

Radio Digest

EVERY WEEK

Illustrated

TEN CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. VII

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R. D. P. Co. Inc.

SATURDAY, OCTOBER 27, 1923

No. 3

CHARLIE CHAPLIN "ACTS"



BOSTON FIRST USER OF RADIO FIREBOAT

HARBOR PATROL DIRECTED BY HEADQUARTERS SET

Danger of Flames Spreading Is Averted by Use of Airphones in Chief's Office

BOSTON.—This city is distinguished by being the first in the world to realize the advantages of Radio in handling harbor patrol. Complete radio transmitting and receiving sets are being installed at fire headquarters and on each of the three fireboats which operate in the harbor and rivers.

The work is under the supervision of J. E. Callahan, a Boston Radio engineer. Heretofore, when it was necessary to communicate with a fireboat the message was telephoned to the nearest point and then relayed by messenger. If the fire was wide in area, messenger service was inadequate.

With Radio-equipped fireboats, the problem is simplified. If all three boats are fighting a fire in a certain locality when another breaks out fire headquarters could dispatch one boat to the other fire. The fireboats can keep headquarters informed as to the developments of a fire by means of their transmitting sets. The equipment includes loud speakers.

Congratulate WHAZ on Birthday

TROY, N. Y.—Among the thousands of congratulatory messages received on the first anniversary of Station WHAZ, the Rensselaer Polytechnic Institute here, was a cartoon from Owen S. Young, Germantown, Pa.

COMEDY KING AFRAID WHEN FIRST ON AIR

Famous Film Actor...
Imitate...
Quails before Microphone...
Takes Message to Thousands but Recovers Confidence

NEWARK, N. J.—Some one long ago said something to the effect that if he could write the songs of a nation he would not care who wrote its laws. And someone said about as long ago something about contributing to the gaiety of nations, in that way keeping them from killing each other.

Some time ago a slender, dapper young man returned to the slums of London in which he was born. He was received in a way that would have caused even the most adroit, the most astute of diplomats to envy. That young man has not as yet written the songs of a nation, although there are many who say he is talented
(Continued on page 5)

Fire Truck Sounds Funeral March for Dallas' Chief

DALLAS, TEX.—Perhaps for the first time Chopin's funeral march was played from a fire truck by Radio recently when a gallant fireman of the local department was buried. A musician at Central station played the famous funeral hymn which was then broadcast over WFAA here. An instrument on the fire vehicle received the broadcast and reproduced it by loud speaker.

Alice Brady (above), stage and screen star, used WMAQ recently to tell why people go to the theater. At the right is wee Leslie Young, mascot of the "Clinging Vine" company, who sang at the same Chicago station



Mabel White, ingenue of the musical comedy "Dew Drop In," broadcasts her songs at WIP and WDAR, Philadelphia

POWER LEAKS CAUSE OHIO "DEAD SPOTS"

CLEVELAND.—Radio operators have discovered a "dead" spot in the air between Norwalk and Cleveland, Ohio. To connect the two cities by air operators say they must transmit hundreds of miles in a roundabout manner. The theory is that the electricity given off by the power houses at Beach Park and Elyria cause the trouble.

Declares Atlanta's Best Advertisement Is WSB

City Official Finds Station Draws Locality into Spotlight

ATLANTA, GA.—"WSB, the station of the Atlanta Journal, is the finest advertisement the city has," declares Willis A. Sutton, local superintendent of schools, who made an extensive tour of the West and East during the summer.

"Wherever I went," the superintendent said, "everyone knew about WSB."

WEIGHTY AIR RIGHTS CASE BEFORE COURT

MAY SUBPOENA HOOVER IN BERGMAN SUIT

Suit to Enjoin Dwight, Ill., Amateur Important to Transmitters and Broadcast Listeners

CHICAGO.—Not only are the rights to the air of every DX amateur in the United States involved in the suit for injunction filed recently by a rich man against the son of a plasterer in Dwight, Ill., near here, but, it is said, the rights of the owners of receiving sets everywhere in this country. The case went to trial a few days ago in Pontiac, Ill.

So important are the questions involved in the legal action that the attorney for the defense may, if necessary, bring to the witness stand Secretary of Commerce Herbert Hoover, others of the president's cabinet and high army and navy officers. The case may be carried to the United States Supreme Court. It involves jurisdiction of the federal government as vested in the interstate commerce commission and a decision of the court itself. Congress itself may be asked to review the situation.

Seeks to Restrain Amateur

All this because Edward McWilliams of Dwight complains of and seeks relief in the courts from what he calls the noisy interference of the amateur station ICA, built, owned and operated by G. W. Bergman, eighteen years old. Opinion for and against the principles in the suit have made of Dwight a town divided. And the cleft may spread until certain powers of the government itself may hover on the brink.

When McWilliams wanted to hear a program for which he had waited several days, Bergman's station, according to McWilliams, would break into the air with "unseemly and irritating sounds," thus marring the peace, quiet and comfort to which McWilliams and his household had

accustomed themselves. The Bergman transmitter has been heard, it is said, as far away as the Pacific coast. Its signals are received almost every night on the Atlantic coast. But that doesn't alter the plight in which McWilliams' set, which it is reported cost \$500, finds itself when 9CA goes on the air.

Denies McWilliams' Allegations

The primary object of McWilliams' suit against Bergman, who is a district superintendent of the American Radio Relay League, is to obtain an injunction based on what the plaintiff alleges is Bergman's unlawful interference with McWilliams' set. Through the attorney, Irving Herriott, of Chicago, retained by the A. R. R. L., Bergman denies that he is interfering with McWilliams and denies, too, that he is violating the Radio regulations of the government and the league. Bergman also denies McWilliams' contention that 9CA, "a station of great power operated not for profit," interferes, too, with all other receiving sets in Dwight.

Chief among the legal points of the defense is that the courts of the State of Illinois have no jurisdiction in the case, that the question of regulation or specifically whether Bergman interferes with McWilliams is a national rather than a state issue, that according to the United States Supreme Court any action once within the purview or determined by agencies of the government remains within federal jurisdiction.

One of the most important questions to be raised during the trial of the suit is whether Congress has the right to regulate Radio amateurs. The defense will proceed along the line that state regulations as to Radio conflict with national and that the latter must supersede.

WASHINGTON.—Radiotelegraph bulletins giving hurricane warnings in the Caribbean sea and the gulf of Mexico have been supplemented by Radiophone broadcasts through the San Juan Station, WKAQ, of Porto Rico.

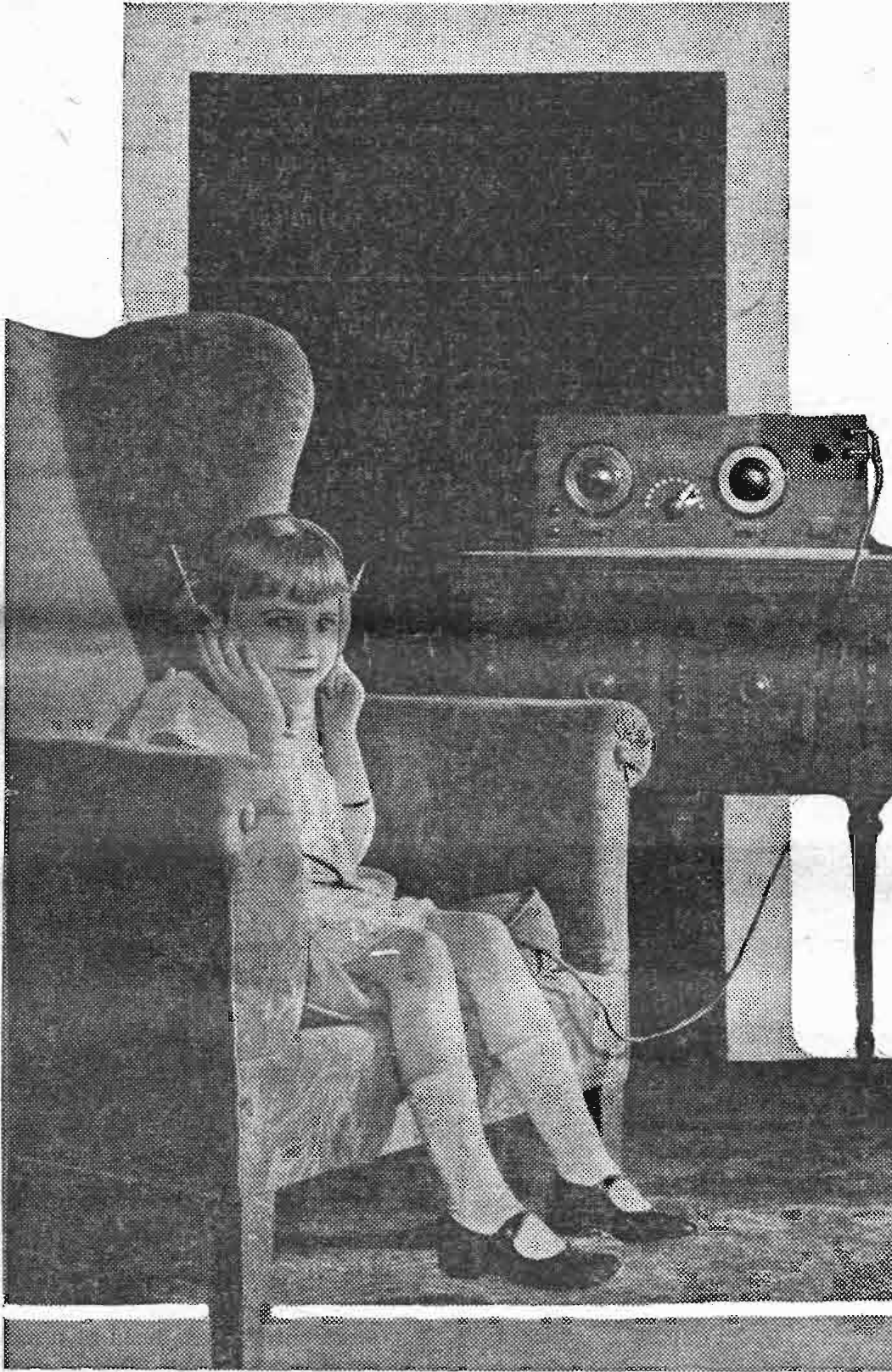
RADIO FINDS RUM ON FORMER GOULD BOAT

NEW YORK.—The seventy-one-foot motorboat Atlanta, once owned by the late George J. Gould, was caught by Radio recently while attempting to run rum in the East River channel here. A police tug, launch and harbor station, all Radio equipped, flashed messages back and forth, reconnoitering until the Atlanta was cornered. Police officials found 386 cases of whiskey aboard.

GUINEA HENS NOISY WHEN STATIC'S BAD

SHREVEPORT, LA.—An 82-year-old farmer near here predicts Radio reception for the evening by the manner in which his guinea hens go to roost! The formula used by the octogenarian is: When the guinea hens go to roost making a lot of noise, atmospheric conditions will interfere with listening in, but if they go quietly to roost, there is to be a fine Radio evening.

LOTS OF GOODIES ON THE AIR



Little Marie Field, whose father could buy several islands, likes her single tube set best of all her playthings because she can listen to bedtime stories every evening

Mother Christian Science Church Service Put on Air

BOSTON.—For the first time in the history of either Christian Science or Radio, services of the Mother Church of Christian Science in Boston were broadcast by radiophone from Station WNAC here recently. The entire service of the

First Church of Christ, Scientist, known as the Mother Church, the first founded and built by Mary Baker Eddy, was sent out by WNAC, including the hymns, Scripture readings, responses and Christian Science readings.

An audion that works on a dry cell can be used in the same circuit that the audions requiring storage batteries can.

RADIO GIVES 'DOPE' CLEW; TWO SIEZED

U. S. AGENTS RAID SHIP'S WIRELESS ROOM

Secret Code Repeated Regularly from Same Position at Sea Arouses Suspicion

By B. A. Sullivan

NEW ORLEANS.—Federal agents and police rushed the Radio room of the steamship Emergency Aid this week, and arrested the operator and a supposed narcotic peddler on the charge of participating in an international drug smuggling plot. The men are said to have admitted their guilt.

The Emergency Aid is in the New Orleans-Germany trade. Federal agents say they knew for some time narcotics were being smuggled into this port from Germany, but it was not until they arrested a man who gave his name as Herman Bruegermann of Ft. Worth, Texas, said to be a confessed drug peddler, that a clue to mysterious Radio code messages was disclosed.

Flashed from Sea in Secret Code

These messages, it is said, were flashed from approximately the same position at sea for several months. The repetition of these messages with such regularity aroused the suspicions of the Department of Justice, whose operatives have been puzzled over the secret code for months.

The agents, through a process of elimination, cut down the three possibilities of smuggling—undesirable aliens, rum and narcotics—to the supposition that the code referred only to narcotics, and to the date upon which the vessel carrying the drug was expected to reach port.

Get Data on Fourteen Ships

It is said the agents found information on Bruegermann which cleared the mystery. They declined to say whether the papers revealed the key of the secret code. The magnitude of the gang's operations was disclosed, it is said, by the finding of papers which referred to fourteen other ships besides the Emergency Aid, which supposed conspirators were bringing in narcotics from Germany.

With this information in their possession, federal agents and city police stormed the Radio room. Earl Ferguson, Radio operator, was arrested, authorities say, as he was in the act of handing over a large quantity of morphine to Bruegermann. Bruegermann was induced to carry out the pre-arranged plan of accepting the narcotics from the unsuspecting operator.

Both were taken before United States Commissioner Carter and held under heavy bonds to await action of the federal grand jury.

15,000-MILE STATION FOR PACIFIC HARBOR

To Serve Coastal Shipping Southward from Los Angeles

LOS ANGELES.—Work of construction was recently commenced on a new Radio station by the Radio Corporation of America, at Wilmington, Calif., which is the inner part of Los Angeles harbor. According to present announcements, when completed in about three months, the plant will be of such power as to be able to both send Radio messages and receive a distance of 15,000 miles.

