt to this key. A conductor 15 leads from some intermediate point 16 of the battery 12, the free end of said conductor 15 being placed in juxtaposition to the spring terminal 17, which also forms one terminal of the switch 13. It has been found desirable also, but not necessary, to place a key or switch 18 in the circuit of the high frequency generator. The compound key or switch may be operated by hand directly or indirectly by means of the magnet or relay 19. The armature 20 is rigidly secured to the operating portions of the switch. This relay 19 may in turn be operated by means of the key 21, which closes a circuit containing the said key, battery 22 and the winding of the relay. In the circuit of the secondary of the transformer 2 is placed condenser 23. A similar condenser 24 is placed in shunt to the battery 7. A choke coil 25 is placed in the circuit of the battery 12.

ARTHUR KENT'S RHEOSTAT

(Patent No. 1,445,324, issued to Arthur Atwater Kent, of Ardmore, Pa., Feb. 13, 1923.)

My invention relates to rheostats, of general application, and particularly those suited for varying the strength of current flowing through, and therefore varying the incandescence of, the cathodes, as filaments, of thermionic devices, such as audions and the like, employed in the radio art and in other relations.

Referring to Figs. 1, 2 and 3, P is a panel or support of any suitable material upon which the rheostat structure is mounted. A sheet metal base member B has at its opposite ends the integral upstanding ears or lugs L, L, and also, preferably, the integral extension E, of any suitable form, as semi-circular, as indicated.

Wound about a strip S, of insulating material, as indurated fibre or the like, is the resistance wire or conductor R, covering a bowed or semicircular portion of the strip S between its ends, by which it is supported upon and secured to the lugs L.

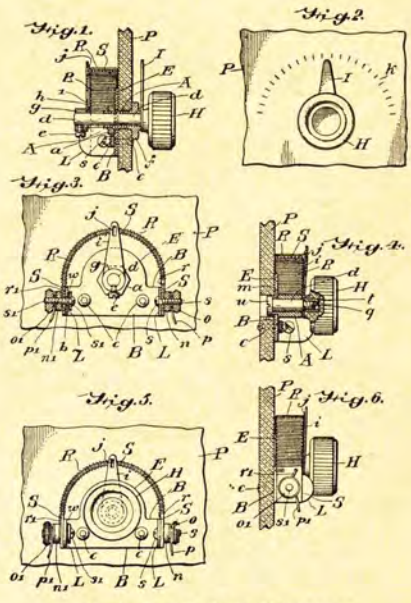
Extending through registering holes in one lug L and one end of the strip S is a screw *s*, upon which is threaded a nut member *n*, thereby holding and clamping the strip S to the lug L. The nut *n* and the co-acting nut *o* form a binding post or one terminal of the rheostat, the binding post structure serving to clamp and connect the circuit conductor *p*, which accordingly, by the structure described, is in electrical communication with the base B, the end *r* of the conductor R being free or unconnected.

Through registering holes in the other lug L and the other end of the strip S extends a screw s^1, upon which is threaded the nut cember n^1, between which and the end of the strip S is clamped the other end r^1 of the resistance wire R, whereby one end of the resistance conductor R is in electrical communication with the binding post formed by the nut n^1 and the co-acting nut member o^1, which serves to connect and clamp the other circuit conductor p^1, which is accordingly in electrical communication with one end of the resistance R. By bushing *b* and washer *w*, both of insulating material, the screw s^1 is insulated from the lug L and base B.

Extending through registering holes in the panel or support P and the base B, or its extension E, is the externally threaded metal bushing A having the flange *f* abutting against the member P and having on its other end the metal nut *a* by which the flange *f* is drawn snugly against the panel P and by which the base B and the parts attached thereto are secured to the panel.

Rotating and bearing within the sleeve or bushing A is the metal shaft *d*, upon which is secured by the screw *e* the metal bushing *g* having the end *h* of reduced diameter extending through a hole in the metallic contact lever *i*, which is fixedly secured to the bushing *g* by spinning over or riveting the end of the aforesaid portion *h*. The contact lever *i* has a struck-up contact portion *j*, which engages the resistance wire R.

The contact lever *i* is more or less resilient, and its tension, as determined by the position of the bushing *g* upon the shaft *d*, determines the amount of pressure exerted by the contact *j* upon the resistance R, the bushing *g* being adjustable to different positions upon the shaft *d*.



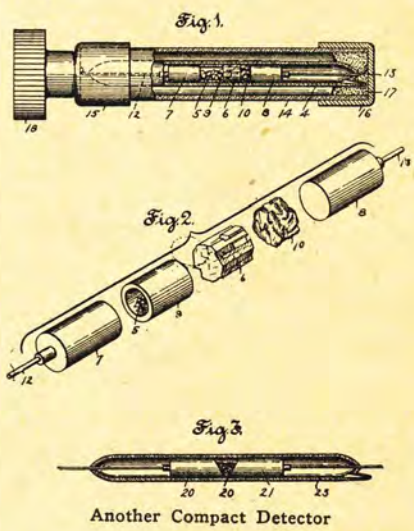
A. A. Kent's New Rheostat

A COMPACT DETECTOR

(Patent No. 1,445,613, issued to Harold P. Donle, Meriden, Conn., Feb. 13, 1923)

This invention relates to devices for modifying the effects of received electro-magnetic waves to produce audible signal responses.

The primary object of this invention is to



Another Compact Detector

provide a sensitive easily adjusted and dependable contact-type detector for radio signaling.

The invention contemplates the use of an evacuated tube containing the dissimilar electrodes which, together, constitute a sensitive couple, for the purpose of converting radio frequency currents such as are received in radio telegraphy or radio telephony. One of these electrodes is stationary with respect to the other, and the other is of a granular or divided material which has noncohering characteristics, and which is so placed within the tube as to afford a variable or adjustable contact with the other or stationary contacts.

The sensitive couple in the form shown in Figs. 1 and 2 consists of metallic particles 5 and a so-called crystal or non-metallic substance 6. The particles 5 are preferably of substantial size and may be termed "granules." They are also preferably of irregular or angular shape. The element 6 may be any one of the well known materials used in self-restoring contact detectors, such as commercial silicon, galena, iron pyrites, natural oxide of zinc, etc. These elements are mounted in the tube between the terminal plugs 7 and 8. The fixed or stationary active electrodes 6 may conveniently be spaced apart from the terminal 7 by means of a sleeve of glass or other insulating material 9.

