ACOUSTICS

Holes in Congress Ceiling Help Hearing

➤ THERE ARE thousands of holes in the ceilings of the Senate and House Chambers so that the words of wisdom members utter won't bounce back at them.

The tiny holes, 15 to the square inch and 3/32nds of an inch in diameter, solve an acoustical problem presented by the new domed ceilings designed to reflect the indirect lighting of the legislative chambers. With these holes, and with other acoustical improvement, the Senators and Representatives can hear each other much better.

The smooth surface of the domed ceiling was just the thing to produce echoes. However, the holes let the "pointing with pride" and "viewing with alarm" of the legislators go through to a chamber above where sound absorbent material captures them.

Dr. Paul E. Sabine, Colorado Springs, Colo., was acoustical consultant in the remodeling of the two chambers. He reported on his work in the JOURNAL OF THE ACOUSTICAL SOCIETY OF AMERICA (March).

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METALLURGY

Metals Melted in Mid-Air; No Container Contamination

➤ METALS BUOYED in the air by invisible electromagnetic fields can be melted without having any container around them through a new process described to the American Physical Society meeting in Washington by five scientists of the Westinghouse Electric Corporation Research laboratory.

As reported by E. C. Okress, D. M. Wroughton, G. Comenetz, P. H. Brace and J. C. R. Kelly, "electromagnetic levitation" is the answer to many problems created by titanium and other metals which combine with other materials during refining stages.

Mr. Brace told SCIENCE SERVICE that, basically, metals such as aluminum can be suspended in opposing electromagnetic fields generated in two conical coils, one suspended above the other. The coils operate on 9,600-cycle alternating current.

The metal becomes molten under the inductive-heating influence of the electromagnetic field. It melts, but is held together by an oxide film formed where the metal comes in contact with the air. When oxide films do not form, the material is held together by surface tension.

Chunks of aluminum as large as four inches long by two and one-half inches in diameter have been melted successfully using the new method. Silver samples, however, have been smaller because surface tension is depended upon to keep the molten metal together.

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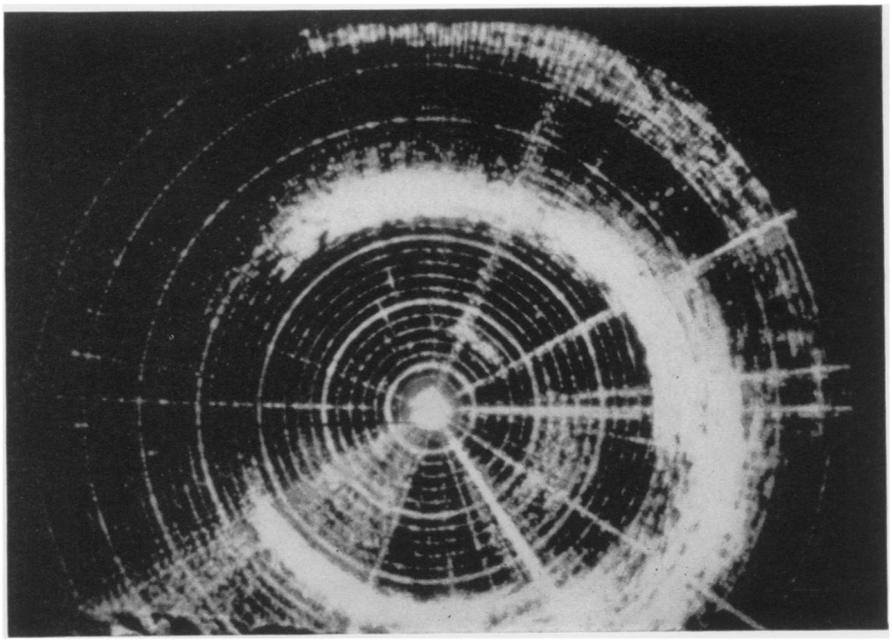

PREDICTING RECEPTION—The bright areas on the screen of this oscilloscope show where radio communication can be conducted from the sender's station, the bright spot in the center, the top part of the screen being north. Bright rings mark the distances, with the outer edge indicating about 3,000 miles.