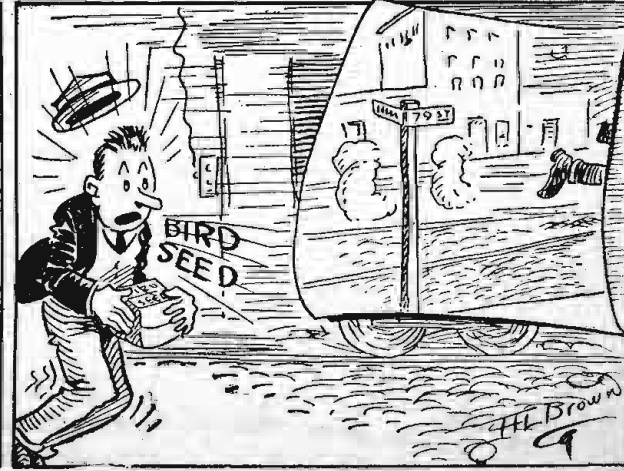
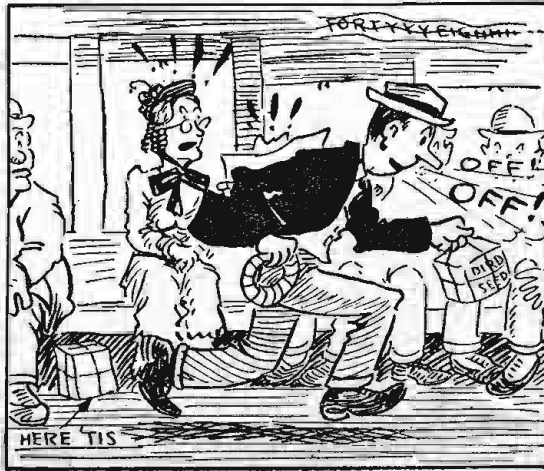
Reliable Radio service to and from Darien, Canal Zone, will be one of the special features of the new station, which will especially appeal to shipping men, and which will also serve to check better the progress of ships and their arrivals in the interoceanic trade.

A special Radiophone transmitting set of increased capacity will be installed by the same company in anticipation of arrangements with the telephone companies whereby a ship called by Radiophone at sea can talk direct with her principals in Los Angeles by connection to land wires at waterfront station.

THE ANTENNA BROTHERS

Spir L. and Lew P.

All He Needs Is the Bird



"LOST" VOICE STILL PLEASES THOUSANDS

FORMER MINSTREL RIDDLE TO ARMY OF LISTENERS

Will Collins, Accompanied by Bernice Raeburn, Broadcasts Songs from WCX by Cooing Them

By Fred J. Huntley

DETROIT.—During the last six or more months thousands of Radio enthusiasts have been delighted by the Red Apple Club which puts on a program of popular music and "stunts" every Tuesday night between 10 o'clock and midnight at Station WCX, the Detroit Free Press. They have heard the "Chief" announce that "Will Collins will now entertain you, with Bernice Raeburn at the piano." Then they have settled back for a musical treat.

It is only at irregular intervals that the "chief" is able to announce Will Collins and Bernice Raeburn; they are not always in Detroit.

Who They Are

"Who is Will Collins?" and "Who is Bernice Raeburn?" are frequent questions.

Well, Will Collins formerly was a minstrel. He has "cracked" more jokes and sung more songs on the stage than most present-day entertainers. One day, two or three years ago, he suddenly lost the full use of his voice. His days of entertaining were at an end.

Collins' Loss the Public's Gain

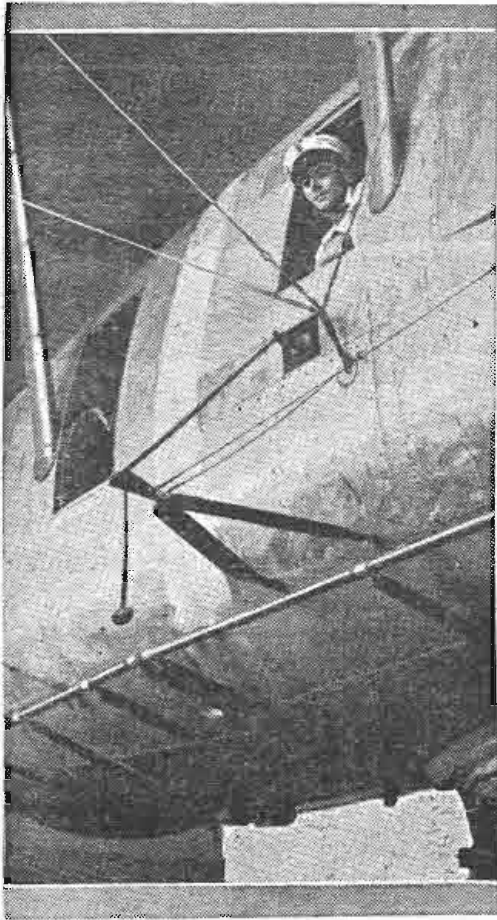
Did he despair? No. He's too big a man for that. He turned his talent to composing. The world since has been enriched by such delightful music as "Falling," "After Midnight," "You Are Easy to Remember," and other hits.

But how can he sing, as he does over the Radio, if he has lost the full volume of his voice?

One should see Will Collins as he sings at Station WCX to appreciate his work. Collins places his lips within two inches of the microphone and the Radio waves do the rest. The "chief" says Collins "coos" his ballads which are broadcast with as much power and purity as if he were singing.

Collins says that wherever he is introduced into musical circles he will hear, "Oh, yes, I know; you sing for the Red Apple Club." And Will is proud to reply—"Yes, that's right."

ZR-1 HAS ITS AERIAL BELOW GONDOLA CAR



No overhead antenna for the new "greyhound of the air." The aerial is dropped from the gondola with the aid of an outrigger on the side and trails below the big bag for a hundred feet or more. John T. Robertson, Radio operator of the ZR-1, in the porthole, is commencing to let it out. K. & H. Photo

Who is Bernice Raeburn? Well, Miss Raeburn is a charming young Detroit woman, a proficient pianiste. She, too, travels about the country entertaining many people.

The "chief"? He is none other than C. D. Tomy, prominent in newspaper circles, director of WCX since Detroit Free Press opened the station about three years ago. It was he who originated the Red Apple club.

145,000 SETS SEEN ON FARMS IN U. S.

Federal Agricultural Survey Shows Average of 51 to Each County

WASHINGTON, D. C.—The alacrity with which farmers have taken up Radio is shown in a recent survey made by the United States Department of Agriculture which shows that there are approximately 40,000 Radio sets on farms in 780 counties. This is an average of 51 sets to a county. Applying the average to 2,850 agricultural counties as total, it is estimated that there are more than 145,000 sets on farms throughout the country.

The county agents' estimates cover every state. In New York it is estimated that in 37 agricultural counties there are 5,502 sets on farms. The agent for Saratoga county, New York, reported 2,500 sets. In 51 counties in Texas there are 3,085 sets. Forty-three counties in Illinois show 2,814 sets; 26 counties in Mis-

souri, 2,861 sets; 42 counties in Ohio, 2,620 sets; 40 counties in Iowa, 2,463 sets, and 26 counties in Kansas, 2,054 sets. New Jersey, Pennsylvania, Michigan, and Minnesota have 1,000 to 2,000 sets each.

Federal weather forecasts, crop reports, and market quotations are now broadcast from 150 Radio stations throughout the country. Special agricultural news in the form of so-called "Agriograms" and talks as to various phases of the work of the Department of Agriculture are also sent out regularly from 250 stations.

Broadcast State Ballroom Syncopation by Direct Wire

BOSTON.—Broadcasting of dance music direct from the State ballroom of this city is the latest edition of talent booked at WNAC, the Shepard Stores here. Listeners in can now get music direct from a public ballroom and fancy themselves on the floor with the other merrymakers, "tripping the light fantastic." A special telephone line from the ballroom, about two miles away, connects with the operating room of WNAC, and this will be a regular weekly feature of the program.

The New Grebe Broadcast Receiver

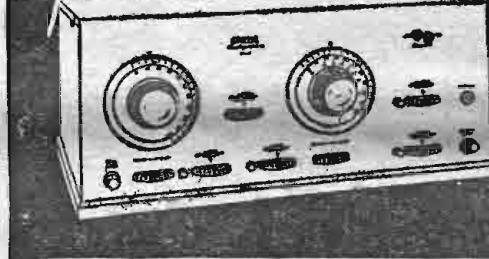


Mr. Abrahamson, of Detroit Elec. Co., writes on July 7:—"Last night, with the Grebe Broadcast Receiver, we tuned in the following stations: N. Y. City, Schenectady, Chicago and Omaha. In spite of high temperature and heavy atmosphere, reception was exceptionally clear, using only 20-foot indoor wire. Unable to receive any results at all on other sets during the same time."

Licensed Under Armstrong U.S. Pat. No. 1,113,149

Ask Your Dealer

A. H. GREBE & CO., Inc. Richmond Hill, N.Y.



THE AUDIOPHONE

Quality of reproduction such as only the original itself can equal. Speech that is so distinct that the voice heard is the actual voice of the speaker. Music that requires no tolerant imagination to be recognized as music of the finest type.



Bristol's Single Stage Power Amplifier



gives additional VOLUME with any two stage amplifier. No separate batteries required. It provides the additional volume necessary to bring in very distant stations on the loud speaker.

Write for bulletin and address of the nearest dealer handling our instruments

THE BRISTOL COMPANY

WATERBURY, CONN.

Boston New York Philadelphia Pittsburgh Detroit Chicago St. Louis San Francisco

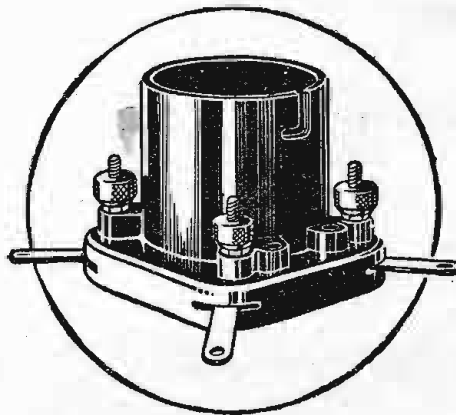
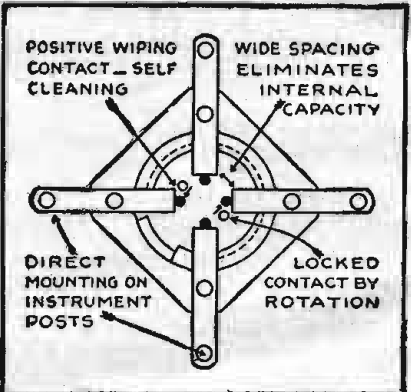
GENUINE—

E. T. Flewelling Sockets

Can You Incorporate Any More Desirable Features In A Socket?

Mr. E. T. Flewelling's years of experience in Radio development work showed the need of a really good socket that would work satisfactorily in Radio Frequency and his well known Super Circuits.

Socket contacts have the same action as plates of a condenser. If they are brought close together they act as condensers and have a detrimental effect on the action of the set.



Standard Tube Socket \$1.00. At your dealer or, until he is supplied, post paid upon receipt of price.

But in the Flewelling socket the contacts are spaced from 5 to 10 times as far apart as in the usual socket and there is no condenser effect. This socket is the maximum in mechanical and electrical efficiency.

E. T. Flewelling says:

"A Radio Frequency Circuit that does what it should do is a rare thing. Most of these circuits suffer because we are not able to eliminate feedback action due to stray parasitic capacity effects. Every effort should be made to keep these effects at a minimum."

BUELL MANUFACTURING COMPANY

2977 Cottage Grove Avenue CHICAGO

FORTY ENGINEERS IN GIGANTIC NAVY LAB

EXPERIMENT ON DEVICES FOR SEA COMBAT

Radio Research Now Prime Aim of Workers in Extensive Quarters at Capital

By L. M. Lamm

WASHINGTON, D. C.—Amateur Radio enthusiasts are likely to reap considerable benefit from experiments which are now being carried on by forty first-class radio engineers working for the navy department and just assigned to the new navy research laboratory constructed by the Government at a cost of approximately \$1,500,000.

The new laboratory, which is located at Bellevue, D. C., in the outskirts of the city, is being devoted almost entirely at this time to Radio research, but eventually it will be devoted to experiments of all kinds by the navy department. Radio, however, will continue to be one of the main subjects studied.

The navy department in opening up the new laboratory has decided to center all of its Radio experiments here and therefore the navy Radio section at the Bureau of Standards, the naval aircraft Radio section and the naval Radio design section, have all been transferred to the new laboratory.

Laboratory Has Five Buildings

Captain E. L. Bennett, U. S. N., is the Director of the Laboratory; while Commander E. G. Oberland, U. S. N., is the Resident Director; and Dr. A. H. Taylor, is in direct charge of the Radio section, having working under him about forty Radio engineers.

The laboratory consists of five buildings, including the laboratory proper, a machine shop for models, a foundry and a pattern shop, and a power house. The buildings have been under construction for two years and have just been opened for work.

The engineers are working out many problems about which the departmental officials do not care to talk for publication, but they affect new Radio apparatus for the use of the fighting ships, the increasing of the selectivity of receivers, the production of directional receiving apparatus, the elimination of static and

JACKIE MEETS MIKE; SAYS HELLO TO FANS



Jackie Coogan, famous juvenile motion picture star who warms the cockles of the hearts of many grown-ups, is here pictured as he was first introduced to "Mike" (the broadcasting microphone). After the formal introduction, Jackie made a very manly little speech to his audience of movie-Radiophans

other similar problems. While these matters of course are primarily for the navy, any discoveries that are made (and some must be made where forty men are working day in and day out on a subject) will eventually be made public.

Edison Responsible for Laboratory

Thomas A. Edison, as chairman of the naval consulting board during the war, suggested the advantages of such a laboratory and it was his insistence, in its early stages at least, that led Congress to appropriate the money for the labora-

CHALLENGE SUPPORTS LIST'S CORRECTNESS

ONE DOLLAR will be paid to every Radiophan reader of Radio Digest submitting the most errors in any one station's listing in the Directory of Radiophone Stations, which appears in four parts, serially continuously, on page 23. Letters must reach Radio Digest's office not later than one week from date of issue corrected. Readers are not limited to correcting one station. Turn in corrections for as many stations as you can find—if you can find errors! Use separate sheet of paper for each station submitted and place name and address on each sheet.

tory. The navy experts are not disposed to discuss the machinery in the buildings but they are insistent in saying that every thing is of the latest design and right up to the minute in completeness.

Air Signals for Astronomer

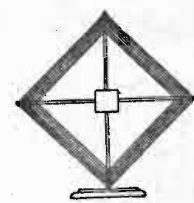
WASHINGTON.—Another series of time signals is being arranged for the benefit of the Australian Government astronomer, to be transmitted twice daily from Honolulu. These signals will last for a period of three months beginning November 1, 1923.

Australia Plans to Erect Sydney-to-London Station

SYDNEY, AUSTRALIA.—E. T. Fisk, director of the Amalgamated Wireless Company of Australia, who recently returned from Great Britain, has announced before the Sydney branch of the Colonial Institute that next year a high-power Radio station at Sydney would connect with London at two-thirds of the present cable rates.

This station would be in constant touch with important centers throughout the commonwealth.

