

engineering sciences

INSTRUMENTATION

Ice crystal replicator devised

Two scientists have constructed a practical device to make replicas of ice crystals. Dr. Frederick K. Odenrantz and Lee E. Humiston of the Naval Weapons Center, China Lake, Calif., report in *THE REVIEW OF SCIENTIFIC INSTRUMENTS* for December that their device will supply information about the mechanisms of ice crystal growth, the possible distribution of charges on the crystal surfaces, the clustering of ice crystals in the atmosphere and the way ice crystals multiply—all of which play a role in artificial rainmaking.

In the replicator, ice crystals are placed on a cold platform. A wire filament with a resinous compound is electrically heated, and the compound vaporizes, condensing and polymerizing on the crystals, thereby preserving their shapes and features in plastic.

AUTOMOBILES

Cold days and hot engines

A solution to the problem of hot engines that will not start on cold days is offered by three auto engineers in the January *SOCIETY OF AUTOMOTIVE ENGINEERS JOURNAL*.

Tests by Ross M. Stewart, Carl R. Spohn and Dr. William A. P. Myer of Gulf Research & Development Company in Pittsburgh, Pa., show that small differences in oil viscosity or battery charge could affect the engine's cranking speed. Their solution is the development of an oil that is thin enough to start cold and thick enough to start hot, even when the battery is down. The researchers point out that commercial winter-grade oils do not meet that standard and they are working on one that does.

MEASUREMENTS

Changes in temperature, voltage and gravity

A temperature scale change and new values for the volt and gravity have been made by the International Committee of Weights and Measures in Sèvres, France.

The new International Practical Temperature Scale, which measures temperature in either Celsius or Kelvin degrees, has been extended down to 13.8 degrees K. from 90.18 degrees K. The practical volt has been decreased by 11 millionths of a volt, a drop which will bring it into better agreement with the theoretical volt.

The value of the acceleration of gravity at the city of Potsdam, which is the starting reference point for gravity measurements, is 9.81260 meters per second per second. Previously, it was 9.81274.

METALLURGY

Filtering system devised

An age-old problem of the metalworking industry has been solved by borrowing from nuclear technology. Engineers at the American Machine & Foundry Company in York, Pa., have found a way to avoid the costly and time-consuming shutdowns that are needed to clean out the solids that accumulate in electroplating baths.

The engineers have devised a filtering system based on one AMF had developed for the nuclear industry. It consists of a 55-gallon plastic container housing seven filter bags made from a specially developed synthetic fiber and a pump.

HEATING

Mini-boiler developed

An experimental mini-furnace that promises to reduce the home furnace to the size of a two-pound coffee can is called a major advance in heat transfer technology by its developer, Raytheon Company.

The experimental device burns gas (natural, manufactured or bottled) in its small combustion chamber and transfers the heat to make hot water, steam or hot air. Its efficiency is 85 percent.

The secret of the boiler is an internal arrangement that produces a turbulent flow of gas to prevent the formation of the insulating layer of heated gas that impedes heat transfer in most boilers.

The device produces 150,000 British Thermal Units per hour—enough heat for a nine-room house in winter.

MATERIALS

Smoke and gas producers tested

Laboratory tests by the National Bureau of Standards have determined the materials inside an aircraft that will give off the most smoke and harmful gases in a fire.

Evaluations of 141 materials show that most do not generate large quantities of smoke or gas. Of the harmful gases found, the worst offenders are hydrogen chloride from burning polyvinyl chloride plastics and insulation and from modacrylic draperies, hydrogen fluoride from polyvinyl fluoride, hydrogen cyanide from wool and from several plastic materials, sulfur dioxide from the plastic polysulfone and from rubber materials, and carbon monoxide from nearly all of the above.

The biggest smoke producer was the acrylonitrile-butadiene-styrene plastic found in paneling.

MINING

Uranium mine radiation level set

Establishment of the new radiation limit of three-tenths of a working level for uranium mines with Atomic Energy Commission contracts does not end the problem of safe working levels (SN: 12/28, p. 638).

Set by former Secretary of Labor W. Willard Wirtz and automatically put into effect Jan. 1 with a two-year grace period, the three-tenths level must still be shown to be attainable. Many think it is not.

During his final days in office, President Johnson approved a Federal Radiation Council recommendation that called for follow-up investigations to determine the feasibility and effectiveness of the three-tenths level.

Despite the two-year extension, uranium mines still cannot go over the former one-working level, and only those mineowners who meet safety standards and who are trying to reach the three-tenths level are eligible to apply for the two-year extension.