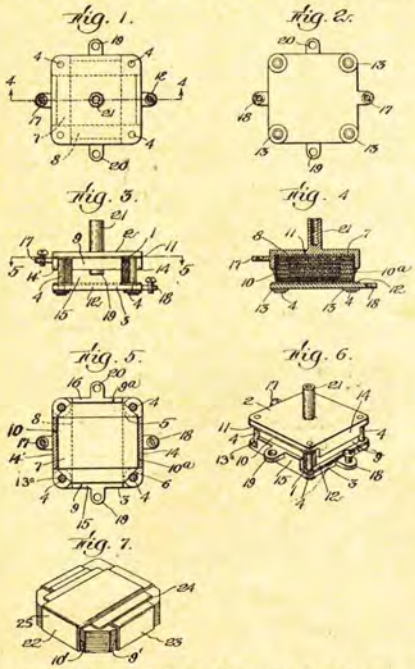
NEW ELECTRICAL CONDENSER

(Patent No. 1,444,534, issued to Butler Ames and Phillip J. Gilinson, Lowell, Mass., Feb. 6, 1923.)

This invention relates to electrical condensers and has for its object a condenser which is simple to construct, which is compact in form, which can be tightly compressed to expel any air trapped therein, which will fit into a magneto rotor or other restricted space.

The device illustrated in Figs. 1 to 6 essentially comprises a body portion 1 made up of alternate layers of insulating and conducting material, end plates 2 and 3 disposed at opposite ends of the body portion, and rivets 4 for securing the end plates together.

The insulating layers of the body portion are in the form of square sheets 5 having their corners cut off as shown at 6 in Fig. 5. The conducting layers are in the form of oblong sheets alternate ones of which are disposed at right angle to each so as to form two sets of conducting sheets 7 and 8 angularly displaced from each other 90° as indicated in Fig. 5. The conducting sheets extend somewhat beyond the opposite sides of



Seven Views of New Electrical Condenser

the insulating sheets and at each side are folded over each other and pressed together with a hot iron or otherwise connected together as indicated at 9, 9a, 10 and 10a in Figs. 3 to 6. While these are the preferred shapes of the insulating and conducting sheets it is to be understood that the shapes may be varied within the scope of the invention in its broader aspect so long as the conducting layers project from different sides of the condenser so as to be united together.

The end plates 2 and 3 are insulated from the body portion 1 by layers of insulation 11 and 12 and the rivets 4 are insulated from the end plate 2 by insulating washers 13 and bushings 13a. Extending from plate 2 along one pair of opposite sides of the condenser are two flanges 14 and 14′, these flanges contacting respectively with the ends of the set 7 of conducting sheets; and extending from plate 3 along the other pair of opposite sides of the condenser are two flanges 15 and 16, these flanges contacting respectively with the ends of the set 8 of conducting sheets. A film of solder is preferably flowed in between each of these flanges and the corresponding set of ends of the conducting sheets to insure a perfect contact between each end of each conducting sheet and one of the end plates. When the end plates are utilized as terminal plates they are provided with terminal lugs 17 and 18, respectively, to which circuit leads may be connected.

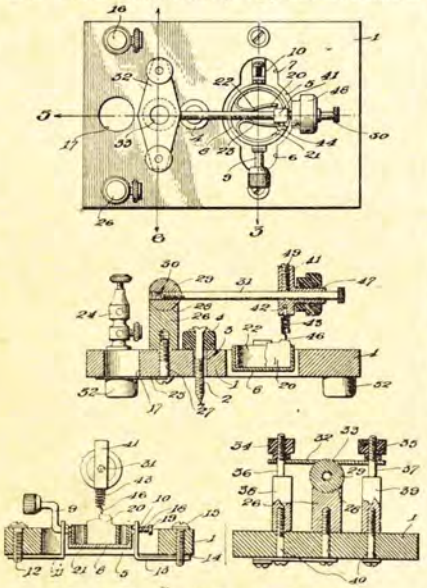
A WIRLESS WAVE DETECTOR

(Patent No. 1,441,988, issued to Emmet P. Lindner, Indianapolis, Ind., Jan. 9, 1923)

This invention relates to wave detectors as used in wireless apparatus and an object of the invention is to provide a carborundum detector which is constructed to permit movement in any necessary direction making it possible to engage any sensitive spot on the mineral crystal with centralogical pressure of the contact point of the detector.

Referring more particularly to the drawing the improved electrolytic wave detector comprises a base 1 of wood or any suitable nonconductiving material.

The supporting base 1 is provided with a centrally disposed circular cutout portion 5 with which diametrically opposed extensions



Four Views of Crystal Detector

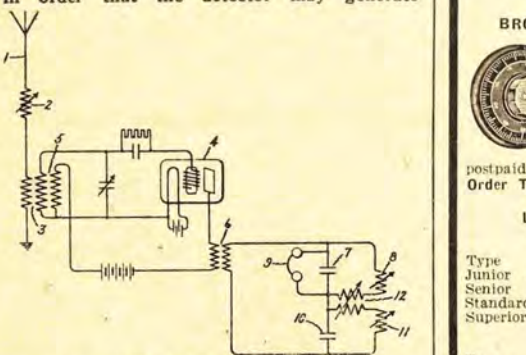
6 and 7 communicate. The mineral crystal carrying cup 8 of the wave detector is positioned in the cutout portion 5 and it comprises a substantially cylindrical cup open at its upper end and having supporting stems 9 and 10 projecting therefrom at diametrically opposed points. The stem 9 is rockably supported in the upper end of an angular metal strip 11 of conductive material, which is attached, by means of a suitable screw or bolt 12, to the supporting base 1. The stem 10 is rockably supported by an angular metal bar 13 of conductive material, one end of which engages a conducting strip 14, being held in firm engagement with this conductive strip 14 by the bolt 15 which serves to connect both the angular bar 13 and the strip 14 to the supporting base 1. The strip 14 is connected to the binding post 16 which is to have connection with the wireless apparatus.

RADIO RECEIVING SYSTEM

(Patent No. 1,443,209, issued to Burke Bradbury, Schenectady, N. Y., Jan. 23, 1923)

The present invention relates to radio receiving systems, particularly to systems for receiving continuous wave signals.

Indicated in the drawing is an antenna 1 with the usual tuning inductance 2 and a coupling transformer 3 by means of which the received signals are impressed upon the grid circuit of a detector 4 of the electron discharge type. The plate and grid circuits of the detector are coupled together at 5 in order that the detector may generate



Novel Radio Receiving System

local oscillations of a frequency slightly different from that of the signals which are to be received. Coupled to the plate circuit of the detector 4 by means of the transformer 6 is a separate circuit in which are provided two frequency traps. One of these which comprises the capacity 7 and parallel inductance 8 is tuned for the frequency of the signals to be received, the usual telephone receiver 9, or any other desired form of indicator, being connected in parallel to this trap. The second trap made up of the condenser 10 and parallel inductance 11 is tuned to the frequency of the interfering signals which it is desired to suppress. This second trap offers a high impedance in the circuit to the flow of currents of the interfering frequency and thereby prevents such currents from affecting the telephone receivers 9. In case the second frequency trap does not completely prevent the interfering signals from affecting the telephone receivers a coupling 12 may be provided between the two frequency traps for the purpose of impressing upon the first frequency trap a current of the proper phase and intensity to neutralize any current of the undesired frequency which may flow in the first trap.