GENUINE RITTER LOOP



The first portable \$1 loop on the market (equal to the best) sold at this extremely low price. Wonderful results. Set up in a few minutes. Everything complete. Endorsed and approved by Radio News, Popular Radio, N. Y. Mail, Sun and Globe and others. Over 200,000 sold in the past 6 months.

There's a reason!

RITTER RADIO CORPORATION
230 Canal St. New York
Dealers write for exclusive territory proposition



\$250

Coto Special Audio Transformer

Real Coto Quality at a Popular Price

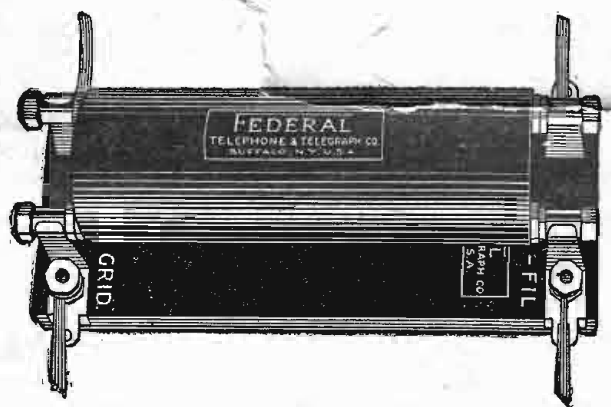
DEALERS!

HAVE your jobbers let you in on this big seller? If not, write us, giving jobber's name.

A marvel of manufacturing economy. In finish, high grade materials and amplifying efficiency, actually superior to many transformers selling at \$5 and over. Ask your dealer to show COTO SPECIAL. If he fails you, send us his name and we will see that he is supplied.

COTO-COIL CO., 87 Willard Ave., Providence, R. I.

Pacific Coast Branch: 329 Union League Building, Los Angeles
Northwestern Branch: Geo. F. Darling, 705 Plymouth Bldg., Minneapolis
Southeastern Branch: C. P. Atkinson, Atlanta Trust Co. Bldg., Atlanta



You Can Cover a Tremendous Range of Wave-Lengths with Federal R.F. Transformers

WITH one mounting, you can use any one of four Federal R.F. Transformers covering any wave-length from 175 to 3000. Contacts are made through spring clips, and the transformers can be changed in a few seconds.

Highest grade of materials, and painstaking care in assembly assure efficient amplification of incoming signals without distortion.

130 Federal Standard Radio parts offer the radio enthusiast a complete line of guaranteed parts of one quality—the best.



Federal Radio Equipment

Federal Telephone and Telegraph Company

Factory: Buffalo, N. Y.

Boston New York Philadelphia Chicago
San Francisco Pittsburgh
Bridgeburg, Canada London, England

New Thrills from Radio

—outdistance your friends!

Defeat interference, abolish foreign noises, annihilate distance—bring in distant and nearby stations with volume and tone-quality that mean real thrills and make your friends envious. Use



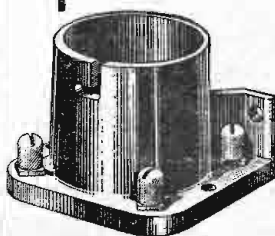
ALL-AMERICAN AMPLIFYING TRANSFORMERS

for Audio or Radio Frequency

Largest selling transformers in the world. More than a quarter million in service. Standard equipment on the better sets. Suitable for all circuits.

All Better Dealers Sell "All-American"

RAULAND MFG. CO.
200 N. Jefferson St., CHICAGO
Pioneers in the Industry



"All-American" Bakelite Tube Socket-base or panel mounting 75c



"All-American" Audio Frequency Transformer come in three ratios.

Special Offer!
We will gladly mail the "All-American" Book of Tested Radio Hook-ups—on receipt of 2 cents to cover postage.

CHARLIE ERBSTEIN AND TWO OF HIS ARTISTS



The noted Chicago lawyer at his broadcasting station, WTAS, near Elgin, Ill. He is here seen adjusting his aerial. The ladies are two of his staff artists; Miss Edna Bodine, dramatic soprano (below) and Miss Catherine Stebbins, pianist. (at right) © U. & U.



LAKE ERIE SPLASH IS WJAX MYSTERY

Cleveland Station Puts Slogan Sound on Air—Listeners Wonder How

CLEVELAND.—Have you heard "The Wave from Lake Erie"—have you heard the water sloshing around the rocks on the shore and breaking into a mist of spray? Hundreds of Radiophans have written to WJAX, the broadcasting station of the Union Trust Company, at Cleveland, Ohio, to praise the wonderful realism with which the station has vivified its unique slogan.

One gentleman wrote from New Orleans that he can picture a twelve-pound "muskie" in the swirling water, and a prominent business man of New York City wants to settle a bet by knowing if a microphone is placed on the shore of the lake to catch the sound. A writer from Minnesota states that the effect is perfect and that he should know, as there are 400 lakes within a twenty-mile radius of his home. Hundreds of letters have been received, praising the fidelity of the sound.

E. G. Johnson, announcer for WJAX, originated and developed the idea and, when questioned as to the method of accomplishment, smiled graciously and said something to the effect that "the possibilities of Radio were unlimited." So the mystery is as deep as ever.

Licensed Operator Hired for Part in Arliss Play

NEW YORK.—A duly licensed, union Radio operator was put on the payroll of the Capitol Theater here recently, when George Arliss in "The Green Goddess" was presented. This bit of realism behind the scenes was synchronized with certain Radio messages used on the screen. Two of the most thrilling sequences in the picture are the sending of a decoy message by the scheming Rajah at his private station, and the SOS sent by his helpless prisoners.

CFAC Gives Health Talk

CALGARY, ALTA.—Miss M. Gilvray, Ph.D., Ph.C., physical education specialist, is now telling Radio listeners the best way to keep well. Her talk was broadcast from the station of the Calgary Herald. This is an innovation in broadcasting in Western Canada and has met with public favor.

in almost every province in Canada; its estimated range is 1,000 miles, but its extreme scope is much greater.

The other reason why WTAS is so widely known is Mr. Erbstein, perhaps the most famous divorce attorney in this country. Among his clients have been men and women of international repute, one of such cases now attracting much interest in the public print.

Builds Station for Hobby

When the burdens of the law became too heavy, when whereases and wherefores and hereinbefores and sobeltes were so numerous as to weigh heavily, Erbstein decided to build a Radio station. With that persistence and diligence which had brought him to the fore in his profession, the distinguished attorney perfected arrangements which resulted in the erection of Station WTAS on his private estate.

(Continued on page 8)

Famous Criminal Lawyer Has Broadcast Plant to Fill in Few Leisure Moments

Charles Erbstein's WTAS Station at Elgin, Ill., Receives a Visitor from Jungles of South America Who Says He "Picked Up" Plant Two Nights Running

By J. L. Newman

'Way down in the jungles of South America, maybe it was in Central America (what difference do a few miles make when Radio is concerned?) a few weeks ago a high official of one of the largest fruit companies, a firm which shapes republics, heard, by way of amusement, a real United States' song.

Now, there are many kin of Uncle Sam below the equator; most of them like to sing at times the airs of the cabaret or theater. But the song that the fruit company's chief heard came not from the deep,

dark outside, nor from the humid bungalows nearby, but from a Radio set in his room. The song stirred him so that he determined to see the station when next he returned to God's country.

Visits Villa Olivia

Shortly afterward he walked into Station WTAS, Villa Olivia, Elgin, Ill., and told C. J. Meyers, operator, and Charles E. Erbstein, owner, that he had heard the station during two successive nights at a place 1,700 miles south of New Orleans.

That is one reason why Station WTAS is known in every state in the Union and

The New Grebe Broadcast Receiver

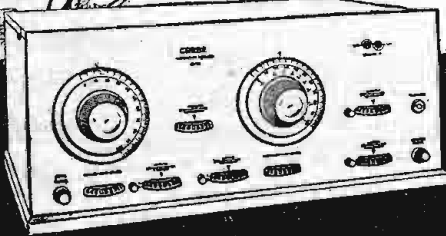


ON THE evenings of August 17th and 18th, in spite of very heavy static, E. W. Patrick, Brookfield, Mo., enjoyed programs from stations at Schenectady, N.Y., Los Angeles, Cal., and Atlanta, Ga., with a Grebe Broadcast Receiver. The only antenna used was the 20-foot indoor wire.

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Write for "Grebe Radio in the Well-Appointed Home."

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RADIOPHANS DECIDE "BATTLE OF MUSIC"

LETTER CARRIERS' BANDS COMPETE ON AIR

Postmen Distribute Million Voting
Blanks to Listeners In for De-
cision on Prize Band

PROVIDENCE, R. I.—Millions of votes by Radiophans will be cast in what was planned to be the biggest nation-wide contest ever held, when the twenty-nine postal bands, who played on a recent night in all the principal cities of the United States, held a Radio concert contest, or "battle of music."

Plans for the contest were made at the convention of the National Letters Carriers' Association, held here recently, when Emory Johnson, the motion picture producer, and the Film Booking Offices of America offered a cash prize of \$500 and a beautiful silver cup to the best postal band in America.

With the agreement to hold the contest, Radio was immediately accepted as the best means of reaching the public, who was to give the decision. In the United States there are twenty-nine large postal bands, from the Atlantic to the Pacific Coast and the plan called for concerts to be held simultaneously all over the country.

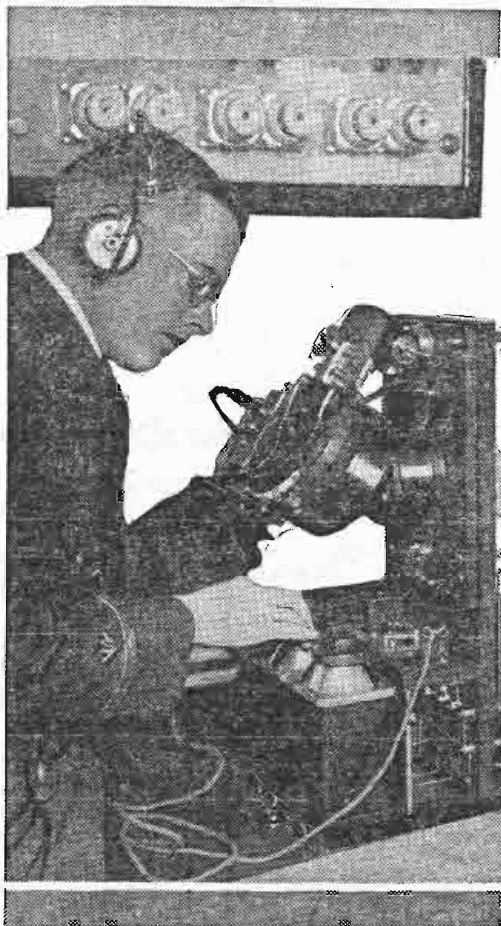
Ballots Distributed to Take Fan Vote

Ballots were printed in the Radio sections of daily newspapers, and 1,500,000 more blanks were distributed by letter carriers to people on their various routes who own receiving sets. The blanks will be the means of deciding the winner. The names of each band and the station from which they broadcast were printed on the ballots so that it was possible to tune in for three or four different bands before the contest finished. As the ballots were sent out several days previous to the concert date, Radiophans had ample advance notice of the event.

The ballots, filled in by those who listened in, are being returned to the carriers, who in turn forward them to the donors of the prizes for counting. Two weeks are allowed from the date of the concert to count the votes, and the winners are to be announced by Radio November 1.

The \$500 cash prize is divided into three,

AMERICAN SHIP HAS GERMAN EQUIPMENT



The U. S. S. Resolute, much in the public eye because she sails under Panama registry in order to remain "wet," has another title to distinction in her "Telefunken" Radio equipment. As one may see, the receiver looks quite different from those familiar to us of the U. S. K. & H. Photo

\$300 for the first prize, together with the silver cup, and \$150 and \$50, second and third prizes respectively.

Whittemore Gets New Job

WASHINGTON, D. C.—L. E. Whittemore, former assistant chief of the Radio section of the Bureau of Standards, has been appointed technical secretary of the interdepartmental Radio advisory committee and from now on will spend all of his time in this work.

The Reader's View

Radio and St. Peter

Just received a copy of Radio Digest at the news stand. I notice in the Questions and Answers, Number 4044, the writer seems to know much more than you.

If he had been as I was more than a year ago with no paper that had the information Radio Digest gives every week and had tried to build his own set without the help you give, he would surely know how to appreciate Radio Digest.

If I were in your place I would be like Saint Peter. A very rich man died and arrived at the pearly gates. He asked for admission. Saint Peter asked Gabriel what he had credited on his book for the man at the gate. After much searching Gabriel found that the rich man had given a dime to the poor. Saint Peter studied a bit and said: "Give him back his dime and let him go to h—l."

I don't think much of the Reinartz circuit. But maybe I think too much of my set to give any other a fair trial. I try nearly every thing that is new.

This letter is for the Question and Answer man who has more patience and Radio knowledge than most of us and should be encouraged.—E. R. U., Princeton, Ind.

Heavy Service Bell Talks

With reference to the article "Talking Transformers," by L. B. Godbey, St. Louis, Mo., I submit the following:

As he so ably explained away the mysteriousness of that case, perhaps he may be able to explain the "why" of a talking electric signal bell in regular use in this office for signaling between this and two adjacent stations about three miles distant on either side.

On several occasions voices have been heard quite distinctly by listening close to the bell; upon removing the receiver from the phone, stations on either side of me were heard conversing.

The bell is for heavy service—coils each 2½ inches by 1¼ inches, gong 5 inches, back frame and removable cover heavy cast-iron at least ¾ inch thick. There is no thin light metallic part that could function as a diaphragm.

This has occurred only at infrequent intervals chiefly, I believe, when storms approached.—F. A. E., Rome, N. Y.

BRITON SEES RADIO LINK ALL EMPIRE

English Postmaster General Paves Way for Air Communication with Colonies

WASHINGTON, D. C.—Recent statements of the British postmaster general indicate that a solution has been found to the problems connected with the establishment of the British empire Radio chain. Not all points connected with the issuance of Radio licenses have been disposed of but it is considered probable that the British government has adopted a policy which will permit private Radio companies to establish high-power stations both in the United Kingdom and in the colonies. The postoffice will proceed with its own plans for a high-power station at Rugby, England.

The companies which have applied for licenses are the Marconi Wireless Telegraph, Limited, and the Eastern Telegraph; the latter is the largest unit in the British cable system. The Marconi company has contracted with the Union of South Africa and the Dominion of Canada for high-power Radio stations designed to communicate directly with England; it is associated with the Amalgamated Wireless which has a similar contract in Australia.

The Eastern Telegraph company is the first cable concern of any size to use Radio transmission as an adjunct to its cable service.

