WOOD STOVE HANDBOOK

by Wilburn W. Newcomb

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Foreword

What happens at home when the supply of gas, oil, or electricity suddenly slows down—or stops entirely? What happens when economic or other factors force a family to look for an alternate source of home heating?

The Woodstove Handbook shows you how wood, burned in a modern woodstove, offers an immediate, practical, low-cost method of full-time home heating for anyone. It shows you how to install and fire your stove for maximum efficiency, how to avoid smoking and smoldering, and how to lay a fire that will hold all night.

You will also learn about different types of firewood, its availability, how to grow it yourself, and how to cut, split, and store it. At your fingertips is a list of North American trees, complete with comments as to their burning, splitting, and storage characteristics as firewood.

If you're a beginning or a veteran wood-burner, or are just in the thinking-about-it stage, you'll get a lot out of the book's discussion of the types of stoves and accessories available. Then, to help you find the stove that's just right for you, the Woodstove Handbook also includes probably the most complete catalog of woodstoves anywhere—a heavily illustrated listing of over 200 wood-burning stoves and furnaces, complete with dimensions, operating characteristics, and prices for most, listed by category, brand name, and manufacturer, distributor, or dealer.

Come on and join the wood-burning boom—it's a realistic, low-cost, enjoyable way of doing-for-yourself!

Acknowledgements

Most of all I am grateful to my wife Lorraine Gorrell for her careful reading of the text, typing, and continued encouragement. My daughter Suzanne Newcomb helped with correspondence. Charles H. Poteet, one of the first to see the wood-energy revolution coming, allowed me free access to his enormous warehouse of stoves, and gave freely of his knowledge and experience. The success of his "The Liter Knot" is no doubt due to his dedication to heating with wood. My father offered a lot of old-time advice, for which I am thankful.

I would also like to acknowledge the following sources for photos, drawings, and other illustrations: Mary Minerva Newcomb; Larry Gay (The Stoveworks); Scott McArthur (Solis Energy Works); New Hampshire Wood Stoves, Inc.; Heathdelle Sales Associates, Inc.; Birmingham Stove and Range Co.; Portland Stove Foundry, Inc.; Riteway Manufacturing; Vermont Castings, Inc.; All Nighter Stove Works, Inc.; Atlanta Stove Works, Inc.; Vermont Woodstove Co.

Also, C & D Distributors, Inc.; Colonial Stove Co.; Quaker Stove Co.; Scandia Wood Stoves; Scandinavian Stoves Inc.; Southport Stoves; Upland Stove Co., Inc.; Abundant Life Farm; Union Mfg. Co., Inc.; Ashley Products; Autocrat Corp.; Hunter Enterprises Orillia, Ltd.; King Stove & Range Co.; Monarch Range Co.; Shenandoah Mfg. Co., Inc.; Suburban; United States Stove Co.; Will-Burt Co.; Wood Heat; Bow & Arrow Imports; Preston Distributing Co.; Arizona Forest Supply, Inc.; Contractor Equipment Manufacturers, Inc. (CEMI); Fire-View Distributors; Fisher Stove Works; Greenbriar Products.

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Author's Note

All prices, designs, and specifications of woodstoves are subject to change by the manufacturer without notice. Prices are listed from the year 1977. Photographs and drawings were not available for some models at time of publication. In some cases, the manufacturer's address is unknown; in that case, the distributor or dealer is listed. Some descriptions, comments, and stated features are based on brochures published by the manufacturers. An attempt has been made to edit all exaggerated claims and limit descriptions to factual data. The author takes no responsibility for their accuracy.

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INTRODUCTION

America Looks to Wood

No one needs a great amount of political acumen to realize that America has an energy problem. Although some would not necessarily call it a "crisis," most of us are beginning to recognize that our country is running out of domestic oil; or, in economic terms, "our consumption of oil is far outstripping our production of it."

Each year this circumstance has forced us to import larger and larger quantities of petroleum, and the resulting cash outflow is beginning to affect our ability to balance those imports with other exports. Even our enormous agricultural exports, which have traditionally helped to offset the expense of stationing our troops overseas, no longer seem able to counter the billions of dollars we pay to foreign oil-producing countries.