I have found that it is possibe by the system indicated to eliminate the effect upon the receivers of signals produced from nearby stations of high power and of wave length differing only slightly from that of signals which are to be received from a distant station.

"Radio Topics" New Feature

THE National Broadcasting schedule which is being prepared by RADIO TOPICS will be included as a supplement of the MAY issue, as the printers were unable to complete it for this issue.

This special feature will be an invaluable aid to radio fans throughout the country. Look for it.

TELEPHONE vs. RADIOPHONE

(Continued from page 20)

without interference, it will be necessary to regulate the service in such a way as to assure the public satisfactory results. Limitations in the number of transmitting stations will naturally come, for talented performers are scarce and the best will have little incentive to perform in a babel of interference and to a divided radio audience.

May Be Extended

Radio receiving stations may be extended indefinitely in number without effecting the quality of service and such expansion in the great radio audience will make it worth while to broadcast the best of programs.

I have made an attempt, by contrasting the two methods of telephony and the two types of service, to show you the necessity or organizing and controlling radio transmission. It is unfortunate that the existing laws are so far out of date and there is now no means of regulating the uneconomic, unnecessary, and senseless interference caused by so many broadcasting stations, to which no one wishes to listen, and individual communications by both radio telephone and telegraph.

The American public will be satisfied only with good programs and good reception. Good programs will come only when broadcasting is done by a few favorably located, high class, high power stations. Good reception is possible if our law makers will allow the separation of broadcasting wave bands and will hush the individual who today ruins the entertainments of thousands by the operation of an antiquated or improperly adjusted telegraph apparatus.

Your co-operation is needed to improve broadcasting conditions. The tastes, troubles and desires of the public must be made known to those who broadcast, to your local radio inspector, and to your Congressional representative.

All of these are anxious to solve the radio problems in such a way that you will be given the best of local and long distance service.

ELEMENTARY ELECTRICAL PRINCIPLES

(Continued from Page 22)

kilowatt-hour you can figure the actual dollars and cents you spend on your line loss alone. A kilo-watt is 1,000 watts. We have here a loss of 186.56 watts or 0.18656 kilo-watt. For one hour of operation of this motor we can calculate the expense not only of the motor's useful power, but also of the line loss power.

First, let us take the cost of useful motor power. The 5 H. P. machine drew from the line 4,662.5 watts or 4.6625 kilowatts. If the rate is 5 cents per kilowatt-hour and the motor runs at full load, every hour of running will mean an expense of 23 cents.

We find this by multiplying the kilowatts by the number of hours by the rate per kilo-watt-hour. If you operate for ten hours per day for 300 days per year, this one motor will cost you close to $700. But this is not all. Here we only considered the motor itself. Remember that the line running to the motor is not 100 per cent efficient. We lost some power in it. Let us see how this works out.

We lost 4.4 volts in the line in overcoming the 0.1037 ohm. We had a current of 42.4 amperes flowing in the line when the motor was running on full load. Then the watts lost in the line being equal to volts times amperes is 186.56 watts. This represents some more money. At the same rate of 5 cents per kilo-watt-hour, we have 186.56 watts or 0.18656 kilo-watt multiplied by one hour multiplied by the rate 5 cents. This equals 0.009328 or nearly one cent money loss per hour every hour the motor is running at full load and drawing its 42.4 amperes.

If this continues for 10 hours per day for 300 days per year, we see the yearly expense of lost power in the line equals $27.98. This is really considerable loss. Suppose you had five or six of these motors all operating like this and each one costing this amount for line loss alone, you would soon begin to wonder what was the matter.

* * *

This condition actually does exist, however, in many factories and shops where the electrician is not technically trained and does not understand the method of handling such problems.

Money is a big thing in plant operation and close tab must be kept at all times on such things as these. Right before our eyes big financial losses occur because of unnecessary resistance of conductors. It all evolves from this idea of efficiency. A simple illustration is this:

You pour into a bucket exactly one gallon of water; you empty the bucket and do you get out exactly the same gallon you poured in? Exactly not! Some of the gallon sticks to the inside of the bucket. There is no machine or no power line which will deliver out the exact amount of energy it takes in. Some is lost. What determines this loss? Simply this—efficiency.

So in our study of electricity we will deal constantly with power lines, be they running to motors, lights, radio apparatus, or anything else. We will always meet efficiency face to face. Resistance is the big thing we must watch in our electrical work. Small wires use up voltage. If we increase the size of our conductors a trifle we would get greater results from our circuits.

In the above problem, if we had wired this 5 H. P. motor with a slightly larger wire, the No. 5 Brown & Sharp, we would have saved some of the voltage drop in the line, consequently saving money. The writer is giving you the problem of determining this amount.

Think over this article very carefully and see if you can connect its idea up with your radio station. You may often wonder why your transformer output is not what it is supposed to be. Have you stopped to consider the distance your transformer is from the electric light mains? Have you stopped to consider the size wire running to the primary of your transformer?

Do you understand why the better trained electrical or radio man tells you that your line loss is rather large? To understand this article in its fullest degree you must read it and reread it; study it carefully. You will then thank the writer for giving you this little bit of information and starting you in on one of your first steps into real electrical engineering.

Problems

1. Referring to the article just discussed, if we would have used the No. 5 Brown & Sharp wire instead of the No. 7, what would have been the following results for the 5 H. P. motor installation, yearly cost of lost energy on the line alone, assuming the 5-cent rate; also, what would have been the necessary switchboard voltage in order that the motor could have received its 110 volts exactly? Show all your figures.

2. The transformer in your radio station is 150 feet from the electric light company mains. These mains carry a pressure of 110 volts exactly. When you press your sending key the ammeter in the primary circuit to your transformer reads 8 amperes. The line leading from the light mains to your transformer is No. 14 Brown & Sharp wire, the cross-sectional area of this size wire being 4107 C. M. Since the mains are carrying a pressure of 110 volts, and your breach line into your transformer is No. 14 wire, what actual voltage will you lose in the line to your transformer? What voltage will your transformer receive? How can you increase the voltage input into your transformer? Use the method given in this article.

3. State exactly, in your own words, just what you understand by voltage drop. Also explain the difference between useful energy and lost energy. How can these factors be remedied and how would you go about it if you were an expert electrical man?

4. A motor is rated at 15 H. P. It operates on 220 volts and draws 60 amperes. Calculate its efficiency. How much would it cost to run this motor for one hour if the rate is 8 cents per kilo-watt-hour?

