effect in smoke production by different percentages of anthracite added to bituminous.

But in the field of dust limitations the anthracite user may have problems. Considerable flue dust can develop from firing fine sizes of anthracite with a forced-draft system. Very few papers give information on dust emission from equipment burning fine anthracite. C S Gladden's paper, "Cinder and Fly-ash Factors When Burning Small Anthracite Coal on Traveling-Grate Stokers" (ASME, 1946), represents about the best source for such data. Here is a point where the anthracite industry can investigate equipment designs for burning small-size anthracite and keep anthracite from becoming a source of dust-nuisance. *AC Paper No. 3.*

The Burning of Anthracite in Power Plants, *by R L Hallman, Pennsylvania Power & Light Co.* The unavailability and large price increase in No. 3 buckwheat has forced anthracite-burning utilities to change combustion-equipment design so it handles No. 4 and 5 buckwheat and silt.

Coal-handling problems increase considerably with these finer sizes of coal. Car shakeouts, slicers and rotary car dumpers, which must be used, add materially to costs. When these coals freeze to 3- or 4-in. thickness and above, some coal-thawing method has to be applied. In addition larger openings, gates and chutes up to 30 in. must be provided for coal movement. Bunkers, hoppers, chutes and spouts require a lining of stainless steel or a nonferrous material to give a smooth surface.

Firing-equipment design must also be revised to handle the smaller coal sizes. Since it is expensive to change stoker length, most operators increase stoker speed to get around one problem the fuel imposes. But this means more maintenance. Further changes must be made on individual area of air-admitting spaces to improve air-distribution and cut down on siftings.

The difficulties coal-producing companies have in preparing No. 3 and No. 4 buckwheat show up at the stoker. The fuel bed mats over as the moisture is driven off. Location and shape of furnace arches must be changed to give proper gas velocity and mixing.

With pulverized coal-fired units considerable erosion develops on fan-blading from entrainment of flyash and cinder in the gas streams. The author then goes into a discussion of the new Sunbury Station of the company planned for fairly early operation. *AC Paper No. 7.*

To Obtain Complete Text

Material in these briefs comes from one of three sources:

Midwest Power Conference, Tenth annual meeting, Chicago, April 7-9, 1948. Papers are identified by initials *MPC.* Available about August 1 in Volume X, Proceedings of Midwest Power Conference, 1948, $3, through Stanton E Winston, Conference Director, Illinois Institute of Technology, 3300 Federal St, Chicago 16.

American Society of Mechanical Engineers, annual meeting, Atlantic City, N. J. Dec 1-5, 1947. Papers are identified by initials *ASME* and paper No. Available while supply lasts at ASME, 29 W 39th St, New York.

Anthracite Conference of Lehigh Univ, Bethlehem, Pa. 6th annual meeting, Bethlehem, May 6-7, 1948. Papers are identified by initials *AC* and paper No. Available in the *Transactions* through A C Callen, conference chairman, Lehigh Univ, Bethlehem.

The Pulverized Anthracite Installation at the Suburban Plant of the Scranton Electric Co, *by D D Schulz, Scranton Electric Co.* A steam-generating unit, guaranteed to produce from 180,000 to 310,000 lb of steam per hr at efficiencies ranging from 86.7% to 85.2%, is the first large high-pressure high-temperature direct-fired pulverized-anthracite unit to go into service. The coal will be No. 4 and No. 5 buckwheat. Steam will be delivered at 1350 psi and 1000 F to a 19-stage turbine-generator of 35,000-kw peak capacity. The author describes the major equipment and its function in this plant. *AC Paper No. 8.*

Experimental Combustion of Pulverized Coal at Atmospheric and Elevated Pressures, *by Battelle Memorial Institute: Herbert R Hazard and Fred D Buckley.* Combustion of pulverized coal at high heat-release rates under a wide range of static pressures constitutes one of the basic engineering problems in gas-turbine plant development. A study sponsored by the Locomotive Development Committee of Bituminous Coal Research, Inc set up four small air-cooled combustors to operate in connection with a small gas turbine.

To determine effect of pressure upon combustion a special furnace was employed. It had three sizes of burners operating from 2 to 75 psi and firing from 40 to 130 lb per hr of coal.

