

1:30 p. m.—Weather report.
1:35 p. m.—First Congregational Church service, San Francisco.
1:00 a. m.—Musical program.

KXN—LOS ANGELES—537
2:00 p. m.—Service from First Presbyterian Church, Hollywood.
6:00 p. m.—City Park Board musical program.
6:15 p. m.—Service from All-Souls Church.
6:30 p. m.—Service from First Unitarian Church.

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DESCRIBES CONE SPEAKER DESIGN

Device Result of Much Work on Part of Experts

Inventor Farnand Discovers Materials Used and Outcome of Various Tests in Address Before Radio Club—Many Methods of Building Instrument.

In the development of the cone loud speaker many different types of construction were experimented with. C. L. Farnand, noted inventor, told members of the Radio Club of America recently. Various materials, including hard rubber, celluloid, wood, metals, paper, etc., were tried for the cone.

A fibrous paper, not highly calendered, operates satisfactorily and presents a good commercial solution. The proper thickness for the paper was found to be approximately one mill (.001 inch) for each inch of diameter, providing a soft-finish paper is used; the thickness should be less if the paper is hard finish. The harder the finish of the paper, the greater will be found the tendency to depart from the cone shape, and undue stress will be set up in the paper, which will give rise to rattles, due to "tension" actions.

The proportion of the altitude of the cone to its base diameter, as gauged by the angle of the side of the cone to its axis, should range between 30 and 60 degrees. These values are approximate and depend upon the size of the cone, and may be deviated from without affecting operation to any large extent.

The freedom of movement, of course, is hindered somewhat by the flexing of the paper at the edge. This flexing involves a loss of power which can be compared to hysteresis losses. Experiments were conducted to determine the amount of these losses and to lessen them. Sandpapering an annular portion at the edge of the cone or substituting light, flexible paper or other material and castulating the paper edge were tried.

Where heavy paper was used the above experiments improved the results and were manifested by an increased treble. Complete freedom of the edge was obtained by suspension of the cone on silk thread. The cone was mounted on a paper straw and reinforced by silk threads from the straw to its periphery. At the end of the straw was mounted a bobbin which floated in the annular field produced by the electro-magnet. The complete assembly was supported by threads. There was nothing to retard the axial motion of the bobbin; it floated freely in the sound wave and motions as large as one-eighth of an inch were sometimes noticed when used.

As this was done, it was found that the edge of the cone, due to the slowness of curvature, was not inclined to move integrally with the rest of the cone. This was overcome by making a circular through-hole portion at the edge, which reinforced it and retained the circular form of the cone. A method nearly as effective is to reverse a small portion of the cone at the edge, making a V shape trough instead of the circular trough. The advantages of freeing the edge of the cone, so to speak, are that the cone can be made of suitable proportion, while the mechanical advantages of a supporting ring at the edge of a paper are apparent. The outer portion of the cone can be conveniently turned inward and the mass of the supporting rings and the supports materially reduced without affecting its operation.

NEW INSTALLATION

Powerful Radio Links Mexico with Most of World.

Installation of two powerful radio systems, sending and receiving, has been completed at the Mexican Government's radio station at Chapultepec, the Department of National Telegraphs has announced.

The new apparatus makes possible communication of Mexico with all points in the American continent, with England, France, Germany, Spain, Italy, Austria, Russia, Yugoslavia, Belgium and Poland on the European continent, as well as with Japan, China and the Philippine Islands.

It is understood that the new apparatus will also make possible the transmission and reception of messages in the Pacific and Atlantic oceans, the Gulf of Mexico and other oceans and seas.

The new apparatus is now being subjected to the most rigid tests, after which it will be officially inaugurated by President Calles. A system of tariffs for the public is now being worked out.

WAVES TRAVEL HIGH

Balloons Hear Stations at Altitude of 31,000 Feet.

The question of whether or not radio waves travel far up in the sky has been answered by Capt. H. C. Gray, who recently climbed 31,000 feet above Scott Field in a gas balloon. He listened in with a broadcast receiver and picked up concerts from KSD and KMOX, St. Louis, hearing them clearly until the altimeter registered 31,000 feet, when he began the six-mile descent.

Capt. Gray did not listen during the drop because he was too busy preparing to make a parachute jump. He reported no static at the high altitude, where the temperature was 70 degrees below zero.

RADIO HELPS DEAF

Vienna Mutes Hear Sound and Music for First Time.

Much interest has been aroused by the success of experiments with a special radio receiving apparatus upon patients and pupils in an asylum for the deaf and dumb in Vienna, according to dispatches to this country.