A pleasant signal filling a moderate size room should be enough to give satisfaction. It is not worth while producing signals which deafen the neighbors. It is wasteful to insist on tremendous signals which are generally not pleasant.

Morrison



Loud Speaker

A LOUD Speaker that DOES reproduce with perfect distinction and clarity of tone—that DOES eliminate all harsh vibration and rattle.

Phonograph OR Horn

Morrison attaches to practically any phonograph or horn in a moment. Hundreds of users write enthusiastically of the enjoyment they now get out of radio. For you can adjust from soft, mellow tones to loud, full volume by the turn of a little dial. We positively guarantee Morrison Loud Speaker.

Nickel Plated Model, Complete with 5 ft. cord **\$10.00**

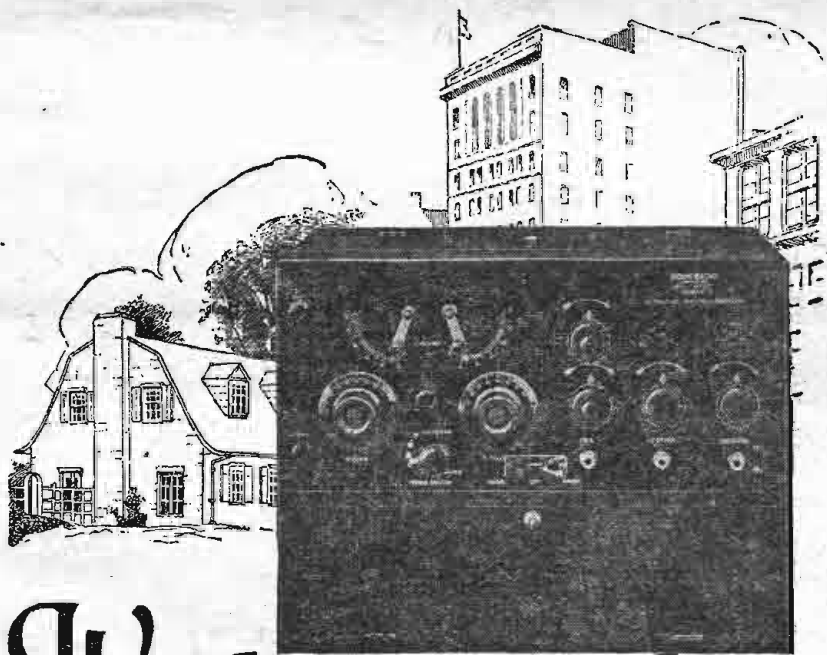
Ask your dealer for demonstration or send order to us direct.

DEALERS

Investigate today—we will show you the wonderful possibilities of Morrison Loud Speaker.

Write for Illustrated Catalog

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Works everywhere -city or country-

Here is a set which brings distortionless speech and music to you no matter where you live. The Moon is operated by simply grounding to a water pipe or radiator—no antenna, loop or indoor wire is necessary.

Stations within a conservative 1,000-mile radius are regularly received with a non-power loud speaker on this set.

It is the ideal set for use in apartments, automobiles, yachts or railroad trains where an antenna is not practical. Extremely sensitive, unusually selective, yet simple to operate.

Write today for our folder
"California or Newark."

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A Laminated Phenolic Condensation Product
SHEETS TUBES RODS
RADIO PANELS
POLISHED BLACK FINISH

CUT PERFECTLY SQUARE
TO ANY SIZE

1/32" THICK	1/2¢	PER SQ. INCH
1/16" THICK	3/4¢	PER SQ. INCH
3/32" THICK	1¢	PER SQ. INCH
1/8" THICK	1 1/2¢	PER SQ. INCH
3/16" THICK	2¢	PER SQ. INCH
1/4" THICK	2 1/2¢	PER SQ. INCH
3/8" THICK	4¢	PER SQ. INCH
1/2" THICK	5 1/4¢	PER SQ. INCH

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RADIOTRON.

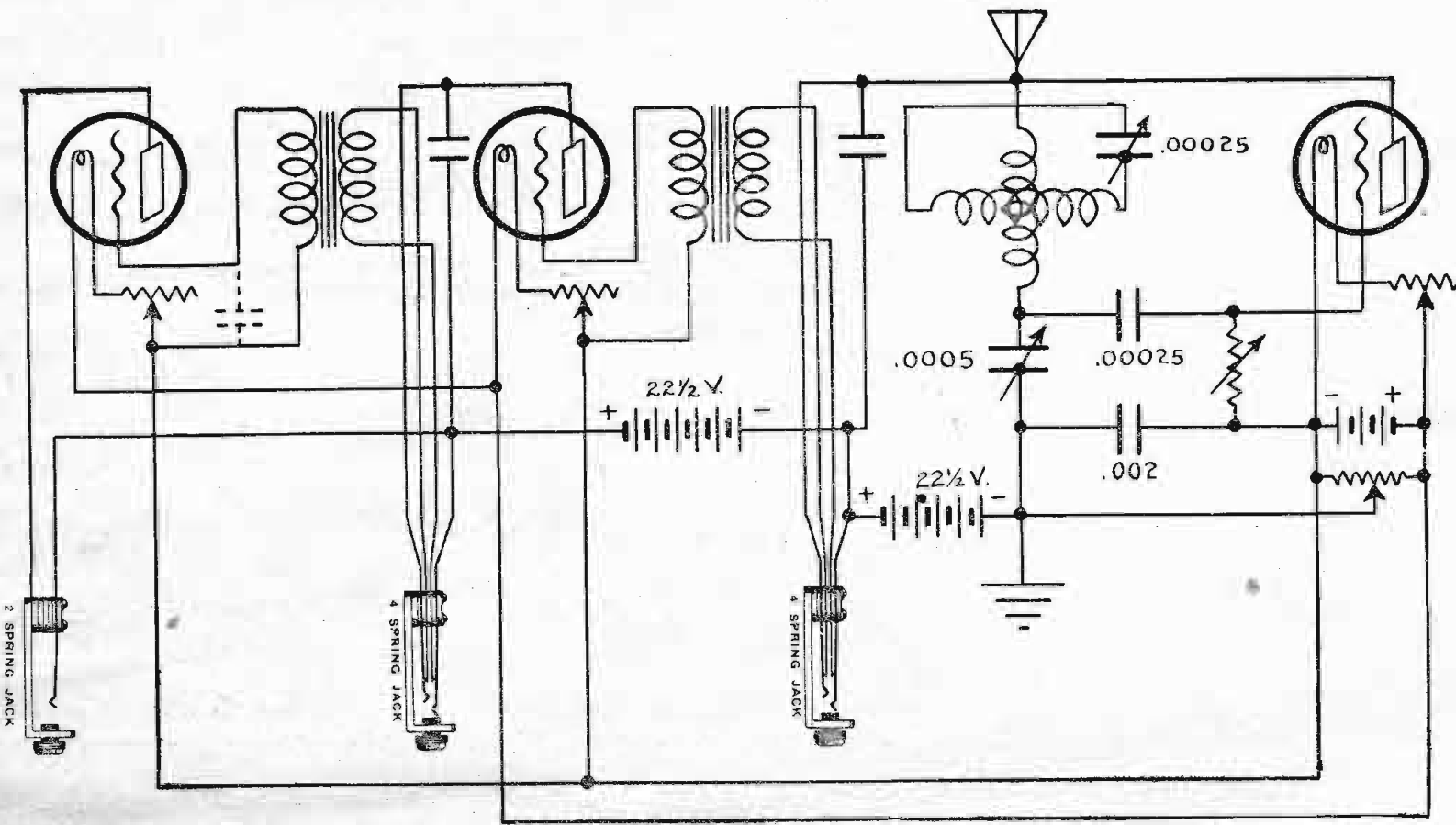
Radiotrons

REG. U. S. PAT. OFF.

Further Details of the Famous Miloplex Hook-Up

Part V—How to Add Audio Frequency Amplification

By the Mystery Man



WHEN is a circuit not a circuit? Answer me that, somebody, and win the fur-lined bathtub, because, didn't six somebodies hardly wait until the ink was dry on last week's Digest before they were in with special delivery letters. Each wondering how in (mustn't say the naughty word, mustn't say the naughty word) I could call the rotor with a condenser shunting it a circuit, and especially so when it had no physical connection with the set?

Asking that question and expecting an answer is just like asking a barber to "gimme a first class haircut," when you haven't got first class hair. 'Pears like as not I'll have to hogtie and double solder it to a ground lead to put it over. But, yes, sir—it's a circuit and you can hear it work—and that's "Raydeo." Some day, methinks, a merchandiser will spring into the limelight by placing a sign in his window reading "Radio Spoken Here." You know what I mean. But, let's start something. Last week an amplifier was promised, a two-tube job I believe; personally I was going to wait a week in order that you might get better acquainted with your choice of the three circuits offered, but it seems many are clamoring for it, so let's go—very well.

Now, read carefully, three circuits have been given you, out of the three you will pick your pet. Naturally, the bearcat of them all is the King III, yet its operation may have some of you perspiring, yes, and sweating too, as Ole says, therefore take your pick for the present, but try the King. Get him (or is it a her) perking for you like a voice amplifier and I think it will be your choice. There are few, if any tricks in amplifying, but there are some mighty dark alleys you better stay shy of. However, as my friend Carl Meyer says, "If you know your stuff" the rest is easy, or as Charlie Tuska says (pardon the familiarity, Charles), "It's

no trick to stop a howl (choke it) if you know how," and I say it's no trick amplifying either of the circuits if you know your stuff.

I should know, I worked nine long months finding out; you surely can stick on the job nine minutes.

"Brownie" has pictured a standard amplifying circuit intentionally leaving out the do-dads I will put in.

Notice that our grid returns (sure, the tail end of the secondary) go to minus

filament, also peek closely and note that the rheostats are connected in the negative A battery lead to filament. Atta boy! Do it just right and don't slip like they

did when the Prodigal Son returned and they killed the fatted calf.

Remember where it says, "they fell on his neck;" surely they didn't wear rubbers in those days.

Keep your panel layout for the amplifier down to the last inch of wire; many a real good Radio set has went sputtering along, just because it was loaded with

(Continued on page 14)

Special for October

Rametra CORPORATION

Fada

Complete markdown parts for the 5 tube Fada Neutrodyne Receiver including drilled engraved Bakelite Panel and Base Board..... **\$65**
Absolutely guaranteed on our money back basis.

AMPERITE—Automatic Filament Control.
Unmounted \$.70. Mounted **\$1.10**

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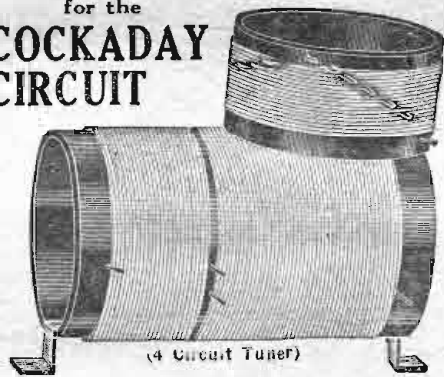
We personally consider both these variometers and couplers to be the best on the market.

Our stock consists of a most complete line of all standard radio apparatus. Just let us know what you want and we will ship it to you immediately at regular manufacturers' prices.

All shipments made immediately on receipt of purchase price.

RADIO & MECHANICAL TRADING CORP.
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EASTERN COIL SETS for the COCKADAY CIRCUIT



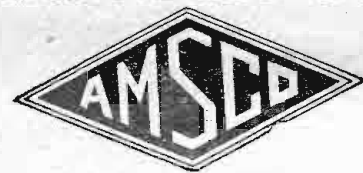
are now a standard, and in universal use, due to their efficiency in this wonder circuit. Made as per specifications of Mr. Cockaday, using No. 18 wire with D coil bank-wound.

Complete Assembled Set of B, C and D Coils..... **\$2.75**

Hook-up directions and material list furnished free with each set of coils.

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You Must Use



RHEOSTATS

to get the best possible results from your set—no matter what type it is. They guarantee noticeable improvement in the reception obtained.

6 Ohms.....	\$1.00
20 Ohms.....	1.25
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25c extra with dial	

Suitable for either table or panel mounting. Condensite base, high grade resistance unit, attractive knob. Adjustable shaft to any thickness of panel.

At all good dealers—or direct on receipt of purchase price. Also write for our complete literature.

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WE REPAIR YOUR VACUUM TUBES

WD-11-12, UV-199, UV-201-A	
C-201-A	\$3.50 each
UV-200, C-300.....	2.75 each
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All Work Fully Guaranteed

Quick Service—Repaired Tubes shipped C. O. D. unless accompanied by remittance plus postage.

NEW TUBES

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Simply because to hear the Mu-Rad is to buy it! One of Chicago's largest radio stores sells the Mu-Rad entirely by demonstration. Their records show that 8 out of 10 demonstrations result in a sale! That's profitable business!

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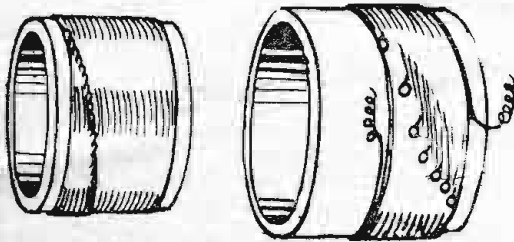
Chapter IV, Part I—Inductances—Fixed and Variable

By M. W. Thompson

THE following article is the fifth of a series for Radio beginners, written by Marvin W. Thompson, well known in air-phone circles for his understandable style of approaching his subject, and his ability as a Radio engineer. Mr. Thompson is now an associate editor on the staff of Radio Digest. A preliminary outline of the Chapters to follow is:

- Chapter V—Condensers—Fixed and Variable.
- Chapter VI—Vacuum Tubes.
- Chapter VII—Antennas and Grounds.
- Chapter VIII—Regeneration.
- Chapter IX—Audio Frequency Amplification.
- Chapter X—Loud Speakers.

WHEN considering inductances we must, first of all, divide them into two groups—those used in circuits in which the current alternates or oscil-



Figures 15 and 16—Bank-wound inductance, showing how turns overlap, and single-layer inductance tapped and wound on solid tube

lates at Radio frequencies, and those in which the current varies at audible frequencies. Taking up the coils used to handle Radio frequencies, we must again subdivide and consider these inductances as those used to provide inductance in a circuit and those used to transfer energy from one circuit to another.

The end toward which all manufacturers of coils are striving is to produce a unit that will provide the greatest inductance in the smallest possible space. At first thought this sounds very simple—merely use fine wire, a small core and wind the wire compactly—but there are several factors which make this method impossible. Opposing the passage of Radio frequency currents through a coil of wire is the element known as "effective Radio frequency resistance."