These are facts. What long-term effect all this will have on the value of the dollar, inflation, and our economy in general is neither clear nor easy to predict. Many thoughtful Americans, however, have drawn their own conclusions and are bracing themselves for hard times. In anticipation of increasingly severe energy shortages and/or higher energy prices, some are erecting windmill generators like those which once dotted the landscape during the 1930s and 1940s. Others are experimenting with various applications of solar energy for heating houses, water, greenhouses, and poultry sheds or for energizing solar battery cells to supply electric power. On the fringe, there are groups dedicated to the extraction of energy from manure (methane gas), from the bicycle (the "pedal plow"), and from flowing brooks (hydroelectric generators and "synchronous inverters"). There seems to be no end to alternate sources of energy.

One of the most immediately *practical* sources of heat energy, however, is wood. Most regions of America are fortunate enough to have wood in abundance, and to use it, we need only a stove and a chimney. Since most houses have been built with chimneys, and excellent stoves are readily available, wood is the most logical alternate-energy source for Americans to turn to.

And turned to it we have! In 1972, you couldn't find an advertisement for wood-burning stoves in a major magazine, and now there are dozens of ads in journals such as *Popular Science, Popular Mechanics, Organic Gardening, Mother Earth News, Country Gentleman,* and in a magazine devoted entirely to the subject: *Wood-Burning Quarterly.*

Stores have sprung up all over America—even in wealthy suburban shopping centers—to offer a wide variety of fireplaces and stoves, both imported and domestic. Owners of these stores have taken out full-page ads in major newspapers to announce "30 percent discounts," and "prewinter sales" on stoves that give "twice-as-much heat," use "half-as-much fuel," and which will "last 100 years," and other possible hyperbole.

Perhaps many of us who grew up with an old potbelly stove in each room can sense irony while we sit in our total-electric home, watch the late show on television, and see ads for newer and better woodstoves, now available at the local furniture stores! And, there used to be a row of the old black monsters at the feed store or general hardware store, but now—at the *furniture* store? Yes, right in the display window, next to an Early American bedroom set!

The variety of models on the market is amazing. A Sears, Roebuck and Co. catalog, in 1897, offered a 125-pound box stove for as little as $5.40 (Fig. 1). Today, a similar stove in a recent catalog sells for $99.99, and other imported stoves having porcelain-enamel finish and ornate heat-exchangers may run as high as $1000.00, with hundreds of different stoves ranged in between those prices. So, owning a woodstove is no longer a sure sign of poverty. In fact, the more expensive models are an obvious sign of

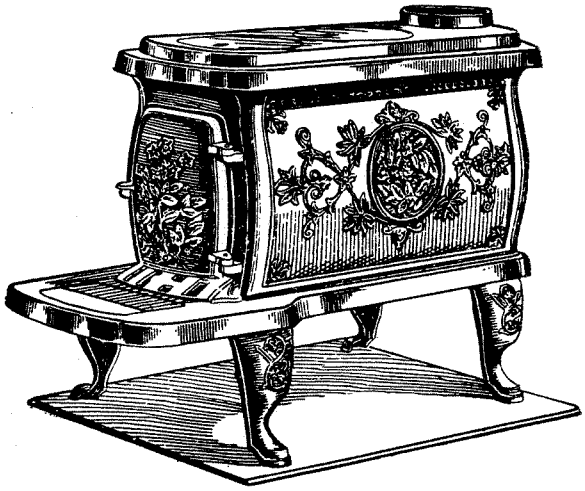


Fig. 1. Sears, Roebuck and Co. stove in 1897 catalog.

status, right along with Oriental carpets, a Mercedes diesel, and Haviland china.

Now, there are even collectors of antique wood-burning stoves, and a knowledgeable book on the subject has been published for the novice: *Antique Woodstoves: Artistry in Iron,* by Will and Jan Curtis (Asheville, Maine: Cobblesmith, 1974). Some of the nickel-plated, 19th-century parlor stoves (Fig. 2) are astounding cathedrals of ornate iron, but in the olden days, the term "woodstove" did not appear. Stoves limited to wood were called "wood-burning stoves or heaters." Modern usage, however, shows almost total acceptance of the term "woodstove."