The experiments were suggested by the well-known fact that persons quite deaf to the direct tones of the human voice often hear perfectly through an ordinary telephone. The newly devised apparatus is generally placed against the ear, but sometimes against the temple, and the results are described as amazing.

Of 120 persons in the asylum, 61 had heard distinctly the sounds transmitted by radio, whether instrumental music or the tones of the human voice. The four who failed to hear were suffering not merely from impairment of the labyrinth of the ear, but also from decay of the auditory nerves of the brain.

Physicians and scientists are studying the nature of this achievement and will devise means for its application on a wide scale, hoping that thus the education of the deaf may be greatly facilitated beyond the bounds made possible by the sign language.

NEW "HAM" RECORD

Amateurs Give New Zealand Early Flight Account.

Provident operators regard as a noteworthy achievement the transmission by amateur radio of a blow-by-blow account of the Tom Heany-Paulino Uzcudun boxing bout from New York to New Zealand, enabling newspapers of the latter country, which is Heany's home, to print the story only a few hours after the fight.

A running story of the fight was broadcast from a New York station. The broadcast was picked up by C. B. Punyon, Jr., of Yonkers, N. Y., who, by means of his amateur station, 2AG, transmitted the story by telegraph on 40.9 metres to John Grinan at station NJ2PZ, in Jamaica, British West Indies, 1500 miles away. Punyon was unable to work New Zealand direct because the fading on 40.9 metres was too severe. At the end of the fight, the station in Jamaica transmitted the blow-by-blow description to OZ2AC, in New Zealand, on a wave length of 21 metres.

At the New Zealand station, newspaper representatives received the dot-and-dash report and rushed to their offices in time for the afternoon editions.

In order to keep up with the blow-by-blow description by the rapid-fire broadcast announcer, the Yonkers operator had to telegraph letters in place of whole words. As an example, he found it necessary to boll down "Heany lands right on jaw" to "HRLJ."

Good Insulators.

Insulators are devices made of materials which will not conduct electricity in the ordinary meaning of that term. They are more properly called "non-conductors." Some good insulators, including the modern bakelite products, are slate, oils, resin, dry leather, dry paper, porcelain, wool, silk, sealing wax, sulphur, mica, jet, amber, paraffin, glass and dry air.

RADIO PROGRAMS

Continued from Page Eleven

11:00 p. m.—Service from First Presbyterian Church, Hollywood.

1:00 a. m.—Feature program.

KOA—DENVER—322

2:00 p. m.—Service of Trinity Methodist Episcopal Church, Denver.

3:00 p. m.—Organ recital from Trinity Methodist Episcopal Church, Denver.

8:30 p. m.—Service of Trinity Methodist Episcopal Church, Denver.

KYW—CHICAGO—336

11:25 p. m.—Time signals and weather report.

12:00 m.—Central Church service.

2:00 p. m.—Boxy and his gang.

3:00 p. m.—Lecture.

5:30 p. m.—Studio concert.

6:30 p. m.—"Twenty Minutes of Good Reading."

8:00 p. m.—Godfrey Ludlow, violinist.

8:30 p. m.—Weekly revue.

10:20 p. m.—Concert.

11:25 p. m.—Time signals and weather report.

WABC—NEW YORK—316

10:50 a. m.—Services West End Presbyterian Church.

WBAL—BALTIMORE—216

7:00 p. m.—Organ recital.

7:30 p. m.—Jubilee singers.

8:00 p. m.—Concert orchestra.

9:00 p. m.—Godfrey Ludlow, violinist.

WBZ—SPRINGFIELD—233

10:50 a. m.—Services from the Church of the Unity, Springfield.

1:00 p. m.—Studio orchestra.

2:00 p. m.—Boxy and his gang.

2:30 p. m.—Baseball results.

3:00 p. m.—Baseball results.

3:30 p. m.—Baseball results.

3:50 p. m.—Baseball results.

4:00 p. m.—Baseball results.

4:30 p. m.—Baseball results.

4:50 p. m.—Baseball results.

5:00 p. m.—Baseball results.

5:30 p. m.—Baseball results.

5:50 p. m.—Baseball results.

6:00 p. m.—Baseball results.

6:30 p. m.—Baseball results.

6:50 p. m.—Baseball results.

7:00 p. m.—Baseball results.

7:30 p. m.—Baseball results.

7:50 p. m.—Baseball results.

8:00 p. m.—Baseball results.

8:30 p. m.—Baseball results.

8:50 p. m.—Baseball results.

9:00 p. m.—Baseball results.

9:30 p. m.—Baseball results.

9:50 p. m.—Baseball results.

7:45 p. m.—Service of Chelsea Baptist Church.

8:00 p. m.—"An Hour with the Classics."