5. If we have a motor which is said to be extremely inefficient, what probable causes would you give for this inefficiency? Name everything you can think of which will lower the efficiency of this motor.

Start to work out these problems and send your answers to RADIO TOPICS, Oak Park, Ill., at once.

HOW AND WHY OF BROADCASTING

(Continued from page 16)

some well meaning but badly informed possessor of a radio set adjusts his set so that he gets a musical note in his head telephone, not only will this note be audible to the innocent novice, but it will be *heard by everyone listening to the concert.* All users of regenerative sets should carefully bear this fact in mind and the next time that his receiver "squeals, howls or sings," he should immediately adjust the tickler knob toward the minimum point until the noise stops.

Tuning Is Critical

When a regenerative receiver is properly used, the tuning will be found to be much more critical and it will be found that undesired stations can be tuned out with surprising precision.

When using a vacuum tube receiver, efficient coils and condensers are essential. Tuning coils with sliders are most unsatisfactory for this purpose and tapped coils, honey comb and duo-latteral coils are to be preferred for the longer wave lengths whereas variometers, vario-couplers and spider web coils are very popular for the shorter waves. Paper condensers should in no case be used in circuits in which flow radio-frequency currents. Only the convential movable plate condenser or mica condensers should be used.

When using loud speakers audio-frequency amplification is essential. It is also serviceable in bringing in weak stations that cannot be heard without its assistance.

Radio-frequency amplification is used to make audible stations that could not otherwise be heard. The volume available from a radio-frequency amplifier is limited and audio-frequency amplification is necessary if a loud speaker is to be used.

Amplifiers

For broadcast reception a radio-frequency amplifier without distortion is of premier importance. Amplifying transformers that will give the same amplification at all of the voice and musical frequencies used must be used. Generally this necessitates the use of moderate turn ratios such as 4 or 5 to one, with consequent sacrifice of amplification. However, quality is more to be desired than volume, and so

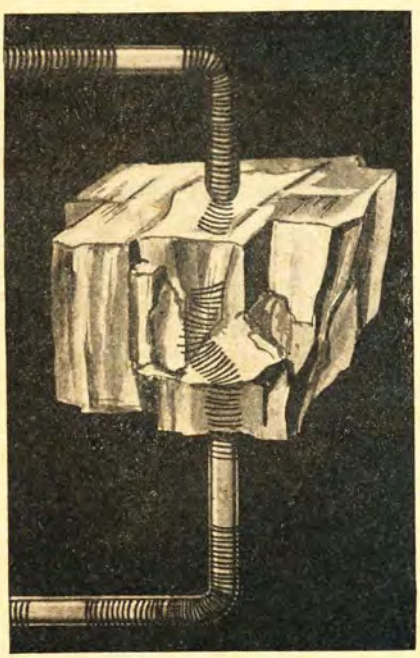
Say you saw it in "Radio Topics" when writing to advertisers.

the transformer of a moderate turn ratio is considered the best compromise.

Care must be used that the output wiring of the amplifier is not brought too close to the detector tube wiring or the amplifier will "howl."

The builders of radio-frequency amplifiers must expect to have to experiment somewhat to get the results they hoped for. At such high frequencies the current does not necessarily hold to the wire, but will pass from wire to wire by condenser action on the least provocation. Radio-frequency transformers therefore must be carefully shielded and much care must be exercised in seeing that the position of the wires is such as to prevent currents getting where they are not desired. A potentiometer is essential to the successful operation of a radio-frequency amplifier.

To sum up, properly constructed and installed radio receivers will operate satisfactorily if they are understood and if too much is not expected of them. Like any device made by man, they have their limitations, and they operate according to certain laws, and when these limitations and laws are properly understood, they will give satisfaction.



The crystal detector acts as a check valve, allowing current to flow through in one direction only. (Courtesy of W. W. Hodkinson Film Corp., from "The Mystery Box" Film.)

The Cat's Whiskers

By

RADIO JOE

CONDITIONS instead of bettering themselves are presenting new arguments in protest of the amateur, and he in turn is beginning to leave the radio field with a big bang, according to the latest reports from the Ninth District Inspector's office, which shows an exodus of nearly 500 cancellation of station licenses. Among these are some of the old two-letter calls. We wonder when the bargain day will commence and how many of the local boys will be radio inspectors in order to walk out with one of these two-letter calls.

* * *

LIFE'S MYSTERIES—We read in the ads of a daily paper that Cunningham or Radioson detector, tubular, "fully guaranteed 9:30 to 10:30 a. m." We wonder what these tubes do at any other time, or whether they are an infringement on the present date tubes. As far as we can remember, we figured that Radioson tubes have been extinct since 1915. Also in same paper, "Magnavox, today special, $24.95." Are these of same category as those selling for $45?

* * *

Now that we have had a dose of the "silent night" in Chicago and have had the pros and cons on this question, somebody steps to the front and admits that it was all wrong, and is trying to force a new one on us, the "staggering hour," for broadcasting. Looks like another case of Watson get the needle; we have something but do not know how to use it.

* * *

The question arises, Why can I get a better radiation with two five-watt bottles and get nothing from two fifty bottles? Ask the makers of these tubes if they have in anyway hurt the working qualities of their product before shipment.

* * *

Everybody wants to know who "Radio Joe" is. He is, and he isn't.

* * *

Well, finally something is started. Haste makes waste. Logwood has entered into a suit against the Radio Corporation of America, seeking information on how they got the super-regenerative patents. Logwood claims first entry for patent. Preference shown again.

* * *

Radio Traffic Association, please give us your address and names of your officers that a line can be had from you in reference to what you are doing. What do you say, Tommy?

* * *

LIFE'S INQUIRIES—M. B. West and his pet, "the Zenith receiver?" We wonder what he is going to tell us next, that is wrong with our radio receiving sets.

New York Has Radio Show

THE third annual convention of Executive Radio Council of the Second District which was held at the Hotel Pennsylvania, New York City, March 1-3, was another success of the radio amateurs.

The exhibitors had an interesting and instructive display and some of them eclipsed anything ever seen at any radio show. There were many new features never before seen at a radio show, among these being a particularly fine transmitting set. This set is something special in the line of transmitters and was used occasionally throughout the show for demonstration. There were more than thirty aerials strung up to the large sign on the roof of the hotel.

Interest ran high around the exhibition booths of the radio clubs, of which there were seventeen, coming from all sections of the metropolitan area.

The convention closed March 3, ending with the third annual banquet at the Hotel Pennsylvania.

