CONSERVATION

You Can Save Fuel

National Defense Will Be Aided If You Follow Suggestions of Engineers for Saving Heat in Your Home

By WEBB WALDRON

HOW MUCH money you may save through improving the efficiency of your heating plant is shown by the experience of 7500 Baltimore families who use oil burners. Last year, their oil dealer consulted government experts and ascertained that with a highly efficient heater (either oil or coal) the chimney flue would not get hotter than 600° and the carbon dioxide content in the flue would be 10 per cent.

The dealer's service men went over every customer's furnace, adjusted the oil burner, regulated draft, repaired leaks, cleaned the boiler. They could not get every chimney to test up to the government ideal—particularly where coal furnaces had been converted to burn oil. But the 7500 families were comfortable with 1,400,000 fewer gallons of fuel oil last winter. One family saved 32 per cent on its oil bill and the average saving was $18.75.

Now the Baltimore idea is being applied on a wider scale. There are 1,260,000 families east of the Alleghenies burning too much fuel oil, experts assert; if cleaning, repairs and adjustments could bring the carbon dioxide in these chimneys even up to 8 per cent, it would save enough fuel oil to release ten tankers to Britain.

The 2000 oil burner dealers in the East have been vigorously pushing a "War on Waste." They offer analysis and check-up for $3 to $5; every oil-using household should have it done. I know one Connecticut family which cut its oil bill 20 per cent by this means last year.

Coal Efficiency Up to You

If you burn oil or gas, you are in the hands of your service man, but if you fire a coal furnace, efficiency is up to you.

A thin fire wastes fuel. The deeper the fuel bed the better the combustion, and the less coal used. The less a coal fire is disturbed, the better. Never poke an anthracite fire from the top. At night, shake the grates gently till the ash-pit shows a glow, then fill the fire pot. One great fault of average householders is that in the morning they open up the furnace and fire it all at once. The house in an hour or so may jump from 60° to 80°. If you do that, you're wasting coal. Add a thin layer of coal in the morning, and after the fire has started up, fill the fire pot. Later on, when the fire is vigorously burning and checked, the grates may be gently shaken, cleaning the fire of ash.

If you use bituminous coal, never cover the entire bed of fire with fresh fuel. Leave a spot uncovered to ignite the gasses driven off from the new coal. If these gasses go up the flue unburned, you're losing a lot of heat.

Draft Is Important

Draft is important. With too little oxygen, the coal can't burn completely, yet too much air cools the gasses so that they will escape before they're burned and you'll have smoke instead of heat. Smoke is always proof of waste; the householder who runs a smokeless fire saves money for himself and helps keep his town clean.

Coke needs a larger fire-box than coal so that it will not burn out too quickly. Be chary of shaking coke.

Few householders are careful enough in handling draft and damper. In most cases, it would be economical to put in a thermostat control, at a cost of $25 or so.

Experts all agree that sifting your ashes is unnecessary. If you're getting much unburned coal in the ashpit you're using too thin a fire or shaking the fire too much, or your grates are broken, or you're buying coal too small for the grates so it drops through unburned, or too large, so it doesn't burn completely. With egg coal, in a thin fuel bed or a small fire-box, a heart of green coal is often left inside pieces that look like ash. Stove coal is the best size of anthracite for the average furnace. If your plant is properly operated, you will not have over 3 per cent loss of coal in the ash pit, much of it so finely distributed through the ash that you can't reclaim it.

Be sure that your fire-box is tight. Are furnace and pipes well insulated? It isn't too difficult to cover them yourself with asbestos.

Is boiler water clean? Even the best gets rusty from the pipes; perhaps your local water is high in iron, lime or other minerals. Scum impedes the water from breaking into steam. Minerals crust the boiler pipes. Have your boiler flushed out each season, and its pipes cleaned. A 1/32 inch of fly-ash on the heating surface of the boiler loses you 10 per cent of your fuel.

One-eighth inch of soot is as much insulation between fire and boiler water as two inches of concrete. See that the inside of your furnace is well cleaned with a vacuum cleaner and wire brushes. Keep your chimney clean. A dirty chimney hinders draft and is a fire hazard.

Sometimes the steam pressure in one-pipe systems seems unable to push the slug of cold inert air out of certain radiators, so that they stay cold. Fast-venting valves should be installed.

With a warm air system, be sure your dust filters are clean. New filters are inexpensive. Dirty ones impede heat circulation.