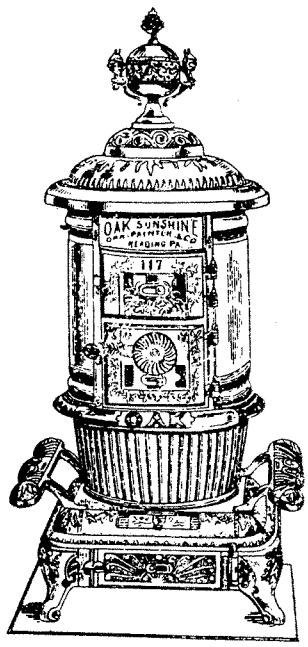


Fig. 2. Late-1890s parlor stove with nickeled skirting, swing dome, urn, door ornaments, foot rails, and nameplate.

So, the wood-burning boom is everywhere to be seen. In fact, a workshop on heating with wood was recently advertised nationally and is taught by a University of California-Ph.D. physics professor at Harrisville, New Hampshire. But *why* the boom? What made Americans go wood-burning bananas? Well, it started about 10 years B. B. (before the boycott).

Before the Boycott

Quite a few of us over 40 years of age will never forget the winter days of our youth when we had to cut and carry in logs for the old potbelly parlor stoves. Wood was used because it was free. Coal could be pretty expensive if you lived very far from the mining regions. My grandmother cooked with wood and corncobs because her part—and many other parts—of the country didn't have electricity before 1940. Even after she got electricity, she continued to cook with wood because she said the food tasted "different" when cooked on an electric stove. A lot of poor people continue to cook and heat with wood, out of necessity.

Hunters, fishermen, and other cabin-owners helped keep a few of America's old stove foundries open (Fig. 3) with a steady demand for cheap, uncomplicated heat (uncomplicated, because with it, electric wires didn't have to be run back into the remote areas where hunting cabins are usually located).

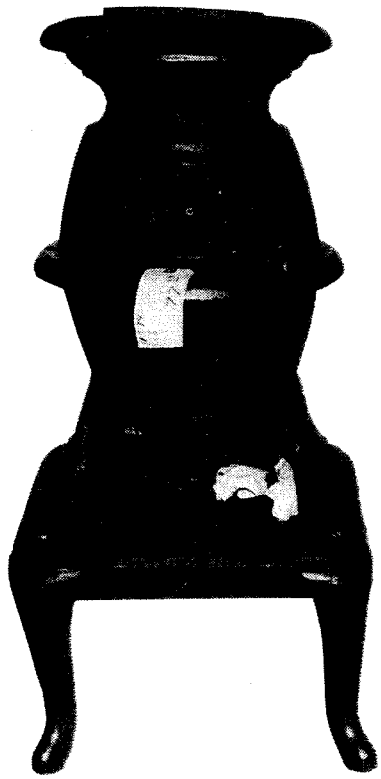


Fig. 3. Small potbelly stove for hunting cabin.

In the early postwar years, a certain number of doomsayers bought wood-burning stoves for their bomb shelters and retreats. I remember an otherwise perfectly normal English professor at a college in Tennessee who had an apocalyptic vision of the End. He bought some land on a mountain, built a concrete bunker, and stuffed it with dried and canned foods, a shortwave radio, *and* a woodstove.

Then there was a different kind of doomsayer: the Minuteman. He also built a bunker, installed a woodstove, and stored food—along with a bazooka, machine gun, and countless rounds of ammunition.

With the "Greening-of-America" in the 1960s, still another different type took to the hills and tried to rediscover the pleasures of times past: the hippie, yippie, beatnik, peacenik, groupie, or whatever the popular terminology dubbed him. There were a number of doomsayers in this group, too, and the means of our impending destruction in their eyes was not to be an angry God, the Russians, or the Bomb, but our own careless and greedy exploitation of the environment.

