ENGINEERING

Fuel To Be Plentiful

We will all keep warm this winter unless there is unforeseen slow-down in production. Kerosene may be scarce because it fuels jet planes.

By A. C. MONAHAN

➤ THERE will be fuel enough to keep American homes comfortable during the coming winter unless a greater emergency should develop or there should be unexpected slow-down in production.

Kerosene may be in short supply because it is the principal fuel for jet-propelled planes. Heating oils may be a little less efficient because certain components ordinarily included are needed in high-octane aviation fuels. No shortages in coal, wood and natural gas are foreseen.

Military needs for high-octane components of aircraft fuels, and they are mounting, will lower the octane value of civilian motor gasolines. If an all-out-war need for large quantities of jet fuel should develop, it will cut deeply into kerosene, range oil and other fuel production. An improved fuel for jet planes uses a mixture of kerosene with heating and diesel oils.

On the other hand, the oil industry is now producing some 3,000,000 barrels of motor fuels a day, and another 500,000 barrels a day could be produced. Along with this increased production of motor fuels, heating oil production might increase.

Coal First Choice

While coal is still the number one fuel used in heating American homes, it is fast losing its place to oil and gas. Exact figures of oil-heating of homes are not available but a two-year-old estimate indicates some 4,000,000 homes used oil for fuel at that time. About 7,200,000 householders now heat with gas, according to the American Gas Association. Oil and gas gains in home heating follow developments in U. S. industry. These fuels now supply 56% of the nation's energy requirements Coal's share is 38% as compared with 71% in 1925.

American scientists are actively developing home-heating systems which do not use the customary fuels. Capturing and putting to work the direct heat of the sun is one. Abstracting heat from the cold earth below frostline or from cold water in deep wells is another. This requires energy to operate so-called heat pumps, but uses economical energy from electrical sources.

Heat from Sun

Solar energy used to heat the homes of the future may be the result of experimental work under way in many parts of the country. An experimental solar house at Cambridge, Mass., operated by the Massachusetts Institute of Technology, got three-fourths of the heat needed to keep it comfortable during the past winter from the direct energy of the sun.

In this five-room house the sun's rays, passing through a heat collector on its southern roof, heated water in a tank. The water then circulated through radiators in the various rooms, or stored the heat of sunshiny days for night and cloudy conditions. For extended cloudy periods, electrical heat was used to supplement the stored heat. This is but one example of many types of solar houses under experimental development.

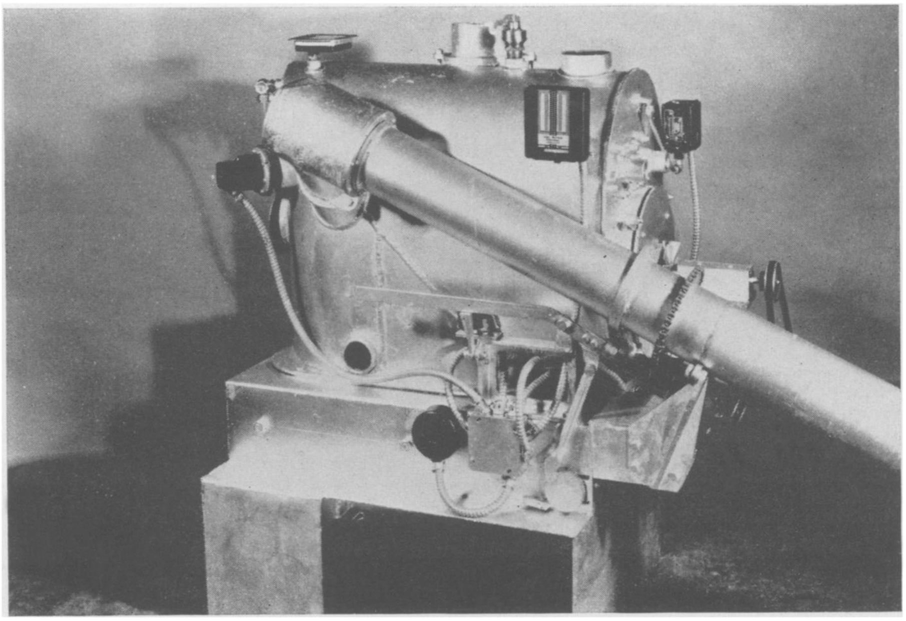
Many houses in the United States, and in foreign countries as well, are being successfully heated by means of heat-pumps which circulate a refrigerant through pipes buried in the earth below the frost line or extending into deep water wells. The principle involved is the mechanical refrigerator in reserve.