Burners were geometrically similar but dimensions differed to give equal burner-tip velocities for equal firing rates at design pressures of 2, 30 and 60 psi. Design called for a spinning secondary air stream from the burners. Tests in the open showed effective coal and air mixing but no swirling action. These burners, accordingly, are to be considered as premixing units.

A high-volatile low-ash high-ash-fusion-temperature coal, Elkhorn No. 1, was used throughout all tests. It was fed to the furnace by a pressure hopper carrying about 700 lb of coal under furnace pressure, plus a few pounds for pressure drop through a ¾-in. piping and rubber-hose system.

A variable-speed feed screw moved the coal in the piping. Maintaining a uniform rate of feed proved difficult. A momentary decrease in furnace pressure developed a surge in coal, whereas an increase in furnace pressure pushed air back into the feed system, retarding coal flow.

All data obtained from pressure furnace operation indicate that combustion reactions are not affected appreciably by pressure, at least up to 75 psi. *ASME Paper No. 47-A-117.*

HEATING

Investigation of the Heat Pump in the Chicago Area, *by M S Olderr, Utilities Research Commission.* Based on present knowledge, the heat pump can be considered in the Chicago area for only better than average homes where cooling as well as electric-heating advantages are desired. Cost of equipment and operation cannot be the sole consideration.

The heat pump can be used advantageously in many industrial installations for evaporating various products, milk, brine, pharmaceuticals—and for heating water. In evaporation one kw input to the heat pump may evaporate 20 to 50 lb of water depending on operating pressure and temperature.

One outstanding characteristic of the heat pump, seldom discussed in America, is its fuel-saving possibilities. For instance, a domestic coal-burning heating plant operates at about 60% efficiency. A system using electric resistance heating gets about 25% of the heat available in each lb of coal. A heat pump with a coefficient of performance of 4.0 could theoretically deliver the equivalent of 100% of the heat available in the coal at the generating station where the electricity is developed. *MPC Paper.*

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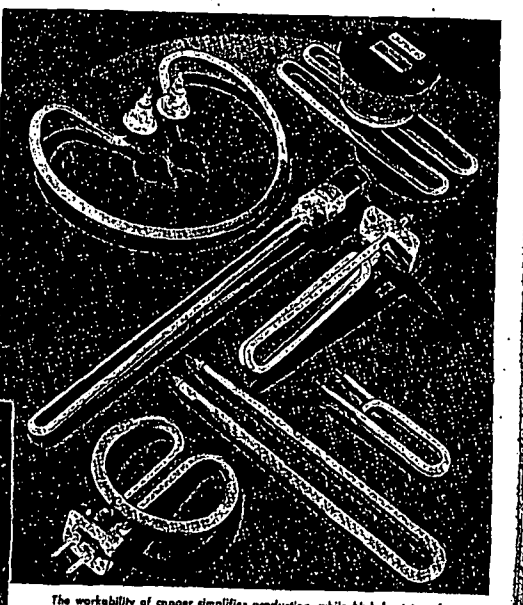
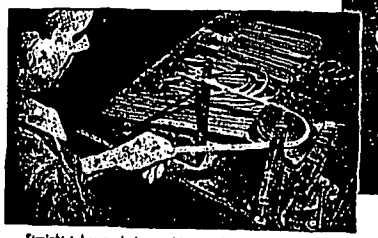


The workability of copper simplifies production, while high heat transfer and corrosion-resistance add to performance of these Chromalox Immersion Heaters. Those shown here are for small vessels. Blade-type heaters are available for larger tanks, kettles and vats.



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In making these heaters, chrome-nickel resistance wire is imbedded in a special refractory and completely encased in straight tubes. Because of the ductility of the annealed copper tubes, intricate bends and offsets are then easily made, and the round elements compacted into triangular cross section under pressure of 20 tons p.s.i. to assure thorough compactness.

There's no end to the utility of copper tubes for industrial applications. Whether for heat exchange use, for fuel and water lines or large diameter process piping, copper offers standout advantages. You'll find commonly used sizes in stock at your nearest Anaconda Distributor.

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