Many in this group later melted into the white-collar society of their parents, but others persisted in their search for a simpler, more meaningful existence, at peace with nature. Several of the large communes founded in the 1960s are still going strong today; some have their own doctors, lawyers, and engineers, as well as farmers, carpenters, and plumbers. Journals advocating this lifestyle have flourished, but none more successfully than *Mother Earth News* and *Organic Gardening* where, by the way, the advertising for woodstoves is the heaviest.

The woodstove is as much a part of this movement as is marijuana, although there were early misgivings about the "pollution" resulting from a wood-stoked fire. In fact, several authors of books on the subject of heating with wood made a careful analysis of wood-burning's environmental impact. When they discovered that wood gives off virtually the same gases when rotting on the forest floor as it does when burning in the stove, their consciences were relieved. Now, they use the stoves to heat everything from chicken coops to homemade sauna baths.

We owe the most to this group of young people for the renaissance of the wood-burning stove. Some even started manufacturing their own stove designs. Others went on to get advanced degrees in certain aspects of environmental science and are now spreading the word with books, magazines, workshops, institutes, and private companies marketing alternate-energy devices. This phenomenon represents, in itself, a remarkable rechanneling of energy away from campus protests and toward consumer products. The intense idealism is still there, however, and its enthusiasm has infused large segments of the rest of our society to a considerable degree.

The Arab-Israeli War and the Oil Embargo

Perhaps the largest single factor in America's turning to wood-burning stoves was the 1973–74 Arabian oil embargo. A few of us can remember very clearly the rationing of gasoline during the second World War, and although the embargo did not last long enough to justify rationing, the long lines at filling stations (many of which were closed two days a week and every night) gave many Americans their first real taste of our vulnerability to petroleum shortages.

For years, petroleum has been our supreme energy source and has helped form the very basis of our mid-twentieth century lifestyle. Coal-fired locomotives, electric streetcars, and electric buses have long since passed into oblivion. In fact, public transportation in all but the largest cities is but a shadow of its previous state. The private auto (two and three per family) has made the suburban spread possible, and commuting as much as 90 miles to work is not uncommon.

The Arabian oil embargo, then, made us all uncomfortably aware of how dependent on petroleum our entire social system had become, but its effect was not solely upon our modern mode of travel. An ever-increasing number of us had come to use oil for household heat, and even some electrically heated homes were, at the power plant, dependent on oil-fired boilers to supply steam to spin the big generators. The prospect of having no fuel to supply heat was frightening indeed. Even when the Arabs started shipping again, there was little consolation; the price of the oil had soared and continued to rise. The doomsday predictions of earlier prophets gained credence.

Brownouts and Blackouts

Meanwhile, our population has continued to grow as has our consumption of all forms of energy. Our increasing dependence on foreign oil-producing states is never more evident than when the statistics of our oil imports are announced each year. Imports as of this writing constitute over 40 percent of our total petroleum consumption. The *percentages* of our imports, however, are not as frightening as the *quantities*. They are so immense as to make the entire Alaskan oil production seem a drop in the bucket.

Along with our steady growth-rates in population, production, and consumption have come massive, seemingly inevitable, electricity shortages. First there were

"brownouts"—short periods of time when our lights dimmed and the air conditioner slowed down—a signal of too much demand for power. The generators simply could not supply the peak demand required.

Then came a number of blackouts around the country, none more dramatic than those in the New York City area, where the power was totally off for some time. Subways were frozen on the tracks; traffic signals were dead, creating automotive chaos; suburban homes could not pump water out of their wells; windowless stores and schools had to close completely. There were more frightening tales to be told, but it became obvious that we were vulnerable to economic disaster which could be brought about not only by the foreign-oil countries but also by our own patterns of profligate consumption.

These self-made crises also made us aware of the conflicting, yet interlocking, philosophies of energy conservation, increased economic growth, and ecological preservation. For example, if we don't use foreign oil, then we are forced to use more of our own, which is, by all accounts, a fast-dwindling resource. If we don't use more of our own oil, then we must use coal, which is a terrible pollutant, and its extraction from the earth scars the countryside as well.