Skin Effect

This element is made up of the ohmic resistance of the wire and the "distributed capacity" of the coil. Every piece of wire offers ohmic resistance to the passage of a simple direct current; if alternating current passes through it, the resistance increases as the frequency is raised due to "skin effect," a term used to indicate

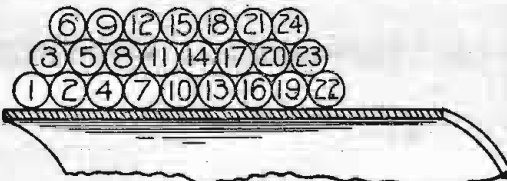


Figure 17—Correct or bank-wound method of making inductances

the fact that the current travels on or near the outside surface of the wire. Since at very high Radio frequencies the current utilizes only a small fraction of the total cross-sectional area of the wire and disregards the center, it is equivalent to having a wire of small diameter. Because

the Radio frequency current will travel only near the circumference, as great a circumference as possible should be provided to keep down resistance. To provide more surface or "skin," braided or stranded wire is frequently used and in labora-

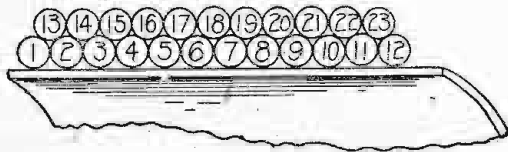


Figure 18—Incorrect method of winding inductances of more than one layer

tory apparatus a type of wire called "litzendraht" is employed. Litzendraht is made up of many fine individually insulated wires twisted into a cable. At wave lengths between 150 and 600 meters, however, the difference in efficiency between a coil wound with solid wire and one wound with "litz" is so small that the average experimenter may disregard it and use solid wire on his inductances.

Distributed Capacity

We come now to "distributed capacity," which is the second detrimental factor to be reduced to a minimum. When winding a coil it is intended that the currents travel in at one end, follow the wire around and around the coil, and out at the opposite end. Could a coil be made in which the high frequency current would do this, many problems would be solved. As stated in a previous chapter, any two



Figure 19—Bank-wound coil divided into sections

conductive surfaces placed close together but not touching, form a condenser. Any two turns of a coil which are close to-

gether constitute a condenser and, because there is a difference in voltage or electrical pressure between turns, we actually have current flowing across from turn to turn all along a coil. Thus, much of the efficiency is lost, as our coil provides inductance only because of the current traveling around and around. That current which jumps across does no work and is lost.

Since every inductance and capacity form a circuit which has a "natural period" or frequency at which it oscillates easily, our distributed capacity, in conjunction with the inductance of the coil forms such a circuit. This unintended circuit absorbs energy from the incoming signals, wastes it and adds to the "effective frequency resistance." Miniature condensers are formed not only by the

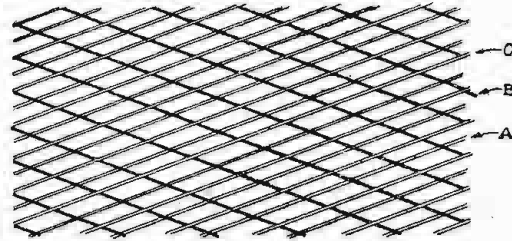


Figure 20—Honeycomb duo-lateral winding, in which A is bottom, B middle and C top layer

insulation between turns but by the material on which the coil is wound; so, to reduce resistance as much as possible, three things should be done: First, the wire used should be as large in diameter as possible, compatible with compactness; second, turns should be spaced, and turns with a large difference of pressure (potential) should not lie close to one another; third, as little solid material such as wood, bakelite, formica or other compound, as possible should be used to support the wire.

Single-Layer Coils

The simplest form of inductance is the short single-layer coil. Such a coil is shown in Figure 15. In this coil all turns are parallel and close together and the distributed capacity between turns is high, but as there are few turns, the total ca-

capacity is not very great and such a coil may be used for short wave work (175 to 500 meters). Distributed capacity only becomes a serious factor when many turns

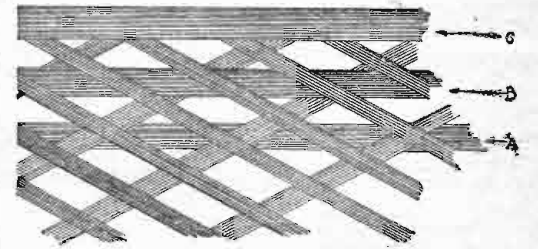


Figure 21—The Giblin-Remler winding in which A is bottom, B middle and C top layer

are necessary for the reception of signals on wave lengths over 500 meters. It will be noticed on this coil that taps are taken off every few turns. Taps are bad practice. If we are using only that amount of turns between one end and the fourth tap, there will be absorption of energy by that part of the coil between the fourth tap and the other end of the coil, due to the oscillating circuit formed by distributed capacity and inductance. Whenever possible, only those turns necessary to reception should be wound on a coil. In everyday practice, this loss of energy in unused turns is accepted as a necessary evil.

Distributed capacity may be kept down and inductance kept high by winding a coil so that the diameter is greater than the length of the winding. The best ratio is 2.5 to 1; that is the diameter should be two and one-half times the length of the coil for maximum efficiency, but there (Continued on page 18)

Another Knockout

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WASHINGTON, SEPT. 6, 1923

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Filament: 4.8 to 7 volts Power Output: 5 watts
Plate Voltage: 45 to 350 volts Filament is of pure platinum
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Are We Coming to This?

Heat, Light and Power May Be Plucked from the Air
AN ENIGMA that has been a scientific dream for years is the transmission of power through the medium of the ether. This means that the electric light wires and long distance high tension systems eventually will be done away with and the subscriber will be able to take his lighting current directly from the air. We may be very near that time or very far from it, but should this happen there will be a considerable saving for most of us.

Hydroelectric power may thus be developed in any part of the country and sent by Radio to any other part. The first cost of the generation of the power will be comparatively small, and with the upkeep of an expensive transmission line eliminated, electricity may be furnished for almost nothing.

Some experimental trials have been made with pleasing results. Power was sent through the air for a short distance. This shows that the scheme has, at least, the earmarks of possibility.

Give Your Applause by Letter

Comments on Broadcast Programs Appreciated

THE BIG season for Radio reception is now with us and in making up programs for those who listen the directors of various stations are largely influenced by the letters they receive commenting on the artists and their programs.

If those who listen in nightly to the various stations would only take the time to write to the manager or artist and tell their wishes and desires, it would guide and enable the manager to give them the kind of programs and the kind of artists they are eager to hear. It would also help in varying the programs. Telephone calls are appreciated, but it is the written word that is passed on to the artists who perform over the Radio that helps most. This written applause is tangible evidence to them of the Radio audience's appreciation of their efforts.

It is not easy for an artist to stand before a microphone and give the best he has to an unseen audience, knowing that when he has finished there is not forthcoming a welcome applause that he would receive from an audience visible to him. Artists who come to a station and give their services and their talent are affording pleasure to millions of people. It would seem little enough to ask of those who are enjoying this entertainment, with no cost whatever, to write and state their pleasure at what they have heard.

Drama for Broadcasting

Who Are the Greatest American Playwrights?

WHAT is the greatest American drama?
What are the ideals of America, and what is Americanism?

The great play of any age is that play which crystallizes most artistically the dominant ideas of its time. The soul of a nation is revealed in its art. A poem, a novel, a painting, a drama becomes popular because it touches sympathetic emotions. In spite of Nietzsche the great test for value remains with the popular voice. Not that momentary applause of the mob—which lasts but a day, to be sure—but that perpetual approval of well balanced human intelligence is to be considered as the popular voice. Many and many a monumental work of art did not become popular overnight.

There is a form of patriotism which is more heroic than that displayed on the battlefield. It is that form which endeavors to create from the noblest sentiments of a nation's soul a living philosophy of every day existence. And when an artist is able to portray in his work characters actuated by such worthy aspirations, he has caught the spirit of his times and placed his name amongst the very rare, but nevertheless true historians. Who, then, are the great American playwrights, and what are their best works? Radio may bring the unknown to the front and into the limelight.

RADIO INDI-GEST

The Rhyme of the Rabid Radiot

(In two parts. Part Two will appear next week.)

The snow was falling, flake by flake,
The hour was half-past eight,
And I was trying hard to make
My crystal oscillate.

No sound disturbed the wintry air
Except the ticking clock,
I tore my locks in deep despair,
When—Hark! I heard a knock!

Then quickly to my door I ran,
I opened it, and lo!
In came an aged, aged man—
His gait was stiff and slow.

"Old man," cried I, "What brings you here?"
He answered slowly, "Fate!"
I started, and he said "Draw near,
I've something to relate.

"Long years ago I bought some wire—"
He smiled, "I'll not forget—"
Drawing his chair before my fire—
"My home-made crystal set.

"At first—it's best to take down notes—
I wound my coil—now hush!
Upon a box of Quaker Oats,
But all I got was mush.

"And every night and every day
I toiled at it in vain—
At last I threw my junk away,
And started in again.

"This time I bought a vacuum light,
Some dials, condensers three,
A socket too, but still each night
Was silent night to me.

"I bought a variometer
And wired it to the plate,
And then I was quite certain, sir,
It would regenerate."

ANN TENNA.

(To be concluded.)

A-B-C Lessons for Indigest Beginners

Chapter XVIII—We Always (?) Get Passes

BY GOSH

S IS for the shows
You never go to see,
But hear them all by Radio,
Because the seat is free.

Our Own A. & Q. Dept.

Dear Indi: What mesh screen do you use in the Stebbins Souper Degenerative?

Answer: With the Stebbins Souper Degenerative we personally use a smoke screen. LOTTA MOSS.

Witty Sir: What to do when my B battery goes dead?

Answer: Inform the lodge it belongs to and hold a funeral. VERA GOOD.

Dear Indi: How much change should I get back out of a fifty dollar bill after purchasing a two step amplifier?

Answer: None after you get the loud speaker, extra tubes and batteries to go with it. RAY D. O.

Honorable Sir: One of the ladies living in my apartment building hangs her washing on my antenna just when I want to listen in. How can I overcome this trouble?

Answer: That's easy. Move into another building. IVA DIAL.

"Gone But Not Forgotten"

Loud the wailings and deep the means,
For the departed one in the House of Jones.
Into the corner of every room,
Seemed to creep the terrible gloom.
On the table the casket lay,
The spirit gone, forsaken, away.

'Twas no wonder the family could but weep,
When they found their "A" was fast asleep.
H. K. C.

INDI-GEST KINKS? SEND A DOLLAR—

THERE are many little Indi-Gest kinks worked out in the home that would hamper your fellow Radioknut and cause him much worry. Indi-Gest is very much interested in securing such material and is willing to accept a dollar for each kink printed. Send a stamped envelope so rejected copy may be returned. Under no circumstances will the dollar be sent back.
INDI-GEST KINKS DEPARTMENT

No Grid Leak

My girl keeps a Radio pinned to her piny,
With a high wire clothes line she calls her Aunt Tinney,
A screw-driver shoved in the top of her boot,
And a brace of drill bits with the brace that they suit.

When she talks it's of aeriels, fivvers and coils,
Of feed-backs, inductances, static that spoils,
Of shunts, microfarads, of meters and dials,
Of hook-ups and circuits, and Radio trials.

By day she's too busy with solder and wires,
At evening so quiet her company tires.
She meets my advances with unfeigned reluctance
And likes all her loving by distant inductance.

Oh! woe unto me while this Radio lasts.
My heart for companionship hungers and fasts.
For once when I asked her if she'd be my bride,
She answered, "My Honey—comb coil beats the slide."
STEP-DOWN BILL

A PIONEER SET



Condensed

By DIELECTRIC

Members of the A. R. R. L. decided to contest with Old Sol recently in getting from the east to the west coast of the United States, with the gratifying result of beating the sun to it. This is quite a feat when you stop to consider that the average daylight range for amateur transmitting stations is hardly more than one hundred miles. D. McR. Parsley, operator of station 4FT, at Wilmington, N. C., made an early start with the rising sun, reaching Los Angeles with his message just one hour and twenty-five minutes later. It was only necessary to relay the message twice on its trip across the continent.

The longest Radio circuit in existence is now in operation and it is said to be more efficient than many circuits covering much less distance. It is more than one-sixth the way around the world between the New York station and that in Warsaw, Poland, yet communication is had direct via Radio. To Poland this means much, as she is now freed of relying on messages relayed through other European countries; politically advantageous as well. We are in direct touch with most of the civilized world through the use of this modern medium, bringing with it a feeling of closer contact, socially and commercially.

It really begins to seem like old times when you can move the dials and bring in speeches and music from some banqueting hall where noted speakers are addressing groups of men and women. The other evening WEAF broadcast Lehigh University's alumni meeting in New York City, which included addresses by Schwab, Wickersham and others and a splendid musical program, giving it also to Radio audiences of WOO, KDKA and KYW. This feature of relaying a broadcast program is one of the very great attractions to Radiophony. It enables thousands who cannot attend, to hear what is said by prominent leaders in letters, science and industry. Think of the educational value of that.

Tests of remote control of airplanes and autos by Radio are made every little while with complete success in practically every instance. One of the latest demonstrations was made at St. Louis during the army, navy and marine flying contest, at which time an auto, built to resemble a bug, was made to move all over the field at the will of the Radio operator. The importance of this amusing exhibition is easily seen when its application to army maneuvers is considered. Without a pilot and directed solely by Radio, an army plane was made to fly over a field at Dayton, O., being brought safely to earth again when the test was over. If the same thing could be applied to small boys, we would not have to lose half a program hunting up our lost progeny.

What has been suggested in these columns as a possibility for the future appears to be drawing nearer all the time. We all know that certain stations are able to reach listeners in at some distance nightly and in a very satisfactory manner. Many smaller stations are less reliable in this respect. The first mentioned may consider that Radio audiences will wish to depend on them for entertainment, so build other powerful stations to cover adjacent territory.

Scores in the world series have been given us by several stations so that we could follow the progress of this exciting sporting event, for millions are interested who never actually attended a single one of these contests. Station KYW, in addition to giving this feature and the city baseball series, will broadcast from Stagg Field, University of Chicago, the results of each football game played there and announce the outcome of contests on other gridirons. I can always depend on a call from a friend of mine Saturday evenings to get the report of football games. One more season and he'll have a set of his own.

Comparing Efficiency of Various Transformers

How to Make a Test to Determine Value in Set

By H. J. Marx

THE rapid development of the Radio industry has been the main factor in the collection of haphazard apparatus that is being sold over the counter. The prospect of getting rich quick has lured

the others. The uneducated public, judging largely on the price basis, more often got the inefficient and poorly designed apparatus than the quality type. With the inauguration of this season,

is not so likely to try to construct himself, making the question of proper selection of greater importance.