RADIO

Radio Reception Areas

System held in secrecy for four years tells at a glance what remote areas can receive radio signals from sender's transmitter.

➤ INSTANTANEOUS PREDICTION of radio transmission paths, a system developed by Raytheon, Waltham, Mass., in 1948 and held by the government in secrecy until now, was explained with motion pictures by Dr. J. T. deBettencourt by whom it was developed, at a joint meeting of the International Scientific Radio Union and the Institute of Radio Engineers held in Washington.

Formerly a member of Raytheon's research group and now a staff member at the Massachusetts Institute of Technology, Dr. deBettencourt supervised work that led to the discovery of a device which tells at a glance what remote areas can receive radio signals from the sender's transmitter.

Previously it has been necessary to make laborious mathematical calculations merely to obtain a less accurate approximation of the areas which could receive the signals.

Radio waves transmitted from the sender's station and reflected by the ionosphere scatter in all directions upon striking the ground at some distant point. It is these ground-scattered waves that indicate the reception area. Some of the scattered signals return to the sender's station. In the experimental work to assure certainty of results, radio beacons triggered by the scattered waves were employed. These sent tell-tale signals back to the sender's station.

Dr. deBettencourt detected the reflections with a radio receiver and electronically plotted them in terms of distance and direction on the screen of a cathode-ray oscilloscope, the "picture tube" of television sets. The results showed a region of no reception, surrounding the sending station, beyond which was an irregular circular, or partially circular, reception area, then a non-reception area again.

The picture he obtained on the screen showed what areas up to 3,000 miles away could receive his signals. The bright areas on the screen could receive the radio waves, the dark areas could not.

To make certain the returning signals were scattered by the ground rather than by elements in the atmosphere, Dr. deBettencourt and his group used radio beacons situated at various places throughout

the United States to transmit a radio pulse of their own after receiving his pulse. The beacon pulse was given a slight time delay and observed on the screen of a different oscilloscope. He thus obtained proof that scattering of the sender's radio signal occurred on the ground and not in the atmosphere as some persons had contended. To him that meant the device could be used to predict radio transmission paths to ground stations.

Such a device can be useful to persons who must rely upon radio for communication to distant points. Continually changing conditions in the atmosphere often block radio waves. The new device aids the sender in finding the best frequencies and times of day for communicating with remote stations.

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PHYSICS

Funnel Aids Auroral Glow

➤ A GIANT, but invisible, funnel acts as the passageway through which solar particles flow to give the aurora borealis, or northern lights, its luminescent glow, occasionally seen in the United States.

This was the theory presented to the National Academy of Sciences meeting in Washington by Dr. Donald H. Menzel, professor of astrophysics at Harvard University. Great clouds of ionized gas, he said, shot free from the sun and breaking through the unseen barrier of the earth's magnetic field, may cause the aurora.

This ionized gas is mostly hydrogen, and within the great clouds are clumps of denser gas, many of these clumps being larger than the earth. As the great gas clouds near the earth, they bump into the invisible magnetic lines of force that envelop our planet. This impact divides the clouds and causes most of them to flow around the earth. Sometimes, however, a particularly dense clump in the cloud will bend the magnetic lines. If the gas clouds keep piling into the dimple, or depression, thus formed, the magnetic lines may be pushed back into the shape of a great funnel, its small end resting on the earth.

When the solar ions and electrons pour through this giant invisible funnel into our atmosphere, there are the most intense occurrences of the aurora borealis, Dr. Menzel believes. The visible glow of the northern lights comes chiefly from the oxygen atoms in our atmosphere which become luminescent when struck by charged particles from the sun.

The energy that such a great gas cloud pours into the auroral regions, Dr Menzel reported, is comparable to that received during the day from the sun.

Dr. Menzel's funnel theory is an extension of work done by Dr. Sydney Chapman of Cambridge University, England, and Dr. D. F. Martyn of Australia. Dr. Chapman showed that the earth's magnetic field has little effect on solar particles until they come quite close, when the magnetic lines of force act as a bumper routing their flow around our planet.