Some have proffered the nuclear alternative, but after a few scattered radioactive accidents at nuclear power plants across the country, and because of a fear of possible atomic terrorists, nuclear energy is becoming a less-interesting alternative. Also, the rush by large oil companies and some European governments to attempt to monopolize the uranium supply sent the price of that power source flying.

For the moment, there is nothing cheap remaining except wood. Capturing the sun's energy requires an enormous cash outlay at the present stage of equipment development, and even the best solar heating systems require a nonsolar heating unit as a backup for periods of cloudy weather. Coal is no longer cheap, and windpower is not at all feasible as a heat source.

Thus, it is wood that seems to be the only immediate answer to the question of how to heat a home economically. It is in plentiful supply in most regions of the

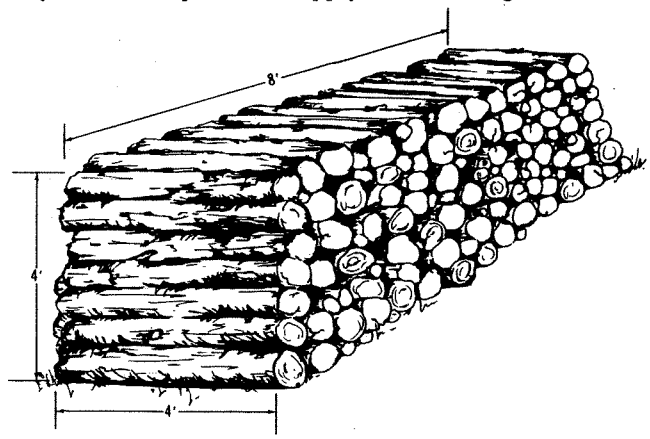


Fig. 4. One cord of wood.

Fig. 5. Woodlot with hickory, oak, tupelo, sweet gum, black cherry, and dogwood trees.

country. On your own property, it is free; a cord of it, cut and delivered, costs $100 at most (in Boston in mid-January) and usually costs a lot less—from $25 to $50. A *cord* (Fig. 4) is a stack of logs 4 feet high, 4 feet wide, and 8 feet long.

Wood is not as polluting as was expected a few years back, when the wood-burning stove movement began to gather momentum, and this is especially true when it is burned in one of the newer, more efficient stoves. Wood is also a replenishable resource, which is perhaps one of its more attractive features. A well-husbanded woodlot of only a few acres (Fig. 5) can provide enough wood to heat a one-family house indefinitely.

For all these reasons and also because of the severe winters the country has suffered recently, Americans are buying wood-burning stoves. And since there seems to be no end to the energy problem (or "crisis") in sight, heating with wood will continue to be a viable alternative to more expensive sources of energy.

CHAPTER 1

Heat and Its Control

Perhaps no single factor is more important to man's evolution than his learning how to generate and control heat. The ancient Greeks realized this and developed an elaborate myth about Prometheus, the fire-bearing Titan god who stole fire from the gods for the benefit of mankind. For the Romans, the Vestal Virgins were keepers of the sacred fire.

Man, of course, understood the workings of fire long before scientists were able to measure and explain the phenomenon, because that understanding was essential for survival. He needed fire to cook his food and to keep his body warm in winter. How man gained more and more control over heat and utilized it to forge his tools and weapons is fascinating in itself, but what concerns us here is (1) the nature of heat, (2) its effects, and (3) the factors involved in the combustion of wood and the transfer of the resulting heat to the surrounding atmosphere or living space of man.

How Hot Is Heat?

The term "heat" is used in a number of slightly different ways. First, there is the sensation of heat. Our central nervous system is extraordinarily sensitive to heat or the lack of it, at least within a limited range. This range of heat we call "temperature," which is the objective measurement of the degree of hotness, or just exactly *how* hot something is. Our perception of the degree of heat in a room can often be influenced by the health of our body at the time or by our experience of heat immediately preceding our entrance into the room. For example, we often feel "chilled" when we are sick with a cold although the room temperature may be as high as 80 degrees Fahrenheit. Likewise, an outdoor storm cellar with a consistent temperature of 55 degrees F will seem quite warm to us when we step into it out of a subzero climate. Our perception of heat, then, is a psychological phenomenon that is relative to other experiences. Temperature is not. It is an absolute measurement of hotness.