The manufacturers' exhibits included the following well known firms: Jones Radio Corp., Eisemann Magneto Corp., Westinghouse Union Battery, Exide, Radio Corporation of America, B. H. Price Co., Advance Metal Stamping Co., General Radio Co., Acme Apparatus, Wm. J. Murdock, Jefferson Transformer Co., P. M. Dreyfuss Co., American Radio Relay League, F. A. D. Andrea, Experimenters Information Service, Federal Tel. and Tel. Co., Diamond State Fibre Co., A. H. Grebe & Co., DeForest Tel. and Tel. Co., Marko Storage Battery Co., The Bristol Co., Jewell Electrical Instrument Co., Adams Morgan Co., Novo B. Batteries, Cardwell Mfg. Co.

Radio Helps Shorthand Students

Every day brings to light another use for radio broadcasting. It is now revealed that students of shorthand and typewriting are picking up addresses out of the ether to increase their speed at the typewriter or in writing shorthand symbols of the speaker's words. Those who have had to rely upon the patience of a member of the family or a friend to read to them while they dashed down the dots, dashes and curves, can appreciate the advantage of radio dictation.

Ford Runs 57 Miles on Gallon of Gasoline

A new automatic vaporizer and decarbonizer, which in actual test has increased the power and mileage of Fords from 25 to 50 per cent and at the same time removes every particle of carbon from the cylinders, is the proud achievement of John A. Stransky, 3482 South Main Street, Pukwana, South Dakota. A remarkable feature of this simple and inexpensive device is that its action is governed entirely by the motor. It is slipped between the carburetor and intake manifold and can be installed by anyone in five minutes without drilling or tapping. With it attached, Ford cars have made from 40 to 57 miles on one gallon of gasoline. Mr. Stransky wants to place a few of these devices on cars in this territory, and has a very liberal offer to make to anyone who is able to handle the business which is sure to be created wherever this marvelous little device is demonstrated. If you want to try one entirely at his risk, send him your name and address today.—Adv.

New WD11 and No. 199 Tube Sockets

Probably a great many have wondered why it was that the Radio Corporation, with its exclusive control of the manufacture of vacuum tubes, have seen fit to change the types and sizes of their bases.

This question was put to one of their representatives recently, who made the following explanation:

There have been no changes made in tube design without a real reason for changing. The size of the W. D. 11 tube lends itself to a smaller base. The variation in the size of the prongs and peculiar location insure the tube being placed in the socket with the proper connections and prevent its being burned out by being placed in a socket of sets using a 6-volt battery.

The same reason for changing the size of the base also applies to the new G. E. 199 tube that works from two dry cells. However, the most interesting change for added efficiency is in the changing of the plate and grid terminals.

In the regular 6-volt tube Nos. 200, 201 and 201-A, the plate and grid terminals are side by side. In the Westinghouse W. D. 11 tube and General Electric Company's No. 199 tube, the plate and grid terminals, or prongs, are opposite each other. This elimination of capacity between these two terminals adds a great deal to the efficiency of these tubes. To get the full benefit of this efficiency it is advisable to use sockets designed especially for this tube. Some manufacturers have simply made over the mold for their regular sockets necessitating making the changing of connections underneath. To do this they must run close to each other, and this restores the capacity effect to a serious degree. This same objection is also found in all adapters, as it is necessary for the connection to cross over and run in close proximity to each other.

The Na-ald socket, designed and sold by the Alden Mfg. Company, Springfield, Mass., is designed especially for this tube, avoiding the fault just mentioned and combining a contact of exceptional merit. The Na-ald contact has a wiping action so made that it will take care of all variation in tube prongs and at the same time exert a pressure that holds the tube firmly in the socket. The conventional socket design, however, has only a pressing contact of small area against the ends of the tube terminals, although the Electrical Engineer in designing a snap switch or any other electrical contracting device, would insist on a wiping contact. A dual wiping contact is also provided in the Na-ald No. 400 De Luxe socket for Nos. 200, 201 and 201-A tubes.

BlairCO Radio

Buy at the Radio Store where they display this sign — "a distinguishing mark" of Mitchell Blair Company Proven Products.

As Long as You're Listening In
Get It *All*—RIGHT!

Do you know that the **effect** produced by the finest Radio Receiving Set you can buy, can be **ruined** by an inefficient head-phone or loud speaker equipment?

You must have purity and clearness of reproduction.

If musical or vocal tones are brought in distorted you cannot fully enjoy your radio.

The Atlas Loud Speaker Cannot Be Excelled For Pure, Sweet, Undistorted Tone

Here indeed is the loud speaker deluxe—the **one** speaker that you can KNOW is giving you the finest results that can be **brought in** by your receiving set.

There are many loud speakers on the market. But comparative tests of the most searching and exhaustive nature, have proved beyond question that in purity of tone the Atlas Loud Speaker **leads them all.**

You can notice the **difference** instantly. With the Atlas all the distortion, all the confusing metallic echo, all the distracting mechanical sound is **gone**—absolutely done away with by the patented construction of the **double composition** diaphragm found **only in** the Atlas. What you hear is a reproduction of life-like tone and **distinctness.**

With the Atlas, you do **not** need the extra battery, extra tubes and other costly equipment usually required. Can be used with power if desired.

This is only one example of the **conspicuous excellence** found in all Blairco Radio.

Atlas Loud Speaker

Will not blast no matter how much current is passed through it. Entirely eliminates tone distortion and mechanical noises. No loud speaker equals it in the pure, clear and exquisite tones brought in. Satisfaction guaranteed or money back.

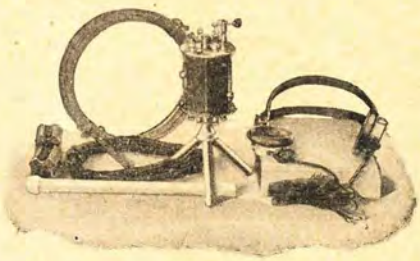
Price, complete, with sound reflecting base and horn attachment with cord—F.O.B. Chicago $25.

See Your *BlairCO* Dealer Today

Blairco Service, dispensed through leading Radio Dealers, enables you to take full advantage of the greater care, better materials and more scientific engineering built into all radio accessories and equipment sold under the Blairco triangular mark of **super-quality.** It enables you to enjoy radio **at its best**—and at no additional **cost.**

If you need additional equipment—if you want to know the cost of a complete Tube or Crystal Receiving Set, including everything from Aerial to head phones, see your local Blairco dealer. Get a free estimate on the complete job. If you have no local Blairco dealer, **Write Us Now for Folder and Prices.**

Radio Dealers! Blairco Products are piling up sales and satisfied customers for Radio Dealers, wherever sold. An unbeatable opportunity for you, if your territory is still open. Big advertising campaign. Live sales helps. Liberal proposition. Write for it QUICK.



BlairCO "FOUR" Crystal Set

The most sensational receiving set value ever offered. All nickel steel. Stands 9 inches high. Takes four sets of head phones. Brings in tones of remarkable clearness and purity. Price only $7.50. Complete with Aerial, ground wire and Atlas head phone—$20.00.