WBH—NEW YORK—361

12:30 p. m.—Organ recital.

2:30 p. m.—Organ recital.

5:00 p. m.—Dance orchestra.

5:30 p. m.—Special feature.

8:45 p. m.—Special feature.

10:30 p. m.—Feature.

12:00 p. m.—Orchestra.

WIP—PHILADELPHIA—508.

7:15 p. m.—Service from Holy Trinity Church.

10:00 p. m.—Orchestra.

WJR—DETROIT—516.

11:00 a. m.—Service from the First Baptist Church of Pontiac, Mich.

12:45 p. m.—Service from the Central Methodist Episcopal Church of Pontiac, Mich.

1:30 p. m.—"Question Box" from the Church, Detroit.

3:00 p. m.—Novena service broadcast from the Shrine of the Little Flower, Detroit.

6:45 p. m.—Organ recital.

7:00 p. m.—"Twilight Hour."

8:00 p. m.—Final baseball scores.

11:00 p. m.—Service from the First Baptist Church of Pontiac, Mich.

WJZ—NEW YORK—451.

9:00 a. m.—Children's hour.

11:00 a. m.—Service from Park Avenue Baptist Church.

1:00 p. m.—Studio orchestra.

2:00 p. m.—Boxy and his gang.

3:35 p. m.—St. George vespers service.

5:30 p. m.—Radio vespers.

6:50 p. m.—Baseball scores.

7:00 p. m.—Correct time.

7:00 p. m.—Organ recital; Helen Turley, contralto.

7:30 p. m.—Male quartet.

8:00 p. m.—Concert orchestra.

8:30 p. m.—"Travelling," "Hills of Old England—Devonshire."

9:00 p. m.—Godfrey Ludlow, violinist.

9:30 p. m.—Studio orchestra.

10:30 p. m.—Correct time.

WKBW—BUFFALO—267.

10:30 a. m.—Service from chapel of Church.

12:30 p. m.—Studio music.

3:00 p. m.—Service.

7:00 p. m.—Evangeline service.

10:15 p. m.—Melody hour.

WVAA—DALLAS—456

4:30 p. m.—Bible class.

8:30 p. m.—Service First Church of Christ, Scientist.

10:00 p. m.—Music from Grace Methodist Church.

11:00 p. m.—Recital.

WVH—PHILADELPHIA—394

4:30 p. m.—Chapel service under the auspices of the Church Federation of Philadelphia.

8:27 p. m.—"Ask me another."

8:30 p. m.—Service from Arch Street Presbyterian Church.

9:15 p. m.—Correct time.

WVNS—NEW YORK—316

4:30 p. m.—"Little Church Around the Corner."

8:30 p. m.—Orchestra.

10:30 p. m.—Musical program.

WVPH—DETROIT—216

8:30 p. m.—Service from the First Church of Christ, Scientist.

WGR—BUFFALO—310

WGY—SCHENECTADY—373

11:00 a. m.—Service of First Reformed Church.

2:00 p. m.—Musical program.

4:00 p. m.—Organ recital.

7:30 p. m.—Service of First Church of Christ, Scientist.

8:45 p. m.—Violin and piano recital.

9:15 p. m.—Correct time.

9:15 p. m.—Atwater Kent hour.

WHAD—MILWAUKEE—275

1:00 p. m.—Organ concert.

2:00 p. m.—Children's Feature.

2:30 p. m.—Studio trio.

4:30 p. m.—Wasson Conservatory of Music class hour.

8:15 p. m.—Baseball.

10:00 p. m.—Organ recital.

11:00 p. m.—Popular tune.

WHAP—NEW YORK—431

9:00 p. m.—Concert of sacred music.

9:30 p. m.—Selections from the Bible and Science and Health with Key to the Scriptures.

10:45 p. m.—Organ recital.

WHAR—ATLANTIC CITY—275

4:45 a. m.—Service of the Chelsea Baptist Church.

2:15 p. m.—Recital.

2:45 p. m.—Vinton Community Church service.

5:00 p. m.—Children's period.

WVH—NEW YORK—451.

1:00 p. m.—Studio orchestra.

2:00 p. m.—Boxy and his gang.

3:35 p. m.—St. George vespers service.

5:30 p. m.—Radio vespers.

6:50 p. m.—Baseball scores.

7:00 p. m.—Correct time.

7:00 p. m.—Organ recital; Helen Turley, contralto.

7:30 p. m.—Male quartet.

8:00 p. m.—Concert orchestra.

8:30 p. m.—"Travelling," "Hills of Old England—Devonshire."

9:00 p. m.—Godfrey Ludlow, violinist.

9:30 p. m.—Studio orchestra.

10:30 p. m.—Correct time.

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