Retained Heat

We also speak of heat in terms of quantity. A bathtub full of hot water (Fig. 1) contains a much larger quantity of heat than does a shallow washbasin similarly filled. Or, expressed differently, it takes a lot more heat to raise the temperature of the water in a 60-gallon water tank one degree than it does the water in a 20-gallon tank (Fig. 2). (It costs a bit more money, too!)

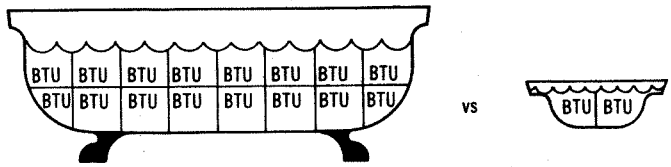


Fig. 1. There is more heat in a bathtub full of hot water than in a basin similarly filled.

Materials like iron and steel will retain more heat over a longer period of time than will an equal quantity of copper or tin. In fact, it is just this ability to "store" large quantities of heat that makes iron and steel ideal materials for stovemaking. They do not store heat permanently, however. They merely absorb large quantities of heat and then release (radiate) it more slowly than do most other materials.

Radiant Heat

This radiation, or "radiant heat," is what warms our skin when we lie in the sun or reddens our face when we sit near a big potbelly stove. Radiation (of the type we are talking about now) is converted into heat when it strikes an absorbing substance, such as our skin. The

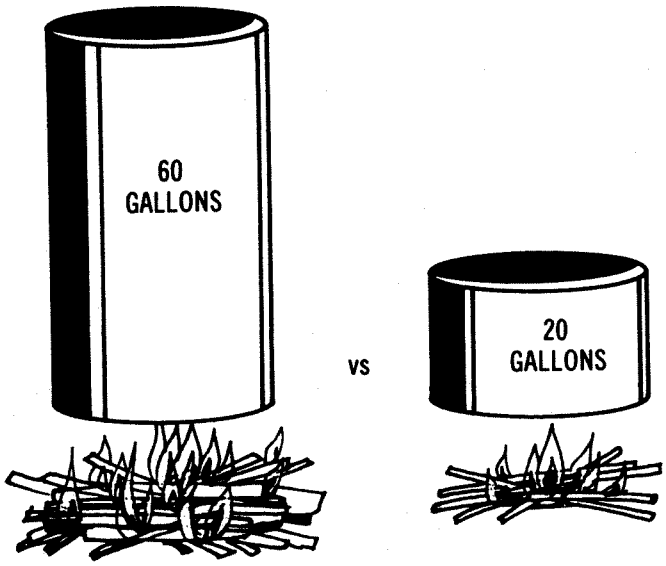


Fig. 2. Takes more heat to raise 60 gallons one degree than 20 gallons one degree.

transfer of heat energy by radiation and absorption is a most important aspect in our consideration of wood-burning stoves (Fig. 3).

The sensation of heat is, therefore, the goal to be reached. Measuring heat is a means of determining how efficiently we can attain that goal. Containing heat in large quantities and allowing it to radiate and diffuse is the means to the end.

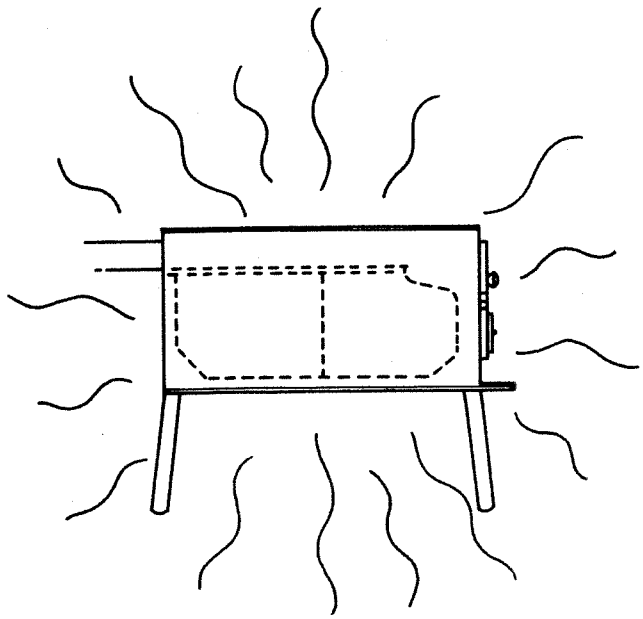


Fig. 3. This woodstove transfers heat by radiation.

