CHEMISTRY

Postwar Furnace

Radically different from conventional anthracite furnaces, the combustion chamber of the new device is a plain horizontal steel tube fed by a mechanical "worm."

➤ COAL-SAVING, space-saving, labor-saving are the three principal characteristics of a new anthracite-burning heating equipment for postwar homes which will result from extensive studies made over the past year by scientists and heating engineers of Anthracite Industries, Inc., in its laboratories in Pennsylvania.

The design of the new furnaces will be radically different from conventional furnaces, as the combustion is based on a new principle. Laboratory models of the burning mechanism were demonstrated in Primos, Pa., before a group of scientists, heating engineers, heating equipment manufacturers and others.

The combustion chamber of this new device is a plain horizontal steel tube, 18 inches long, and either four or six inches in diameter, into which the anthracite is pushed at one end and burned in the center section. Ashes, which finally drop from the end of the tube, occupy the rest of the space. A mechanical worm, similar to the endless screw in the familiar household meat grinder, keeps the fresh coal, the burning fuel, and the ashes in a steady movement from one end of the tube to the other. This worm is in a delivery tube, a prolongation of the 18-inch tube where combustion takes place.

While the worm is in operation, pushing the anthracite into the combustion section, a constant stream of air is pulled by a suction pump placed over the worm section of the feeding tube, into the opposite open end of the combustion tube, through the ashes to the burning section. Any gases resulting from combustion are drawn by it onward through the unignited coal, which absorbs much of their heat, and pass through the pump to an escape flue.

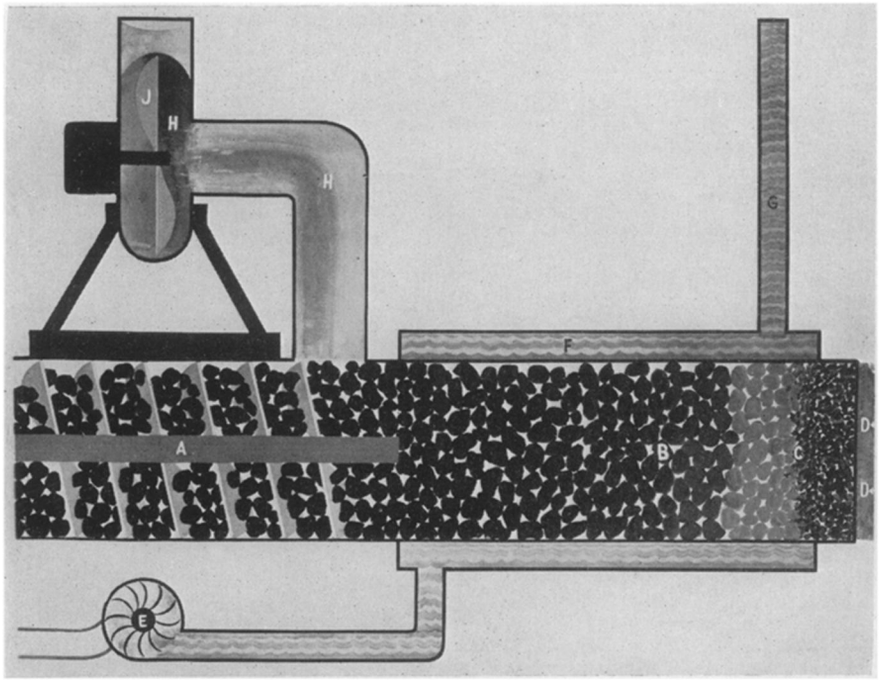
A water jacket with a layer of water about an inch thick surrounds the 18-inch steel tube and absorbs the heat from the steel itself. This water is in continuous circulation within the water jacket and throughout the hot water radiators in the house. It is kept in circulation by a small electric pump in much the same way as the water in an automobile engine is circulated through the engine and radiator.

To ignite the coal, when the heating unit is put into operation, a small bag of shredded paper, shavings and charcoal is stuffed in the ash-end of the tube just ahead of the coal. When this is lighted with a match and the suction fan started, the coal is ignited almost immediately. It will continue to burn as long as fresh coal and air are supplied. The rapidity of combustion may be controlled with thermostats, which will regulate the speed of the suction pump and the screw feeder.

The economy of this new device is due to the complete combustion resulting when the coal and air supplies are properly regulated, and also to the high rate of heat absorption by the steel tube and the surrounding water in the water jacket. In addition the device prevents the loss of vast quantities of heat which often pass off in the gases that collect above the firebed in the ordinary furnace and escape only partly burned.