Always Heat in Earth

No matter how cold the earth or water may be, there is some heat in it. The refrigerant, tending to evaporate in the pipes, picks up heat which is accumulated and delivered to the house.

No matter what type of fuel is used to heat the home there are two essentials in economic heating. One is a house tight enough to hold heat; the other is a well-cared-for and efficient furnace. Economical heating can not be expected with a "leaky" building, or if the heat from the fuel is wasted up the chimney.

One of the first essentials in home heating is to fill cracks and crevices through which heated air from the inside gets out



NEW STYLE—The unjacketed operating part of a revolutionary anthracite coal furnace reveals the tube in which combustion takes place. A stream of coal is fed into one end of the tube and air for combustion is drawn in the other end.

SUN WARMED—Large windows in the living room of the Massachusetts Institute of Technology solar house in Cambridge, Mass., help capture heat from the sun, but the main capture device is on the roof above. The heat storage tank containing water is just under the roof.

or cold air from the outside gets in. These air passages may be around the window and door frames, between frames and sashes, along sills in the basement or eaves of the roof. Stuffing with rags or paper will close them. Better, however, are some of the putty-like materials plentiful on the market which were developed for this particular purpose. Weatherproofing strips, easily inserted between sash and frame of a window, make tight, leak-proof joints.

Double windows, particularly on the windy side of a house, will pay for themselves in a very few seasons. Some engineers say they can save up to 25% on fuel costs. Evidence of their value is immediate with a touch of the hand on the inside of a single window, and then on the inner pane of a window opening having double windows.

A furnace to be efficient must be clean. If the inside flues through which air or water to be heated are coated with soot from the fire, heat does not get through. A layer of soot is an excellent insulator. Any householder, with the wire brushes available for the purpose, can keep the flues clean. Dampers and checks must also be kept in good condition.

Very important in keeping a house warm, where coal is used as the fuel, is proper firing. Smoke rolling from the chimney is usually a sure sign of waste and improper firing. Anthracite users, of course, have no trouble from smoke. But if a shovelful of bituminous coal is scattered over a hot fire, volumes of soot and volatile unconsumed combustible gases immediately arise and escape up the chimney.

Good firemen heap the bituminous in a conical pile in the center or in a sloping pile on one side. Combustion then takes place along the edges of the slopes.

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AERONAUTICS

Plane Spotting Obsolete

More than 150,000 volunteer civilian aircraft spotters taking part in recent training exercises were wasting time. Process too slow and outmoded by radar.

➤ MORE than 150,000 patriotic volunteer civilian aircraft spotters wasted their time in a recent weekend test, learning something which is obsolete and will be of little use to the defense of the United States. And thousands more will do so as the training program continues.

Volunteer airplane spotters on training exercises spend two hours or more in their observation posts. Every plane a volunteer sees, he reports through regular telephone channels to an area filter center. This report then is coordinated with others, plotted and relayed to radar centers. Radar centers evaluate the reports and send jet fighters after theoretical enemy planes.

By the time all this time-consuming process has been followed, the "enemy planes" would have A-bombed the coastal cities and headed out to sea again.

Even in World War II, plots from civilian spotters were always behind plots from radar in our coastal cities. Sometimes the lag was as much as five minutes.

It is almost impossible to tell by the eye alone whether a bomber flying at 40.-000 feet is friend or enemy. It is impossible to identify fighters at that height. Radar can do this instantaneously because friendly planes carry an electronic device known as IFF—"Identification, Friend or Foe." In addition Russia is believed to have in production a plane that looks almost exactly like our B-29.

Higher top and cruising speeds of bombers and the increased altitudes at which they fly will not give the air defenses time to use the information which comes from the civilian spotters. The B-29 top speed is over 350 miles per hour, the B-36 top speed over 435. The Russians may well equal or surpass that.

Jet fighters have an extremely fast climbing rate—how fast is a secret—but if they had to depend on civilian spotters for information, in many cases they could not even start climbing until after an enemy bomber had done its damage and started home.

During World War II most vital American coastal cities were ringed with radar networks. They could spot planes as far as 150 miles out at sea. Some present-day radar sets can spot storms—and presumably planes—as far away as 250 miles. Civilian spotters are not able even to see the planes until they are over land.

The Defense Department is currently constructing a radar network in Canada and along our other borders. During war it is likely radar-carrying ships will cruise off shore. A vast network of civilian spotters will not be able to give as much or as accurate information as this network. Nor will the spotters be able to give this information as fast.

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