Atlas Head Phones

Only high grade receiver set offered at a reasonable price. 2200 ohms. Sensitiveness and adaptability superior to all others. Eliminates disagreeable noises in ears. Comfortable. 5-ft. of cord. Price—$9.00.

Mitchell Blair Co.

"First With the Best"

1429 So. Michigan Ave., Chicago, Ill.

"BUILD YOUR OWN" WITH "RASCO" PARTS!

THE Radio Specialty Company—"RASCO" for short—now in its third year, is unquestionably the most unique radio parts supply house in the United States, if not in the whole world. This Company makes a specialty of very small orders. No order is too small to get immediate and prompt attention. The reason is simple: 80% of our orders are small.

The reputation of this house was built upon service. Ask any of your radio acquaintances what they think of "RASCO" service, "RASCO" promptness. Thousands upon thousands of unsolicited testimonials are in our files, to prove that we serve the public as it has never been served in radio merchandise before. Be sure to get our great 68-page catalog, containing over 500 different parts. Catalog contains over 300 illustrations.

Order direct from this page. All goods sent prepaid in 24 hours. We pay all transportation charges. Money refunded if goods do not satisfy

RADIO FREQUENCY TRANSFORMERS

The best Radio Frequency Transformer developed so far. Designed for us by Mr. R. E. Lacault, Associate Editor of RADIO NEWS. For wavelengths of 320 to 420 meters. Air core. Guaranteed to do the work. This Transformer brings in the long distances.

R-2800 Radio Frequency Transformer, size 1⅞"x2½" $2.00

VACUUM TUBE SOCKET

Made entirely of composition. Gives no rise to capacity effects, as metal sockets do. Positive contacts.

R-6500, Vacuum Tube Socket .....$.35

ANTENNA CONNECTOR

Made entirely of aluminum. Will not rust. The four wires go to upper holes. Lower hole takes lead-in. Don't solder your aerial. Dimensions, 2" high, 1¾" wide.

R-999, Antenna Connector $.30

MOULDED DIALS

Highest grade made. Brilliant black composition. Figures inlaid in white enamel. For ¼" or 3/16" shaft.

R-3074, Dial, 2½" .....$.55
R-3075, Dial, 3¼" ..... .65
R-3076, Dial 3⅞" ..... .80

FLUTED KNOBS

Made of best black composition, provided with 8/32" bushing. Height 1", Diameter 1¼".

R-2055 Fluted Knob.....$.15

"RASCO" POSTS

R-650, Post made entirely of best black composition—8/32" screw—each .....$.08

R-202, Post has nickel-plated bottom part, each..... .08
Dozen, each style ..... .90

RASCO SWITCH POINTS

Nickel-plated and polished. The following have been found the most popular.

1, ¼"x¼", 6/32" thread, doz.....$.35
2, 3/16" high, ¼" dia., 6/32" thread, doz. ..... .35
3, 3/16"x3/16", 4-36 thread, doz.., .35
4, ¼" dia., ⅜" thick; shank 6/32" doz. ..... .40
5, ¼" dia., 3/16" thick; shank 4-36, doz. .40
6, 3/16" dia., 3/16" thick; shank 4-36, doz. .40
7, 3/16" dia., ⅛" thick; shank 4-36, doz. .40
75, Switch Stop ⅜" long, 4-36 thread, complete with nut, each ..... .04
76, New style Switch Point, to be pressed into bakelite panels with forced fit. Wire is soldered to pin end. Head ¼" dia., 1/16" thick, doz. ..... .40
77, same as above, but head is ¼" dia. x 3/16" thick, doz. ..... .40

SOCKETTES

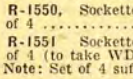
Substitute for Vacuum Tube Socket. Four of these take one Vacuum Tube. Grasp tube firmly. Best contact possible. Take less room. Are better.

R-1550, Sockettes, nickeled, set of 4 .....$.25

R-1551 Sockettes, nickeled, set of 4 (to take WD-11 Tube) ..... .25

Note: Set of 4 sufficient to hold 1 Tube.

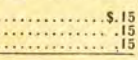
VACUUM TUBE FUSES



Insure your tubes against blow outs.

R-2575, Fuse, 1 ampere.....$.15
R-2576, Fuse, 1½ ampere ..... .15
R-2577, Fuse, 2 ampere ..... .15

UNIVERSAL BEARING



THE bearing to hold variometer and variocoupler rotors. Total length of bearing 2¼". Outside shaft, 1¼". Length of thread 1". Length of threaded sleeve, ¾".

R-1375, Bearing .....$.25

AUDIO FREQUENCY TRANSFORMERS

No better Transformer on the market. Highest class materials. Impregnated coils. Silicon steel stampings used. Save 50 per cent by assembling it yourself.

R-1100, A.F. Transformer, ratio 4¼ to 1 .....$2.65
R-1150, A.F. Transformer, ratio 6½ to 1 ..... 2.65

HONEYCOMB COILS

No better coils on the market. Too well known for lengthy description. Firm impregnation. Range given is in meters when varied with a .001 Variable Condenser:

No.	Turns	Range	Price
R-5000	25	120- 250	$ .40
R-5001	35	175- 450	.45
R-5002	50	240- 720	.50
R-5003	75	390- 910	.55
R-5004	100	500- 1450	.60
R-5005	150	600- 2000	.65
R-5006	200	900- 2500	.75
R-5007	250	1200- 3500	.80
R-5008	300	1500- 4500	.85
R-5009	400	2000- 5000	1.00
R-5010	500	2800- 6100	1.15
R-5011	600	4000-10000	1.30
R-5012	750	5000-12000	1.45
R-5013	1000	7900-15000	1.70
R-5014	1250	9750-19500	1.95
R-5015	1500	14500-26500	2.20

CORD TIP JACKS

Take the place of binding posts on instruments or panel. Cord tip firmly gripped by jack. Made of brass, highly nickel-plated and polished. Screw to attach lead wire. No soldering necessary.

R-1500, Cord Tip Jack, each.....$.15

CARDBOARD TUBING

Only seamless tubing made in United States. Perfectly seasoned. Heavy wall. (I.D.—Inside Diameter. O.D.—Outside Diameter. L.—Length).

R-6600, 3" I.D., 3¼" O.D. x 7" L. ....$.30
R-6601, 3½" I.D., 3¾" O.D. x 7" L..... .35
R-6602, 3¼" I.D., 3½" O.D. x 5" L..... .25
R-6603, 3¾" I.D., 4" O.D. x 5" L..... .27
R-6604, 4" I.D., 4¼" O.D. x 5" L..... .35
R-6605, 2¾" I.D. 3" O.D. x 2⅜" L..... .15

MICANITE TUBING

Especially suitable for CW work Nothing better made. Natural color.