Transformer Problem

Tube analysis has been demanded and described—the next step has been the transformer problem. Few fans are anxious to sit down and make audio frequency transformers. The prospect of having to count the required number of turns in the primaries and secondaries, running from 10,000 to 60,000 and over, is not an attractive one, leaving alone consideration of the requirements of proper winding for minimum capacity reactions; and selection and construction of laminated steel for cores doesn't improve the situation.

For these reasons, fans buy their transformers but want to know which ones are the best. In order to try them out for comparison, they require a test that will not lead them into a series of calculations in advanced mathematics and a technical knowledge possessed only by electrical engineers. The test must be fair and give a comparative value of efficiency under operating conditions. It is not intended as a laboratory analysis, but a sufficient guide to give the fan an idea as to what results he may expect from various types.

Test Circuit

An effective circuit for a test outfit for transformers is shown in Figure 1. It will be noticed that the circuit makes use of the transformer in a normal stage of audio frequency amplification. The test consists of impressing an oscillating current on the main circuit through a fixed condenser and a potentiometer. By means of a double pole, double throw switch this current is thrown into a pair of receivers direct or forced to pass through the stage of amplification first. By increasing the resistance (500 ohm calibrated) the tone through the amplifier is reduced until it matches the tone direct. Under these conditions, the voltage amplification of the

(Continued on page 20)

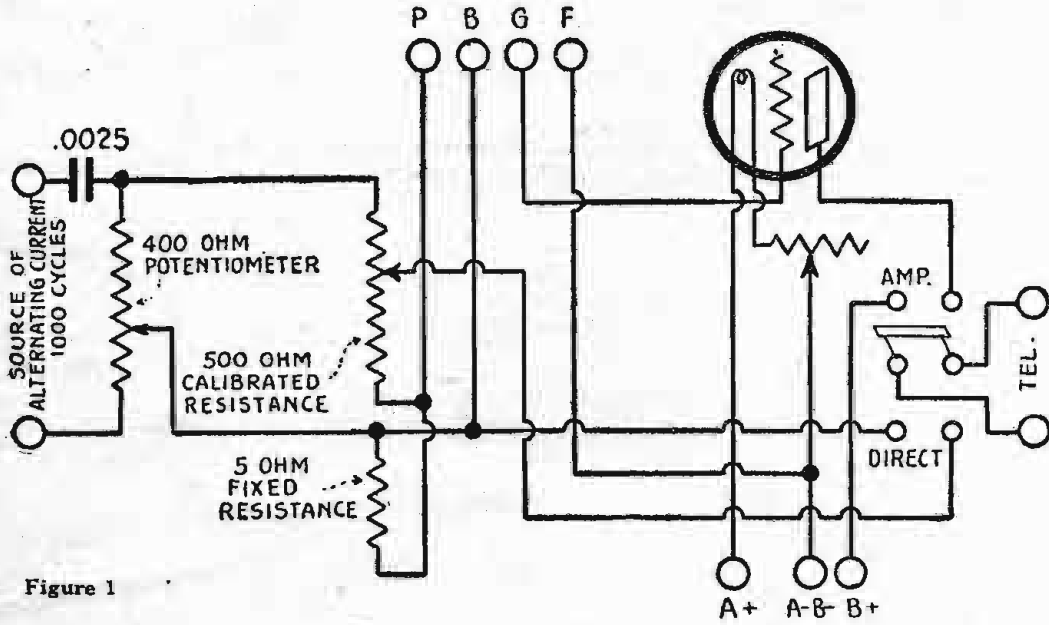


Figure 1

men from all fields into the making of Radio apparatus of all types and descriptions. Some were wise and employed designers that knew something of the subject; others copied the designs of established makes, while still another class just made up stuff to sell. As might be expected, the old line manufacturers in related industries that took up Radio as a side line, thought, too highly of their reputation, and therefore placed the design of apparatus in the hands of competent engineers.

The ultimate results showed an assortment of all types, qualities and prices in apparatus. Naturally, the carefully designed apparatus was higher-priced than

the tendency toward discrimination has become more apparent. Not only is the question of cost losing much of the fan's consideration, but he is displaying a decided "show me" tendency. Even the high-priced apparatus must undergo sharp scrutiny and test before approval is vouchsafed.

The effect of all this is illustrated in the increasing demand for methods of testing and comparing of apparatus. This is especially true of any parts that the fan

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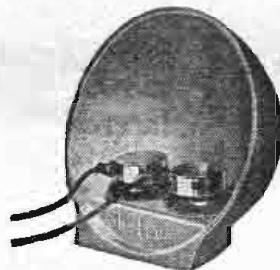
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Reinartz Coils

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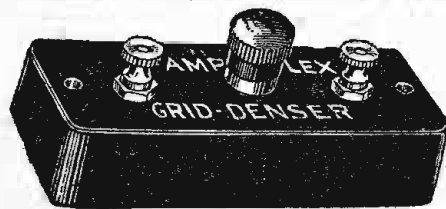
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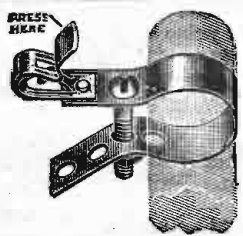
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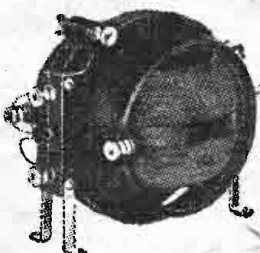
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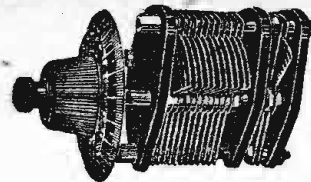
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3 Plate Variable; value, \$1.75.....	\$1.05
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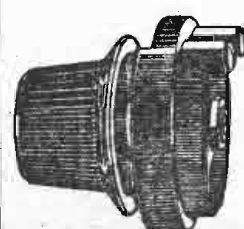
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Every article advertised above is guaranteed by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of \$5.00 or over east of the Mississippi River. Send cash, check or money order—absolutely no goods sent C. O. D.

RADIO FOR EVERYBODY

(Continued from page 15)

is no serious harm done if this ratio approaches 1 to 1.

Bank Winding

In their efforts to reduce distributed capacity and effective resistance, manufacturers and engineers have developed some remarkable methods of winding, a few of which are shown in our illustrations. Figure 16 shows a "bank-wound" coil and Figure 17 gives a cross-sectional view to make clear how the turns are laid on. Let us say there are to be 24 turns. If our coil is wound in two layers as shown in Figure 18, it not only is longer, but the potential or pressure difference between adjacent turns is high and there is tremendous loss through distributed capacity. Between turns 1 and 24 there is the potential difference developed by 24 turns. If, however, we wind our coil as shown in Figure 17, it is shorter, and between any two adjacent turns there is only the potential difference developed by four turns, as between 5 and 9 or 20 and 24. Bank-winding is not at all difficult, is far more efficient than a long single layer or the double layer of Figure 18. As stated before, tapping is bad because of the energy absorption by unused turns

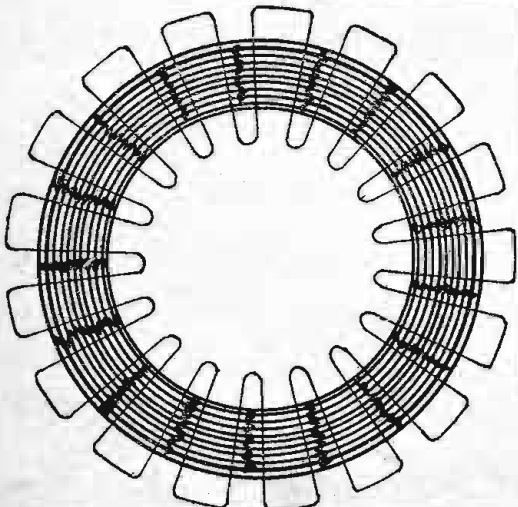


Figure 22—Spider-web coils are wound on a slotted disk; the wire is laid in the slots, crossing itself from one side to another

which is known as "dead end effect." To reduce this, it has been found good practice to wind bank-wound inductances as shown in Figure 19, and throw the sections entirely in or out of the circuit by switches. Thus, when the right-hand section is in use it is not connected in any way to the remaining sections and, as they are some distance away, they absorb little energy.

Honeycomb "Duo-Laterals"

Honeycomb coils are an excellent means of obtaining inductance with low loss. A close-up of a section of a "honeycomb duo-lateral" coil is shown in Figure 20. The word "honeycomb" refers, of course, to the little cells formed by the criss-crossing wires; the word "duo-lateral," however, needs some explanation. In our drawing, three layers are shown with A as the lower layer, B the middle and C the outermost layer. The turns of layers

A and C are parallel and separated by turns B. In the ordinary honeycomb, the turns of layer A would be directly under the turns of layer C. To get them further apart, the C turns are wound to come between the turns of layer A, which innovation is known as "duo-lateral" winding. This coil is excellent because the turns of the adjacent layers A and B cross at a considerable angle, resulting in small distributed capacity; turns in the same layer as well as turns in parallel layers are well separated by the duo-lateral winding.

The Gibling-Remler

Figure 21 shows the Gibling-Remler method of winding. It was developed after the honeycomb appeared in the belief that greater inductance could be obtained without materially increasing the distributed capacity. Between the honeycomb and the Gibling-Remler coils there is practically no difference in efficiency and the average of ten samples of one would probably be the same as the average of ten samples of the other.

In Figure 21, the diagonal lines represent yarn, while the horizontal lines show turns of wire. Five turns are wound as shown by A; then the parallel groups of yarn numbered 1, then the five turns B; then the groups of yarn numbered 2; then wire we call C. On top of C would be another layer of yarn, the turns running parallel to the two turns, and this alternate laying on of diagonally wound yarn and horizontal turns of wire can be continued to make a compact coil of considerable inductance with low losses. The inductance is increased by winding the wire in groups of five turns and keeping all groups parallel, and the yarn separates wire groups, keeping down the distributed capacity losses.

Spider Webs

A fourth method of winding is the "spider web," as shown by Figure 22. Here, the paralleling and close proximity of turns has been kept down, but solid material is introduced. Solid matter, which separates two metal surfaces or wires between which there is condenser effect, is known as the "dielectric" and there is more or less dielectric loss depending upon the material of which it is composed. Glass and rubber are excel-

lent insulators and have low dielectric losses; bakelite, formica and other compositions are also excellent insulators, but their dielectric losses are comparatively high. Wood is a poor insulator and its dielectric losses are high. But to get back to our "spider web"; a circular form of thin material is utilized and radial slots are cut from the circumference inward to provide fan-shaped sectors. An uneven number of sectors, are provided so that after the first layer of wire is wound on

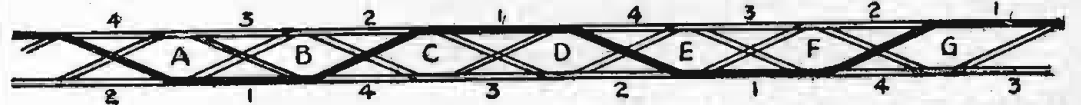


Figure 23—Sickler winding looking at the edge. Air is the only dielectric and the distributed capacity is low

the form, the wire of the second layer will cross the wire of the first in the slots, and the straight portions of this second layer will be on the opposite sides of sectors to the nearest portions of the first layer. When the third layer is placed on the form, its straight portions will be on the same sides of sectors as are the straight portions of the first, but they will be separated by a distance which is the diameter of the wire used. Such a coil has an excellent ratio between inductance and loss but seems limited to use on shorter wave lengths, as a coil of many turns would have an impractical diameter and be unwieldy.

"Sickles" Coils

Another form of winding these flat or "pancake" coils is the Sickles method. This coil is wound on a form consisting of a hub with radiating spokes which are later removed leaving only the wire. While the losses due to solid dielectric are eliminated, an adhesive, such as collodion, must be used to bind the turns together

and it, in turn, introduces distributed capacity, but probably not as much as would solid dielectric. An edge view of a Sickles coil is shown in Figure 23. At points A, B, C, etc., there were wooden spokes; the lowest layer, number 4, comes in from the left above spoke A, passes below both A and B, then across and above C and D, then across and below E and F. Turns 3, 2 and 1, when laid on, follow this same practice (above two spokes, across, below two spokes), but do not all cross at the

Summing Up

There are other methods of winding (Continued on page 21)

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A Solution to the Small Soldering Problem of the Discriminating Assembler. Unbreakable Construction — Economical Operation on any Electrical Circuit—Interchangeable Tip.

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Large. Scientifically correct. Non-metal prevents tinny sounds. Complete..... \$8.00

Single Control Distant Receiving Tube Set. Easily assembled, mahogany cabinet, drilled panel, vernier condenser and vernier rheostat, tube, batteries and phones with directions. Complete..... \$19.00

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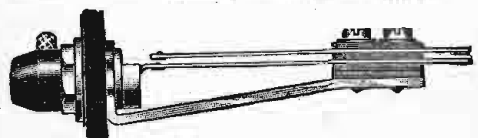
Fremont Radio Sales Corp.

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Carter Jack Switch

\$1.00

The best radio switch yet devised—easily mounted on panel—a quarter turn of the knob operates the heavy phosphor-bronze springs.



Furnished complete with "On" and "Off" name plate, knob and pointer.

Made in four spring combinations. Send for FREE wiring diagrams of various hook-ups; also complete catalog of other new improved Carter Radio Products.

Carter Radio Co. 7 203 S STATE STREET CHICAGO

NEW TYPE Variable Resistance Leak



ONLY THE KNOB SHOWS ON THE PANEL

This device is especially built for use as a tuning instrument. Its construction is such that it will withstand unusual usage. Fully guaranteed. Absolutely no pencil markings.

Can be mounted on any panel in a few seconds. It will enable you to get stations you have never heard before.

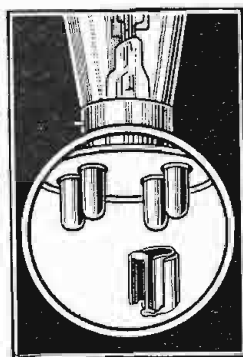
Complete with either .00025 or .0005 Freshman Condenser \$1.00 Without Condenser75

At your dealer's, otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc. Radio Condenser Products 106 Seventh Avenue New York

GAMBLING?

YOU ARE IF YOUR RADIO TUBES ARE UNPROTECTED



Your Vacuum Tubes are the most delicate parts of your Radio Set.

They are easily blown out—you have probably already had this exasperating experience—it is apt to happen at any time.