Does it pay to push the thermostat down at night? Engineers have violently opposed opinions. Some insist the fuel saved at night is all used warming the house again in the morning. However, in careful tests at the University of Illinois, shifting the thermostat from 72° to 60° between 10 p.m. and 4:30 a.m. saved fuel—from 7 per cent to 11 per cent, depending on the weather. Just how much *you* save will depend partly on your house. A well-insulated house with storm windows and weather-stripping will cool very slowly after the thermostat is set lower, and will warm quickly in the morning.

Place on Inside Wall

Location of the thermostat is important. It is best placed on an inside wall, away from fireplace, chimney or radiator, likewise away from outer doors.

Old-type thermostats that lag four or five degrees waste fuel. The newer type holds heat within one degree of where you set it, saving fuel.

Extravagant statements have been made about the value of humidification. It has been said that if a home was properly humidified 68° or even 65° was comfortable, thus saving a good deal of fuel. Humid air feels warmer than dry air at the same temperature, but the National Bureau of Standards states that the amount of fuel required to evaporate water to obtain a feeling of warmth is probably greater than that required to achieve the same results by maintaining a slightly higher temperature.

Moreover, the American Society of Heating and Ventilating Engineers states that all tests as to the bad effects of dry air on health have been negative or indecisive.

See that your fireplaces have dampers. Otherwise tremendous quantities of heat flit up their chimneys.

Will you save heat by cutting off an unused room? If it's an isolated room, you certainly will, but if it is surrounded by heated rooms, you don't. You'll simply be heating it inefficiently—i. e., expensively—through walls and floor. Sometimes housewives, distressed by ugly steam radiators, hide them with pretty covers. They might as well put the radiators in a clothes closet and shut the door.

Keeping a house at much above 70° is expensive. In the latitude of Washington, D. C., it takes one-fifth more fuel to hold a house at 75° than at 70°.

Free circulation of air from room to room is important in conserving fuel, especially with hot air systems. It is almost impossible to heat a cold room unless its doors are open to the other parts of the house, so that circulation is set up in the room.

If you follow such of these suggestions as apply to your home, you'll be doing your part in conserving fuel for national defense, with no sacrifice of comfort or danger to health.

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ASTRONOMY

Stars Have Atmospheric Shells Like the Sun's Corona

Two Groups of Extended Atmosphere Described; One At Rest on Star, the Other Expanding Rapidly

THE ATMOSPHERES of the distant stars may have regions similar to those of our sun, which itself is a star.

Dr. Otto Struve, director of Yerkes Observatory, uses the terms "reversing layers," "chromosphere," and "corona," in describing the outer portions of stars which appear to have shells of gas surrounding them, although their atmospheres are probably not exactly the same as the sun's.

The picture of a star as a spherical mass of gas with an opaque surface radiating most of its light is no longer one which tells the whole story. During the past two years, Dr. P. Swings and Dr. Struve have secured a large number of peculiar stellar spectra at the new McDonald Observatory in Texas. These, and observations from Mt. Wilson and Victoria, formed the basis for Dr. Struve's recent discussion before the American Astronomical Society.

There are two groups of extended atmospheres. The first kind remain at rest with respect to the star itself, while the second expand, with more or less rapid motion. Novae, or new stars, are characterized by expanding shells which are eventually observed visually as well as spectroscopically, and appear to form what are called "planetary" nebulae.

Dr. Struve advances the hypothesis that fundamentally all stars which exhibit shells are alike, and that the tendency of a star to produce a shell results either from rapid rotation of the reversing layer (portion of its atmosphere which produces the dark lines in the star's spectrum) or from a tendency of the star to become double. This latter case is observed in the star Beta Lyrae, which is shaped like an hour glass, and has a tail of matter streaming from it and forming a shell around it.

In stars with shells, three layers are distinguished. The first is the stationary reversing layer, but it is in rapid rotation; then comes an inner stationary shell which shows little or no rotation, and which Dr. Struve calls the chromosphere; finally the outer, expanding shell, which he calls the corona. In some stars the outer shells are one or the other or both opaque, while in others they are transparent, and these differences produce important observed differences in their spectra.

However, Dr. Struve pointed out that there are stars which are known to be in rapid axial rotation, but which show no shell around them. No explanation for this is given at present.

Closely related to Dr. Struve's researches are those of Dr. Paul W. Merrill, of Mt. Wilson Observatory. He classifies the lines observed in a star's spectrum into three groups: "stellar" lines are produced in the reversing layers of the stars themselves; "semi-detached" lines come from extended stellar atmospheres or shells, and from the so-called planetary nebulae; "interstellar" lines originate in clouds of sodium, calcium and other elements in the tremendous spaces between the stars. The interstellar lines are recognized because they do not shift their positions according to the star's motion, as do stellar lines. The semi-detached lines show similar characteristics, but do not increase in intensity with increasing distance of the stars.

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