Just how economical the new furnace and method of burning anthracite will prove cannot be determined until household units are designed and scientifically tested. In the new method the coal is consumed from five to six times as rapidly as in the conventional furnace but the amount of coal burned is much less, and tests show that it liberates much more heat. In contrast with present home heating equipment, which burns anthracite at the maximum rate of approximately 10 pounds per square foot per hour, the new development makes it possible to burn 50 to 60 pounds per square foot per hour. This liberates over 500,000 B.T.U. (the British Thermal Unit, commonly used in America) per cubic foot as compared with 50,000 liberated with present-day equipment. As a result, the heat absorption per square foot of heating surface is raised from 6,000 B.T.U. to 40,000 or 50,000, with a reduction in the total amount of coal consumed during the heating season.

The principle of the new burner, according to Dr. Raymond C. Johnson in charge of research for Anthracite Industries, "is founded upon a basic characteristic of anthracite combustion. Anthra-



TOMORROW'S FURNACE—A tube surrounded with a water jacket! A revolving worm (A) feeds the coal into one end; ashes are at the other end. Air enters at (D) and is drawn through by a fan (J) in the smoke pipe (H). The water (F) is forced through the jacket by a circulator (E) and carries the heat to the house through the outlet pipe (G).

cite, unlike most other fuels, under proper conditions can be made to burn to complete and perfect combustion within its own area without the necessity for secondary air or secondary combustion space."

Without the need for this secondary space the complete unit using the new method will probably not require over a two-by-three foot floor area and will not stand over two feet high.

The new furnace may be adapted to hot-air and to steam-heating systems. With special adaptations the principle may be used in an upright gravity-fed cylinder with a hand ash-shaking device. No clinkers form in the new furnace because, despite the higher rate of burning, the small fire bed permits the water surrounding the tube to carry off the heat so rapidly that the actual temperature of the burning coal is lower than the point at which clinkers form in anthracite fire.

Science News Letter, August 26, 1944

ECONOMICS

Plenty of Gasoline

In the immediate postwar period, gasoline will be plentiful. Unsettled conditions may restrict vacation travel.

➤ PASSENGER car owners may have nearly 700 gallons of gas apiece to drive on in 1945, if the war in Europe should be over by that time, and if estimates made by C. L. Burrill, petroleum economist of the Standard Oil Company of New Jersey, as reported to *Petroleum Technology,* are correct

In any event, Mr. Burrill states, gasoline will be plentiful in the immediate postwar period as military consumption declines. Gasoline consumption will be heavy because cars will be older, and probably use more gasoline per mile of travel. Also contributing to the heavy consumption of gasoline will be the large amount of automotive travel by families returning to their homes from war production centers.

Vacation travel, Mr. Burrill points out, may be restricted during the time that war workers are shifting to civilian industry and soldiers are being demobilized. This, and the fact that many cars will be in poor repair, may tend to hold gasoline consumption down to a normal level, and prevent it from skyrocketing.

In addition to the crude oil produced in the United States, the total supply of petroleum products available to meet postwar requirements includes a substantial amount of natural gasoline as well as imports of fuel oil and heavy crude oil.

It is generally believed, Mr. Burrill states, that one important effect of the substantial construction of catalytic cracking plants during the war will be to increase the yields of light products at the expense of the yield of residual fuel oil, thereby making it possible to produce the light product requirements with less crude oil than would be necessary with the older thermal cracking process.

Science News Letter, August 26, 1944

PHYSICS

Lightweight Telephone Switching Unit Developed

➤ A WORKABLE telephone switching unit weighing only a few ounces and so compact that the operator can carry the parts in his pocket or in a pouch of his cartridge belt, has been put into service by the Army. The unit is designed for use where it is not practical or possible to carry regulation switchboards, such as in the field while under fire.

Basis for the new communications system is a transparent plastic plug with fasteners for line connections, a neon lamp that responds to ringing signals, in place of a bell, and two combination jacks and plugs for tandem connections.

The operator can make not only individual connections but conference connections by calling the desired parties individually and connecting the adapter plugs in tandem. When a conversation has been concluded, the parties flash the operator, who then disconnects the plugs.

The new unit was developed by the Signal Corps in response to the need for substituting a visual signal for a bell signal. A bell can be heard for considerable distances by enemy snipers. The greater use of the new light unit for substitute emergency switchboards was a by-product.

In use, the operator attaches the field wire pair entering his outpost to the new unit, and connects his telephone by a short length of wire to another unit plug. Incoming calls flash the lamp in the first unit plug, and this signals the operator, who then makes connection with his telephone set by putting the two plugs together.

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Pyrethrum grown in Peru and Ecuador is found to be of equal quality with the Japanese-grown insecticide plant.

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