"B" Battery wires accidentally crossed for only an instant with the filament leads or sudden excess current from the "A" Battery will do it.

You can prevent this and save yourself money and inconvenience and relieve your mind at a trifling cost.

INSTALL

RADECO SAFETY FUSES

on all your tubes. Applied in an instant to one of the filament terminals. Will fit any standard tube going in any standard socket.

Price 50 cents each, sent postpaid and fully guaranteed. Do not delay. Order now. Specify type of tube used.

DEPT. 6

RADIO EQUIPMENT COMPANY

Manufacturers and Distributors of Standard Radio Equipment 630 WASHINGTON STREET BOSTON, MASS. New England's Oldest Exclusive Radio House Dealers:—Write for our proposition

Audio Amplification for the Flewelling Set

Two Stages of Audio Frequency Added for Volume

By E. T. Flewelling

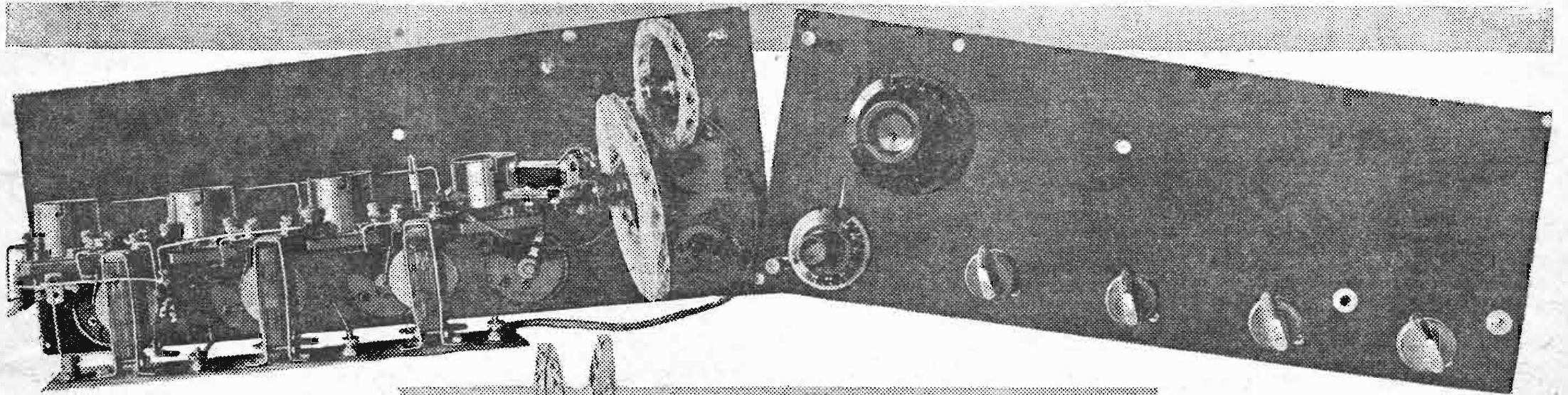
WHILE it is the purpose of this article to describe how a suitable audio amplifier for the Flewelling circuit may be built, I believe that our readers will find that most of the notes will be entirely applicable to audio amplification for any Radio set.

There are so many things to be taken

tone will immediately become very blurred; if indeed one can hear it at all through the various squeaks and howls. A three step set was built under just such conditions as this and the reception was such that if we had good luck, we could understand what was said by the announcer. To this set was added jacks to

far more exactness in the building, it was decided to construct these experimental amplifiers in three stages, knowing that if three stages were successful, then two stages would also be correct. We found that an amplifier could be made or ruined as an amplifier simply by the arrangement of the parts or the wiring.

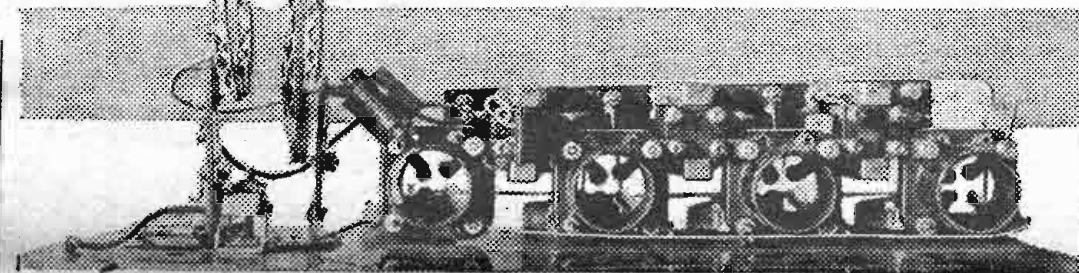
can take the necessary parts and build a Radio set complete with three stages of audio amplification and obtain very much greater volume and much cleaner-cut reception than we have often seen in two stage amplifiers, these matters are worthy of observance. It is surprising how short the leads between parts can be made if we



into consideration in this subject that it is hard to decide where to commence. The writer has been so impressed during very exhaustive tests with audio amplification by the effects caused by arrangement of wiring and particular parts used, that perhaps this end of the subject should be taken up first. Let us consider first the type of transformer to use. Of course, we cannot name any specific types of apparatus, so that I will be unable to be of any assistance to our readers on this point. It was quite well demonstrated during the tests spoken of above that satisfactory operation of an amplifier was not in general obtained with transformers of a high ratio, that is, transformers in the 10 to 1 or 6 to 1 class. Better results can be obtained with transformers of a ratio of 5 to 1 or less. The reason is that the high ratio transformer has so many turns of wire on its coils that its impedance and resistance value are such as to unfavorably affect the grid and feedback conditions. There are so many Radio sets using amplifiers that show traces of this trouble that it might be well here to show how it may be recognized.

Correct Amplification.

An amplifier operating with transformers of the high ratio type will quite often sound furry or have the "tin horn" sound that is so objectionable. Almost invariably the clear-cut sharp resonant note amplifier will be one using transformers of low ratio, or at least transformers that are wound with larger size wire than is ordinarily used on a high ratio transformer. That the above is so is easily demonstrated by adding a third step to the usual two step amplifier, when the



control the filament, that is, we could plug in on the second step or the third step, lighting the filaments by the insertion of the jack or putting them out upon its withdrawal. The addition of these jacks demonstrated that they were not a success, because after their installation we were unable to understand anything that was said.

These notes regarding the ratio of the transformers the writer believes to be extremely important to heed in constructing an amplifier; and the above might be summed up by the simple statement that in general low ratio audio frequency transformers are preferable and recommended, while the use of filament control jacks is not advisable.

Wiring the Set

Another extremely interesting thing, and really of vital importance in the construction of an amplifier, is the matter of wiring the set. During our tests, probably fifty amplifiers were built, and because three stages of amplification demanded

We have always been strong advocates of short leads and the elimination of all unnecessary parts and wiring in dealing with Radio sets, and we find that invariably the best operating amplifiers are those that followed along those lines. By the use of reconstructed sockets, transformers, terminals and home-made tuners, condensers, etc., the writer has been able to make amplifiers that are so free from feedback conditions that any amateur builder might follow this rule with every assurance of success.

Short Leads in Set

The foregoing, as we said, is so important that great care should be taken that the points given be considered. It does seem that, if an inexperienced amateur

really go about it with this thought in mind, and I think that those who build their amplifiers as here advised will thoroughly

(Continued on page 20)



RUSONITE
CRYSTAL RECTIFIER
(Patent Pending)

THE PERFECT SYNTHETIC CRYSTAL DETECTOR, SENSITIVE OVER ENTIRE SURFACE. No Hunting for "Spots." Loud and Clear. Endorsed by thousands of satisfied users. Sensitiveness Guaranteed. Price, Mounted..... 50c

14 K. GOLD SUPERSENSITIVE RUSONITE CATWHISKER. Permanent. Will Not Oxidize. Price..... 25c

RUSONITE REFLEX CRYSTAL. Manufactured Expressly for Reflex Circuits. Will Stand Up Under Heavy Plate Voltage. Guaranteed. Price, Mounted..... \$1.00

Order from your dealer or direct from
RUSONITE PRODUCTS CORP.
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You Don't Need Tubes

to get out of town. If you want new stations on your crystal set WRITE ME TODAY. Mine works 400 to 1,000 miles without tubes or batteries! Thousands have bought my plans and now get results like mine. CHANGES OFTEN COST LESS THAN A DOLLAR. Send self-addressed envelope for further information. Leon Lambert, South Volusia, Wichita, Kansas.

WD-11 and WD-12 Tubes Repaired

- WD-11 or WD-12.....\$3.50
- C-300 or UV-200..... 2.75
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Tubes Sent Parcel Post, C. O. D.



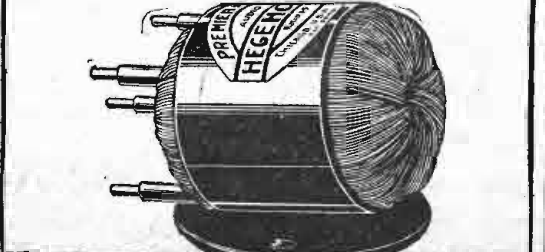
Ask your Dealer about "HEGEHOG"

(Trade Mark)
AUDIO TRANSFORMER \$3.50

This little wonder is the surprise and talk of Radio Engineers everywhere. Fix in your mind's eye an AUDIO Transformer about the size of an English walnut and you have the "HEGEHOG" for size. Then recall the best Radio amplification you ever heard, and you have the "HEGEHOG" for volume and tone quality. Our new patented design and construction (100% shielded) makes this possible. It's a real bit of engineering, and we would like to have YOU try one.

Ratios 1 to 3, 1 to 4 and 1 to 5.....\$3.50
1 to 10..... 4.50

Premier Electric Company
3810 Ravenswood Avenue, CHICAGO, U. S. A.



Super Values

Flewelling Circuit Complete		Reinartz Circuit Complete	
List Price	Our Price	List Price	Our Price
7 x 9 Radion Panel.....	\$ 1.15	Genuine Reinartz Coil endorsed by John L. Reinartz and bearing his signature. The only genuine coil for this circuit on the market. All others are imitations.....	\$ 2.50
23 Plate Var Condensers.....	3.00	One 7x10x 3/4 Radion Panel.....	1.25
3 .006 Mica Condensers.....	3.00	National Bakelite Socket.....	1.00
C. R. L. Var Grid Leak.....	1.85	Klosner Vernier Rheostat with dial.....	1.50
Two Coil Honeycomb mount adjustable with knobs.....	4.00	Two 23 Plate variable condensers at \$3.00 each.....	6.00
50 Turn Honeycomb Coil.....	1.54	Switch Points and Nuts.....	.80
75 Turn Honeycomb Coil.....	1.54	Six Switch Stop Points and Nuts.....	.40
(Mounted).....	1.00	Freshman Grid Leak and Condenser	1.00
One tube socket.....	1.00	Seven Binding Posts.....	.70
Klosner vernier rheostat with dial.....	1.50	25 ft. Tinned Bus Bar.....	.30
One three inch Dial.....	1.00	3 Switch Levers with knobs.....	.75
(Taper Knob).....	.25	One Baseboard for mounting.....	.40
8 Binding Posts.....	.80	One Fixed Phone Condenser.....	.40
Baseboard for Mounting.....	.75	One Single Jack.....	1.60
Complete Instructions for Assembly and Wiring.....	.50	Blue Prints with complete instructions for assembly and mounting.....	.50
Regular Price.....	\$21.63	Regular Price.....	\$19.05

OUR PRICE \$13.20 **OUR PRICE \$11.05**

All the necessary screws, nuts and miscellaneous small parts which are necessary to complete the set are included in the above prices. Any part in either of these circuits may be purchased independently at the advertised cut prices.

LOUD SPEAKERS

\$161.00 Western Electric 10-A.....	Our Price \$125.75	\$30.00 Music Master.....	\$24.50
55.00 Western Electric 10-D.....	44.00	25.00 Atlas Amplitone.....	19.50
60.00 Magnavox Type R-3.....	51.00	25.00 Trinity Type A-1.....	18.50
35.00 Magnavox Type R-2.....	29.50	22.50 Belcanto.....	18.00
		28.50 Dictogrand.....	23.50

PHONES

List Price	Our Price
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List Price	Our Price
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6.50 CUNNINGHAM C. 301-A.....	5.75
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6.50 CUNNINGHAM C. 11.....	5.75
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6.50 CUNNINGHAM C. 12.....	5.75
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List Price	Our Price
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5.00 23 PLATE VERNIER.....	2.50
5.50 43 PLATE VERNIER.....	2.75
3.00 23 PLATE PLAIN.....	1.50
2.80 43 PLATE PLAIN.....	1.90

AUDIO TRANSFORMERS

List Price	Our Price
\$4.50 ALL AMERICAN, 3 to 1 Ratio.....	\$3.95
4.75 ALL AMERICAN, 5 to 1 Ratio.....	4.10
4.75 ALL AMERICAN, 10 to 1 Ratio.....	4.10
7.00 AMERTRAN.....	5.55
7.00 FEDERAL No. 65.....	5.55

ALL Mail Orders Shipped Promptly. Send Money Order, including Postage

Write for Our Catalogue

HANES-ZENER CO., 3 West 29th Street, New York City
The RADIO MAIL ORDER HOUSE—Known for Low Prices

TESTING TRANSFORMERS

(Continued from page 17.)

transformer and tube becomes approximately a factor of the ratio of the 5-ohm resistance to the total amplifier resistance, which includes the 5-ohm fixed. For example, if the calibrated resistance, when the tone is balanced, reads 295 ohms, the voltage amplification is $295 \div 5 = 60$.

The purpose of the potentiometer is to

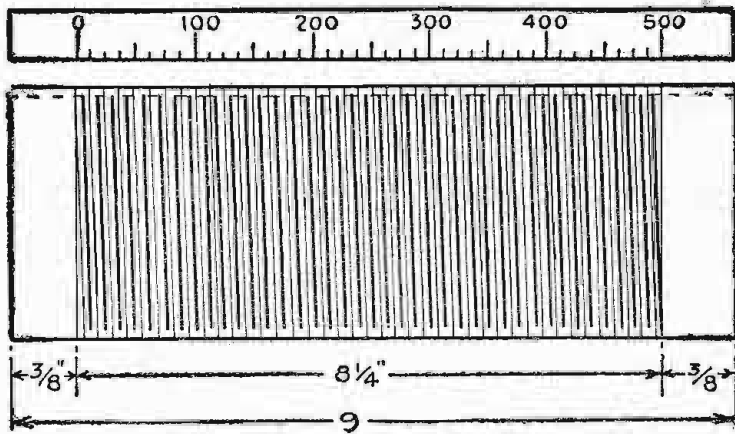
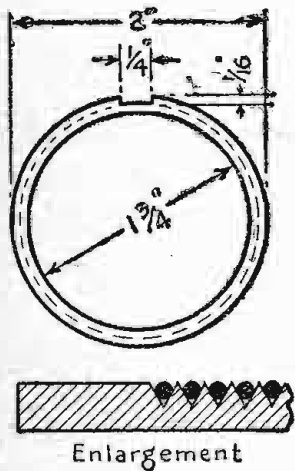


Figure 2

control the initial volume when connected directly to the phones. This direct tone must not be too loud, or adjustment is difficult. In comparing two transformers, the tubes must be taken in consideration as they will vary with different tubes.

