

## ENGINEERING

# New Heating System

Chemical liquids which vaporize at high temperatures may replace water in home heating plants. Radiators may be warmed by high volatile liquid.

► HOME OWNERS who now rely upon water and steam to warm their radiators and baths may find chemical liquids which vaporize at high temperatures for future mediums for conveying heat in their houses.

Engineers convening in New York for the 52nd annual meeting of the American Society of Heating and Ventilating Engineers heard a report on developments in the domestic power field by Orion O. Oaks of the John B. Pierce Foundation. Experiments by the Foundation were begun early in the war in conjunction with the Office of Product Research and Development of the National Housing Agency with a liquid known as tetra-cresyl silicate. This liquid, which may be heated up to 817 degrees Fahrenheit without vaporizing, may well change domestic heating practice.

Two other chemicals are being experimented with for possible domestic application. They are Dowtherm A and Dowtherm E, products of the Dow Chemical Company, now used in industries concerned with molding plastic products, cooking varnishes, processing foods or other high temperature operations. Dowtherm A is a mixture of 73.5% diphenyl-oxide and 26.5% diphenyl. Dowtherm E has the chemical formula  $C_6H_4Cl_2$  (inhibited orthodichlorobenzene). Use of such chemicals, while not new in industry, is new in domestic practice.

Using such "fluid heat" methods, a home could be powered from one source of heat. The independent power plants of the kitchen refrigerator, stove, dishwasher and washing machine might be eliminated. In their place would be a consolidated, single-fluid heating unit which would provide energy for every appliance, including the iron. Special tubing, instead of present electrical wiring, would carry the energy in the form of heat in the liquid around the house.

For use in home units a chemical such as tetra-cresyl silicate or Dowtherm must have high and controllable temperatures with relatively low pressures. Uniformity, non-toxic and non-poisonous characteristics are required. The liquid

must have a boiling point many degrees higher than the highest working temperature and be of a permanent chemical structure. It must also be inactive toward materials used in fabrication.

Power and light are planned to be possible with installation of additional equipment. Success in this field would aid many farm communities and areas where power lines do not run. A saving of 48% in favor of liquid heat over anthracite coal is claimed by the Pierce Foundation in their experiments, and such savings would offset any added expenditures in installation of equipment.

Home unit are still in the development stage, according to Clarence W. Farrier, Technical Director of the National Housing Agency. One utility core unit consolidates the household heating, plumbing, electrical, bath, kitchen and laundry elements in a space no larger than a closet. Prefabricated, it can be rolled through the house framework during the building period.

This unit, being developed by the Ingersoll Division of the Borg-Warner Corp., could use fluid heat should application seem feasible. A unit known as the Grebe Plan, still in the development stage at the Dow Chemical, Midland, Michigan, plant, put all the kitchen and bath equipment in a U-shaped unit eight by 12 feet and about room height. The Pierce unit would operate any appliance that utilizes heat, including steam and hot water boilers.

Use of liquid heat would allow vari-

ous equipment to be integrated into one unit so that piping connections and other parts, including actual appliances, could be factory installed. This would reduce the inefficiency of poor field connections and eliminate numerous separate installations. Continued developments promise great savings and added comfort for home owners of the future.

*Science News Letter, February 9, 1946*

## CHEMISTRY

## Ammonium Nitrate in Liquid Ammonia as Fuel

► A COMPLETELY revolutionary idea for fueling internal combustion engines is embodied in U. S. patent 2,393,594, issued to Dr. Clyde O. Davis, a chemist in the employ of E. I. du Pont de Nemours and Company, to which firm he has assigned rights in his invention.

Dr. Davis' proposal is to use as fuel a solution of ammonium nitrate in liquid anhydrous ammonia. Since ammonium nitrate contains oxygen which can be liberated and immediately recombined with the other elements, such an engine would need no outside source of oxygen, and could operate in the higher stratosphere, in submarines and in other places where air intakes present serious problems. Such an engine would be making use of the principle already successfully applied in guns and powder-propelled rockets; for powder also contains its own internal supply of oxygen, in the form of the nitrate atom-group.

An engine of this type should be non-fouling, for the elemental constituents of the fuel are gaseous at all except the very lowest temperatures. Moreover, since both ammonia and nitric acid can be made synthetically from constituents of air and water, such engines would be completely independent of a dwindling petroleum supply.

*Science News Letter, February 9, 1946*

## ANYONE CAN USE A SLIDE RULE

Absolutely no math background needed if you have the **PRACTICAL SLIDE RULE MANUAL** by J. M. Klock, Mathematician for the U. S. Navy and former instructor in the Detroit Public Evening Schools. An absolutely non-technical explanation of how to use a slide rule for the fundamental math calculations. **STUDENTS** of all math, science, and technical subjects will find the use of a slide rule to be a great aid in their work. **SHOP AND TECHNICIANS:** special applications made to formulae from mathematics, engineering, aeronautics, air navigation, etc. The slide rule gives rapid solutions to all the basic formulae. **OFFICE:** and business administration applications are numerous. The slide rule is especially valuable in per cent and interest work, and cost accounting. The booklet includes chapters on these subjects. The slide rule is also a valuable rapid estimator.

Large illustrations. Simple and non-technical explanations. Based on 9 terms of teaching adults. With this booklet anyone who knows the simplest arithmetic can easily learn the slide rule. Starts from a simple reading of the scales, and goes on through the most advanced practical work. Booklets are sent postpaid by return mail. Send today, and learn a skill that will help you during post-war times. Send \$1.00 to

SLIDE RULE • BOX 2293 • DETROIT 31, MICHIGAN