R-250, Micanite Tubing, 4" dia., 6" long $1.20
R-251, Micanite Tubing, 6" dia., 6" long 1.60

JACKS AND PLUGS

Best material. Only pure silver contacts used. Factory that makes Postal Telegraph jacks makes these. This is your guarantee.

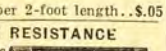
R-1000, Jack, 4-springs double circuit .....$ .75
R-1001, Jack, 3-springs .80
R-1002, Automatic 5-spring Jack..... 1.00
R-1003, Plug ..... .65

BUS BAR WIRE

This wire is square, measuring 1/16" by 1/16". Easy to solder as it is already tinned. Used on all up-to-date instruments. Sold in 2-foot lengths only.

R-6400 Bus Bar Wire, per 2-foot length..$.05

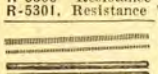
NON-INDUCTIVE RESISTANCE



Made of special graphite copper-plated at the ends. Round rods 1⅜" long, ¼" diameter. Resistance accurate within 20 per cent.

R-5300 Resistance 12,000 ohms.....$.65
R-5301, Resistance 70,000 ohms..... .65

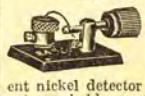
BRASS RODS



Sold in 6" lengths only

R-8032, Brass Rod, 8/32" thread, per length .....$.08
R-6032, Brass Rod, 6/32" thread, per length ..... .06
R-1425, Brass Rod, plain ¼" round, per length ..... .10
R-3616 Brass Rod, plain 3/16" round, per length ..... .06

"RASCO" BABY DETECTOR



Base is solid black composition; mounted on same is nickel holder and binding post, which holds the fluted hard rubber knob with its sliding rod member. Patent nickel detector cup and binding post. Patent cup holds crystal.

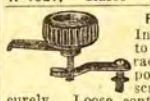
R-1898, Baby Detector, with Galena .....$.50

"RASCO" LUBRICATED PANEL SWITCH

Our patent spring fork holds the switch handle always at a uniform tension. At the same time it insures best contact possible. New wiping contact covers every portion of the switch point. Double leaf blades used.

R-1921, "Rasco" Switch .....$.40

PANEL SWITCH LEVER



Impossible for this lever not to make positive contact. Leg radius 1½". Nickel-plated and polished. Lock fork holds the screw (in which it rotates) securely. Loose contact impossible.

R-200, Switch Lever .....$.30

"RASCO" NAME PLATES

The circular plate is our new Binding Post Name Plate. Diameter, ¾". These denominations: PHONES, GROUND, —, OUTPUT, "A" BATTERY —, "B" BATTERY —, LOUD SPEAKER, GRID, LOAD, "C" BATTERY —, AERIAL, +, INPUT, "A" BATTERY +, "B" BATTERY +, LOOP, TICKLER, PLATE, "C" BATTERY +, FILAMENT.

R-6000 to 6019, Binding Post Name Plates, each denomination .....$.03
Dozen ..... .30

Square Name Plates

Same denominations as above also these: SERIES 1st STEP, 2nd STEP, 3rd STEP, SECONDARY CONDENSER, TELEPHONE, SECONDARY, DETECTOR, TRANSMIT, GRID VARIOMETER, PARALLEL, COUPLING, PRIMARY, LOADING COIL, RECEIVE, ANTENNA, PLATE VARIOMTER, "BLANK", LUDION, ON, OFF.

R-834 to 866, Square Name Plates, each..$.04
Dozen ..... .40
R-839 "INCREASE CURRENT" (Right)
R-840 "INCREASE CURRENT" (Left)
Each ..... .10

VERNIER

Cleverest vernier made. Can be used with any dial. Soft rubber ring engages dial. Does away with vernier condenser. We guarantee results. All metal parts moulded in best black composition. Nothing to come apart. Biggest hit of the season.

R-1450, Vernier .....$.30

"RASCO" CONDENSERS

R-5050, Phone Condensers, each.....$.20
R-5056, Grid Condensers, each..... .20
R-5059, Grid Leak Condensers, each ..... .30

COPPER FOIL

Thinnest copper foil made, .001" thick. Comes 4" wide.

R-5025, Coper Foil, per ft. $.10
10-ft. length ..... .80

RADIO CEMENT

Weather resisting. Used particularly for cementing covered wires. Coils covered with this cement require no form. Wires hold together solely with this cement.

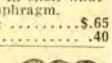
R-1750, Cement, 2-oz. bottle $.50

TELEPHONE SHELL AND CAP

For the experimenter we list this composition shell and cap. No holes in shell whatsoever. Takes standard 2½" diaphragm.

R-2700, Shell-and-Cap, complete .....$.65
R-2701, Shell only ..... .40

MICA DIAPHRAGMS



Made of special India mica in two sizes, 2⅛" diameter and 1-13/16" diameter. Excellent for experimentation in telephone work.

R-2550, Diaphragm, 2⅛" .....$.20
R-2551, Diaphragm, 1-13/16" ..... .15

RHEOSTAT WINDINGS

These windings, with the switch arm shown below, constitute a complete rheostat for the experimenter. Resistance wound on flexible black fibre. Carries 1½ amperes, resistance 6 ohms.

R-4300, Rheostat Resistance each .....$.20
R-4301, Potentiometer Resistance, each (200 ohms) ... .35

BLADE WITH COLLAR

Fits above.

R-1675, each .....$.10

MAGNET WIRE

We list only best qualities. "DCC" means Double Cotton Covered. "GS" means Green Silk. "E" stands for Enameled. The following come on 8-ounce spools:

R-2500, DCC No. 18.....$ .50
R-2501, DCC No. 20..... .60
R-2502, DCC No. 22..... .75
R-2503, DCC No. 24..... .85
R-2504, DCC No. 26..... .95
R-2505, DCC No. 28..... 1.15
R-2506, DCC No. 30..... 1.65

The following come on 4-ounce spools:

R-2507, GS No. 20.....$ .50
R-2508, GS No. 22..... .55
R-2509, GS No. 24..... .60
R-2510, GS No. 26..... .65
R-2511, GS No. 30..... 1.05
R-2512, GS No. 32..... 1.30
R-2513 GS No. 36..... 1.85

The following come on 8-ounce spools:

R-2514, E No. 20.....$ .45
R-2515, E No. 22..... .55
R-2516, E No. 24..... .60
R-2517, E No. 26..... .65
R-2518, E No. 30..... .70
R-2519, E No. 32..... .80
R-2520, E No. 36..... 1.00

LITZ WIRE

R-323, equals No. 25 B&S, per foot .....$.02
R-890, equals No. 28 B&S, per foot ..... .01
R-891, equals No. 21 B&S, per foot ..... .03
R-892, equals No. 20 B&S per foot ..... .04
R-893, equals No. 14 B&S, per foot ..... .12

Discounts of 10 per cent in 100-foot lots.