Dr. Martyn extended this by proposing that the particles spill over the northern and southern edges of the field to cause the auroral zones.

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GENERAL SCIENCE

Academy Elects Members

➤ THIRTY MEMBERS, three foreign associates, a treasurer and two new members of the Council were elected at the National Academy of Sciences annual meeting in Washington.

The newly elected members of the Academy are:

Fuller Albright, associate professor of medicine, Harvard Medical School; Richard M. Badger, professor of chemistry, California Institute of Technology; Horace R. Byers, chairman of department of meteorology, University of Chicago; Claude Chevalley, professor of mathematics, Columbia University; G. M. Clemence, head astronomer, U. S. Naval Observatory; L. R. Cleveland, professor of zoology, Harvard University; Joseph S. Fruton, professor of biochemistry, Yale University School of Medicine; Crawford Hallock Greenewalt, president of E. I. du Pont de Nemours and Company, Inc.; D. T. Griggs, professor of geophysics, Institute of Geophysics, University of California at Los Angeles; Sterling B. Hendricks, chief chemist, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture; H. H. Hess, head of department of geology, Princeton University; C. L. Hubbs, professor of biology, Scripps Institution of Oceanography, LaJolla, Calif.; William S. Johnson, professor of organic chemistry, University of Wisconsin; Berwind P. Kaufmann, department of genetics, Carnegie Institution of Washington; Clyde K. M. Kluckhohn, professor of anthropology, Harvard University; Donald B. Lindsley, professor of psychology, University of California at Los Angeles; Philip D. McMaster, member of the Rockefeller Institute for Medical Research; Carl Niemann, professor of organic chemistry, California Institute of Technology; Chaim L. Pekeris, member of the Institute for Advanced Study, Princeton, N. J.; Norman F. Ramsey, Jr., professor of physics, Harvard University; Emilio Gino Segre, professor of physics, University of California; Robert Serber, professor of physics, Columbia University; F. H. Spedding, head of department of physical chemistry, Iowa State College; Lyman Spitzer, Jr., director of Princeton University Observatory; G. Ledyard Stebbins, Jr., professor of genetics, University of California; E. L. Tatum, professor of biology, Stanford University; Victor F. Weisskopf, professor of physics, Massachusetts Institute of Technology; John A. Wheeler, professor of physics, Princeton University; J. W. Williams, professor of chemistry, University of Wisconsin; and D. W. Woolley, member of the Rockefeller Institute for Medical Research.

New foreign associates elected are: Niels Bjerrum, professor of chemistry, Royal Veterinary and Agricultural College, Copenhagen; Tadeus Reichstein, director of organic laboratories, University of Basel; and Harald Ulrik Sverdrup, director of the Norsk Polarinstitutt, Oslo.

Dr. William J. Robbins, director of the New York Botanical Garden, was reelected treasurer for a four-year term. Dr. Robbins has served in that capacity for the past four years.

In addition to the treasurer, other officers of the Academy, all of whom are members of the Council, are: president, Detlev W. Bronk; vice president, Edwin Bidwell Wilson; home secretary, Alexander Wetmore; foreign secretary, Roger Adams.

Dr. Robert F. Loeb, professor of medicine, College of Physicians and Surgeons, New York, and Dr. W. M. Stanley, chairman of the department of biochemistry, University of California, Berkeley, were elected to membership on the Council of the Academy to serve for three years. Other members of the Council are Drs. Jesse Wakefield Beams, O. E. Buckley, Walter S. Hunter, William W. Rubey, and E. C. Stakman.

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METEOROLOGY

Predict Cool May For Both Coasts

➤ ABUNDANT SHOWERS along the coastal regions of Washington, Oregon and New England, but less than the usual amounts of rainfall in the northern half of the nation from the Rockies to the Appalachians are predicted for the rest of May.

The Weather Bureau's Extended Forecast Section also says that the rest of the nation can expect the usual amounts of rain from now until June 1.

The great plains area can expect warmer than usual weather with the northern parts of the plains going up farthest from the seasonal normals. The Atlantic and Pacific seaboards, however, will have cool May weather, while the conditions for the rest of the nation will be about as usual.

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