The Source of Current

The oscillating current can be a buzzer circuit or where more critical tests are desired the frequency should be controlled and determined in order to make tests for values at various frequencies and thus determine whether the amplification factor remains constant. A variation for different frequencies indicates distortion will result in reception.

Parts Required

The parts required are all standard, with the exception of the calibrated 500-ohm variable resistance. The 5-ohm fixed resistance can be made by winding 1 foot of Number 29 gauge Chromel "C" resistance wire on a small spool, taking care that adjacent turns do not touch. This wire has a resistance of 5 ohms per foot.

The Calibrated Resistance

The calibrated resistance can be constructed by any fan. A suggested plan is indicated in Figure 2. A hard rubber tube (bakelite or fiber may also be used), 2 inches in outside diameter, 1/8-inch wall, and 9 inches long. It is threaded in a lathe (24 threads to the inch) to within 3/8 inch from each end. A slot, 1/4 inch wide and 1/8 inch deep, is cut along the full length. The wire is wound in the threads. The diameter at which the wire is wound will be about 1 1/8 inches. Each turn has a resistance of 2.536 ohms. Then 197 turns are required. Whether the turns required measure 8 1/4 inches in length, as shown, is not important, but the calibration guide should be made on the basis of the actual length of the winding from start to finish.

If chromel "C" 29 gauge resistance wire is used at 5 ohms per foot, 500 feet will be required. Don't use this wire for any other connections, however. In connecting from the end of the winding to any binding post copper wire should be used. A slide and bar is then added. The slot in the tube permits contact with the resistance wire, which lies under the outside surface of the tube. This calibrated resistance will come in

very handy for other uses, which will be discussed later.

Radio Boosts Wire Industry

Radiophans have opened a lucrative field for wire manufacturers. One firm turns out 7,500,000 feet of stranded wire for a month. Seven strands of hard drawn copper, supplied from as many spools and one strand of cotton from another are fed into the automatic strander machine. A cotton string center often is used as a base for the winding to make the wire rounder, so that it presents more surface for picking up the Radio waves, and stands greater stress.

This wire came on the market quite some time after the solid copper wire, owing to the fact that the government absorbed about all that was manufactured. Airplanes during the war used stranded wire about 500 to 600 feet long trailing behind for an aerial. At each landing a new wire was usually secured before the next flight as it usually became tangled in the air or in landing. More than 20,000,000 feet or 200,000 one-hundred foot aeri- als were thus utilized during the war. Stranded wire was utilized because of its greater efficiency and flexibility.

AUDIO AMPLIFICATION

(Continued from page 19)

oughly agree with me that the idea is a correct one.

We have taken photographs of a three stage set that has been taken apart, built and re-built so many times that it is indeed a veteran, but it is believed that these photographs, shown with this article, will be of value to the fans, as they show what can be done with ordinary apparatus and a few tools. It might also be of interest to state that this set can be entirely taken down and reassembled in a little over half an hour; that its volume is attested to by the fact that with a Chicago station thirty miles away on an ordinary loud speaker, we are able to understand every word spoken 200 yards away.

By referring to the photograph, you will notice that the grid plate leads of the tube sockets to the transformers are simply short pieces of strap brass that have been drilled to take the binding posts, and if it were possible, we would have mounted the socket directly on the transformer posts and done away with any kind of a lead. We were unable to secure transformers that had a long enough binding post for this, however.

We have in the set filament control jacks so that by using them or cutting them out, we could note the effect upon the set. It is sufficient to say that their use makes the set practically worthless, whereas with them cut out, the set operates as stated above.

THE UNITROL (One Control) Broadcast Receiver

A Real One Tube Set. Made of best material throughout. In a Real Cabinet, with hinged top. High grade mahogany finish, hand rubbed. At a Real price. Will ship C. O. D.

Postage paid east of Rocky Mountains \$11.90

Set is Fully Guaranteed. Wonderful Distance Reported by Enthusiastic Users.

Dealers: Write for our proposition. Some territories still open for bona fide Radio Dealers.

To the Experimenter and the Man Who Builds His Own: Write for Our Bulletin of Parts at Bargain Prices. Standard Merchandise Only.

Abalene Radio 105 Audubon Ave. New York, N. Y.

Checking Summer Static

The following are a few things which may be done to reduce the effect of static on a receiving set:

- Use a low, short single wire antenna.
- Employ an indoor aerial which in most cases brings in the local stations clearly and distinctly.
- Use a crystal detector instead of a vacuum tube. This is particularly recommended where one or two stages of Radio frequency amplification precede the detector.
- Covered wire is considered better than bare wire for an aerial, for the reason that the latter is subject to corrosion and in that state offers a certain amount of resistance to Radio frequency currents.

KEYSTONE RADIO LIGHTNING ARRESTERS

\$2.00

Should be on every aerial the year 'round. Provides highly efficient lightning and static protection for the home. Fully approved by Fire Underwriters. Can be installed outdoors. Has no vacuum to lose. Install one in your aerial lead now—be safe. This pioneer radio arrester is backed by 31 years' experience in lightning arrester design. For sale by Dealers everywhere, or sent postpaid for \$2.00. Write for circular.

Electric Service Supplies Co. 17 & Cambria Sts. Philadelphia, Pa. Monacaok Bldg., Chicago 50 Church St., New York

The "A" Battery's Power in Your Radio Receiving Set

THIS IS NUMBER TWO OF A SERIES

THE sole purpose of the "A" Battery in your Radio Receiving Set is to furnish current to heat the filaments of the tubes.

And this can be done satisfactorily only by an "A" Battery that supplies an adequate steady current.

Anticipating the popularity of the dry cell tube in Radio, and realizing that it required a Dry Cell capable of standing up under service conditions differing from what dry cells are called upon to meet in other fields, the National Carbon Company developed the Eveready Radio Dry Cell specifically for this new use.

A dry cell gives its maximum service only when designed especially for the work it is intended to perform. There are for dry cells several uses which are so alike that one type of cell serves for all. This is the field covered by the ignition or general purpose dry cell.

The conditions encountered in Radio are different from the conditions grouped together under the term "general purpose." And while the general purpose dry cell performs well as an "A" Battery, it was found possible to produce a Dry Cell "A" Battery capable of delivering more service on Radio loads.

Thirty years of dry cell experience and an immense research organization resulted in the superior Eveready Radio Dry Cell. One of the outstanding features of this special cell is that while it will last much longer when used as an "A" Battery, it is no larger than the standard dry cell.

The increased service life of the Eveready Dry Cell "A" Battery greatly offsets the slight increase in cost; so this battery is not only the best, but it is the most economical you can buy. "The Story of Eveready Dry Cell Radio 'A' Batteries," which tells how to use Dry Cells to the greatest advantage with the various dry cell tubes now available, will be sent to you free on request.

The "A" Battery gives power to your Radio Receiving Set. Eveready Batteries—especially made for Radio—serve better, last longer, give better results.

Note: This is number 2 of a series of informative advertisements which will appear in this magazine. They are designed to help users get the most out of their Batteries and their Radio Sets. If you have any battery problem, write to G. C. Furness, Manager Radio Division, National Carbon Company, Inc., Thompson Avenue and Orton Street, Long Island City, N. Y.

POWER for Your Radio Set

Eveready Dry Cell Radio "A" Battery (No. 7111)

Directions and wiring diagrams on the jacket tell just how to use this battery with the different dry cell tubes.

This special Radio Cell is also available in two and four cell multiple batteries for receiving sets employing from two to four WD-11 or WD-12 tubes.

Other Radio Batteries

Eveready Storage "A" Batteries — best suited for filament heating of all Radio Tubes not especially designed for dry cells. The quality storage battery with the long life plates, \$15 to \$20.

Eveready "B" Batteries—the life of your Radio.

Eveready "Three" Battery—3 cells, 3 purposes.

Manufactured and guaranteed by NATIONAL CARBON COMPANY, Inc.

EVEREADY Radio Batteries

—they last longer

Cockaday Coil Set \$2.50

Including full size blue prints of panel layout, complete picture hookup, and fully illustrated instructions for construction and operation.

Coils are fully assembled, made exactly as specified by Mr. Cockaday, D coil bank wound. Far more efficient than any home made coils.

Standard parts for this sensational circuit—panel, coils, condensers, verniers, variable resistance, vernier rheostat, socket, double jack, dials, switch, contact points, posts, busbar wire, spaggetti, etc. (no tubes or phones).

Complete for \$11.65

Postage additional on all shipments. Send No Money. PAY THE POSTMAN. All Goods Shipped Parcel Post C. O. D.

RADIO SURPLUS STORES HELENA, MONTANA

Another Scoop Niloplex

Genuine parts as recommended by the inventor including the now

Famous SPLIT VARIOMETER

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We are the largest exclusive radio jobbers in the middle west.

HUDSON-ROSS 173 W. Madison St. Chicago

LOUD TALKING CRYSTAL DETECTOR

B-METAL

The Crystal That Brought Joy to 100,000 Radio Users Last Season.

Sent on approval. Pay us when you are satisfied. That's how sure we are that it will please you. Just pass the good news on to a dealer so others may enjoy B-Metals too. Just send us the name of dealer who hasn't heard of B-Metal when remitting. 50c

RADIO CRYSTAL

The B-Metal Type C Fixed Detector for Your Reflex Set—Try One and Know

The price is reasonable when you see what it does. Thousands in use. Read one of the many reports.

\$2.50 B-Metal Refining Co. Elgin, Ill., May 27th, 1923. Gentlemen:—The crystal and type "C" Reflex detector received and tested out and we find that they are superior to any we have used so far. Hoping to be able to place a larger order in the near future, I remain, Very truly yours, H. W. PEARSON, 240 N. Worth Street.

B-METAL REFINING COMPANY 3134 Trumbull Avenue, Detroit, Mich. Chicago Branch, 53 West Jackson Blvd. For Sale by All Dealers

Questions and Answers

Feature Circuits

(4913) OAG, Mechanicsville, N. Y.
I think you will admire my frank statement that lately I find nothing in your paper. What is the matter?
I have taken practically every single issue of your paper since you started publishing, and have liked it very much, and have preserved these copies for future

who find great interest and service in those circuits which to the more advanced and experienced are classed as "passé."

However that may be, Radio Digest in the intent to be truly helpful and worthy of the confidence of its readers has no disposition to impose upon them untried and unproven "new circuits." It is, in gen-

tion of trade sets and apparatus it is not our policy to elaborate. We do not consider such within the spirit of our service. It does not to Radio Digest seem ethical in view of the heavy advertising campaign entailed in placing an article on the market that it should encroach upon the legitimate rights of the manufacturer. There is not the least animus in us in this matter and we are after all confident that we do continue to merit your interest.

Reinartz Coils

(4743) CHM, Jackson, Mich.
Will you be so kind as to answer the following questions—would there be any advantage in winding the primary and grid circuit of a Reinartz coil on a separate spider web coil from the plate circuit and arrange them so that the coupling could be loosened or closed (as they do with honeycomb coils)? Would it be any advantage to wind all three circuits on separate coils?

Can the Hazeltine Neutrodyne Radio frequency be applied to the Reinartz circuit?

A.—While greater selectivity may be obtained in the method you suggest there

is a decided drop in the effectiveness of the set. Would not recommend it.

The Hazeltine Neutrodyne principle may be applied to any circuit but it is of doubtful advantage to the Reinartz.

Loud Speakers

(4798) T.J., Estewau, Sask., Canada.
I am putting on a stage of audio frequency and would like a little information.

Can I operate a loud speaker 4,000 ohms resistance on a one stage circuit, or will a 1,500 ohms be enough to operate my set satisfactorily?

A.—Answering your inquiry we are advising that a loud speaker of either 4,000 or 1,500 ohms will operate on a one stage circuit, although the latter will afford the greater volume. It is, however, found necessary usually to use two stages for best results.

The Questions and Answers department is purely a service department and the publishers would like to have your assistance in helping to keep it up to the highest standard; therefore when asking questions please make out your queries on a separate piece of paper and write on one side only. Do not mix your questions with other material; write that on a separate piece of paper. Each one must go to a different department. Then, too, we have so many who fail to put their name and address on each sheet. Please remember this when you write your letters, and also to enclose a stamped self-addressed envelope. Unsigned letters are not answered. The Radio Digest does not consider it good business ethics to furnish hook-up diagrams of any standard manufactured receiving sets.

reference, but since you finished up with Flewelling, you haven't anything of any value in the hook-up line. How come?

I take every Radio weekly, and monthly publication on the market, and until lately have enjoyed yours as well as any, but not lately, so spruce up. I prefer now to any.

I take —, and can get more value out of their paper than out of yours, and that should not be.

Why don't you give us a write up complete, constants and all of the Grebe CR-12, the Sleeper Monotrol, the Melco Supreme with the Telos Variotransformers, and such stuff of some value. The regenerative 1, 2 and 3 circuits are passé now that we are developing into 6 and 8 tube sets, and would appreciate some good tuned Radio frequency hook-ups.

Grimes inverse duplex is interesting, too, in preference to the ordinary reflex, but what we are all most interested in is the Grebe CR-12 as divulged by the —. I happened to miss a couple of the series and am out of luck and shall depend on the Digest to do something for us in this respect. Push-pull amplifiers with the — matched split transformers is good stuff, too; let's hear something on these developments.

A.—That you find "nothing" in our publication is a broad statement. We do admire your frank assertion of what you may consider to be a truth. We like constructive criticism. However, we are certain that your expression is individual and not in accord with the general testimony from our readers.

In your demand for the more complicated circuits you must not forget that Radio Digest has not ceased to cater to a constantly increasing number of readers

eral, our purpose not to make public through our service any circuit which will not bear favorable comparison with the standard American receiver. When a new circuit can take the same number of tubes and show equal results, we consider that it is then time to proceed to investigate it further. Miracles do not happen overnight. And the science of Radio reception is not revolutionized in a day. The miracle, after all is said and done, is the patience of any service which is willing to bear upon its surface the nonsense of believing so.

Too much is being published at the present time for the sole purpose of advancing particular manufacturing interests. This is not our policy; we strive to be impartial.

Further, in the matter of detail descrip-

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