The "Rasco" Catalog

CONTAINS 75 VACUUM TUBE HOOK-UPS, 300 ILLUSTRATIONS 500 ARTICLES, 68 PAGES

All Armstrong Circuits: These important circuits are explained clearly, all values having been given leaving out nothing that could puzzle you.

Just to name a few of the Vacuum Tube circuits: The V.T. as a detector and one-step amplifier; Armstrong circuits; one-step radio frequency amplifier and detector; three stage audio frequency amplifier; short wave regenerative circuits; 4-stage radio frequency amplifiers; radio and audio frequency amplifier; inductively coupled amplifier; Armstrong superautodyne; radio frequency amplifier and crystal detector; combination V.T. detector one stage amplifier; two stage radio frequency amplifier and detector with feedback coupling (regenerative); regenerative receiver, using single spider web coil; Armstrong super-regenerative circuit; two stage radio frequency amplifier coupled to a two-circuit tuner, using two-slide tuner regenerative receiver; two stage audio-frequency amplifier, using crystal or V.T.; one stage radio frequency detector, two stages audio-frequency with feed-back coupling to first tube; power amplifier with loud speaker; regenerative receiver and one stage amplifier for DX work; one stage radio frequency detector with feed-back coupling; three stages radio frequency, two stages audio-frequency loop reception; crystal detector with rectification; one tube super-regenerative receiver; short wave regenerative receiver with two variocouplers, capacity-coupled tuner; trap circuit to eliminate interference; selective circuit to eliminate interference The catalog contains 300 illustrations. On account of its great cost, it cannot be distributed free of charge. Mailed only upon receipt of

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MANUFACTURERS OF

GOLLOS MERCURY RHEOSTAT
GOLLOS MERCURY POTENTIOMETER

118 NORTH LA SALLE STREET

CHICAGO, ILL.

January 30, 1923.

Radio Topics,
1112 North Blvd.,
Oak Park, Ill.

Gentlemen:

Believing in the practice of placing credit where credit is due, we wish to express our appreciation of the results obtained from our January advertisement in your magazine. We received forty-three inquiries on this one ad of which twenty-one resulted in bona fide orders including dealers and jobbers. This we believe to be a very fair percentage considering the amount of space used and the price paid for same.

We shall be glad to recommend your publication to other advertisers should the occasion present itself. Hoping for your continued success in the upbuilding of your publication, we wish to remain

Yours very truly

GOLLOS ELECTRICAL DEVICES CO., Not Inc.

Anatol Gollos

AG/AG

WorkRite Reduces Prices

Good News for Radio Fans

Concertola, Jr.

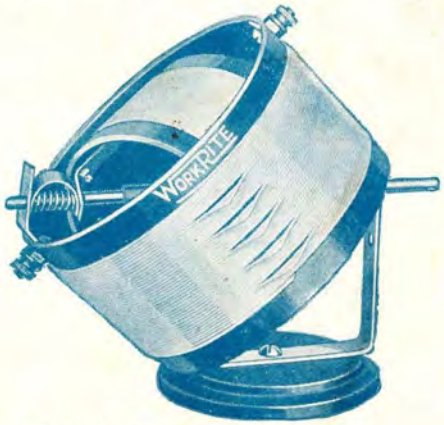
Here is the opportunity for you to get WorkRite Variometers and Variocouplers at prices less than those asked for inferior unknown instruments. The new WorkRite Super Variometer and WorkRite Super 180° Variocoupler, with 12 taps and wound with green silk are now $3.50 each. Last spring they sold for $6.00.

Don't wait any longer. Equip your set with WorkRite parts at once. Remember the prices.

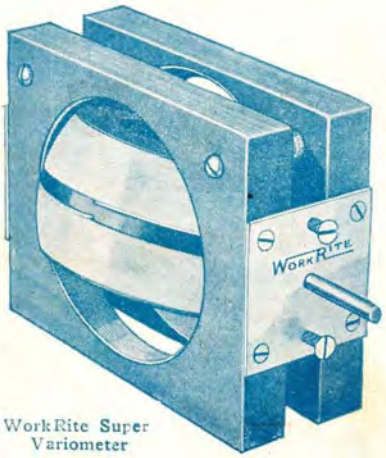
WorkRite Super Variometer, each.....$3.50
WorkRite 180° Super Variocoupler, each.....$3.50

Faith in You

is what caused us to make this big reduction in prices. In order to maintain it we must increase our sales largely. We must sell 10 instruments where we previously sold one. But we know that you will justify us in this faith.



WorkRite 180°. Super-Variocoupler



WorkRite Super Variometer

Concertola, Sr.

WorkRite Concertolas

These Loud Speakers are becoming more popular every day. And no wonder when you consider that they have no metal except in the phone units and therefore do away with that "tin-panny" tone entirely.

READ WHAT ONE OF THE THOUSANDS OF CONCERTOLA FANS WRITES US:

Regarding the WorkRite Concertola received some time ago, I wish to advise that it is the best $12.00 worth I have ever bought. Stations in the following cities have all come in very QSA, even on warm nights, with the Concertola: St. Louis, Louisville, Pittsburgh, Detroit, Schenectady, Dallas, Texas, Fort Worth, Texas, Atlanta, Ga., Havana, Cuba, Charlotte, N. C., Chicago, Cleveland and many others. These stations can be heard all over the room with ease on warm nights, and all over the house on colder nights. With every good word for the Concertola, I am, EARL E. DAESCH,

1103 Columbia Terrace, Parkersburg, W. Va.

Complete List of WorkRite Products

Three Day Trial! If after you have tried the Concertola on your set you find that it does not work satisfactorily return it and we will refund your money.

These instruments are designed for use with vacuum tube sets having two-stage amplification.

WorkRite Concertola, Jr., with Cord and Phone Unit.....$12.00

WorkRite Concertola, Sr., with Cord and Phone Unit.....$24.00

WorkRite Super Variometer. Very sensitive and sharp to tune. Price $3.50

WorkRite 180° Super Variocoupler. Range 180 to 800 meters. Price $3.50

WorkRite Concert Headset. Try a WorkRite side by side with any on the market. Price.....$8.50

WorkRite E-Z-Tune Dial. Has a grip on the rim where you can grasp it for fine adjustments. Price 75c

WorkRite Super Vernier Rheostat. Has 50,000 possible adjustments. Price $1.50

WorkRite Type "A" Hydrometer. You need one to keep your "A" Battery in condition. Price.....75c

WorkRite Concertolas. Loud Speakers of Quality.

WorkRite Concertola, Jr.....$12.00
WorkRite Concertola, Sr.....$24.00

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