Combustion

With an understanding of these basic characteristics of heat, we now turn to the phenomenon of combustion and observe what happens when we ignite a log of wood. It is important to understand combustion because the many types of woodstoves are made to take advantage of the various processes which occur in an actively burning fire.

Vaporization of Water in the Wood

The first stage in the combustion of wood is the vaporization of moisture (water). Moisture content usually represents the ratio of the weight of contained water to the weight of dry wood. "Dry wood" is considered absolutely dry when all water that is not chemically bonded to other elements in the wood is removed. This can be done by drying wood in an oven at the boiling point of water (100 degrees C or 212 degrees F). A freshly felled cypress tree in a swamp in South Carolina may contain 200 pounds of water for each 100 pounds of dry wood. It is thus described as having 200 percent water. More frequently the water content of sapwood in freshly felled timber amounts to about 100 percent, with the heartwood containing much less. Wood allowed to dry ("season") in the open air will generally dry until the moisture content equals that of the atmosphere. Brought indoors, the wood may dry further until it reaches 6 or 7 percent water. Even well-seasoned wood will contain as much as 20 percent water.[1]

As the wood becomes hotter, it loses more and more of its moisture and begins to give off a complex mixture of gases and tar-forming vapors called *volatiles*, which immediately burst into flame. The ignition temperature of these gases can be anywhere between 800 and 1200 degrees F, but is usually around 1100 degrees F. It has been estimated by scientists that about 40 to 60 percent of the heat-value of wood comes from the burning of these gases.

Charcoal Stage

While the gases continue to flame, the wood goes through complex chemical changes until, as the flames subside, the wood turns into charcoal. These red-hot coals burn with hardly any flame because the volatiles have been mostly burned up. Charcoal, however, needs large quantities of air in order to keep burning, and the coals are so hot that the mass of air is nearly always heated enough to help burn the carbon monoxide gas produced by the coals. This gas turns into carbon diox-

1. See Donald George Coleman, *Encyclopedia Britannica*, 1967, s. v. "Wood."

ide, the same gas we exhale from our lungs and drink in carbonated beverages.

The charcoal stage of the burning cycle lasts longer in hardwoods like oak and hickory than when relatively soft woods such as white pine and spruce are burned. Soft woods, that is, woods of lesser density, will produce longer flames and burn more fiercely in the beginning stages of the fire. It has been discovered, however, that the flaming stage, even in hardwood fires, can be prolonged by igniting the fire with a more intense heat-source and by allowing the fire access to much more oxygen. The charcoal stage will then be correspondingly briefer.

Designers and users of wood-burning stoves must be aware of these processes if they are to obtain maximum heat from the fuelwood. For example, it is known that in an open fireplace, most of the gases given off in the first stage of combustion are cooled by too much oxygen; therefore, they do not ignite completely and are lost up the chimney (Fig. 4). In the older-model box stoves, the flame-path to the flue is so direct that much of the gas passes up the flue before it can mix with enough oxygen to burn more vigorously. These gases must be heated enough to ignite and to be maintained in flame both by the surrounding flames and an adequate source of secondary (preferably preheated) air. Modern stoves deal with this problem in a variety of ways (to be discussed in chapter 2) and with varying degrees of success (Fig. 5).

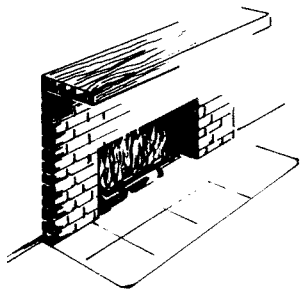


Fig. 4. From 40 to 60 percent of latent heat goes up the fireplace chimney as dark, smoky gases.

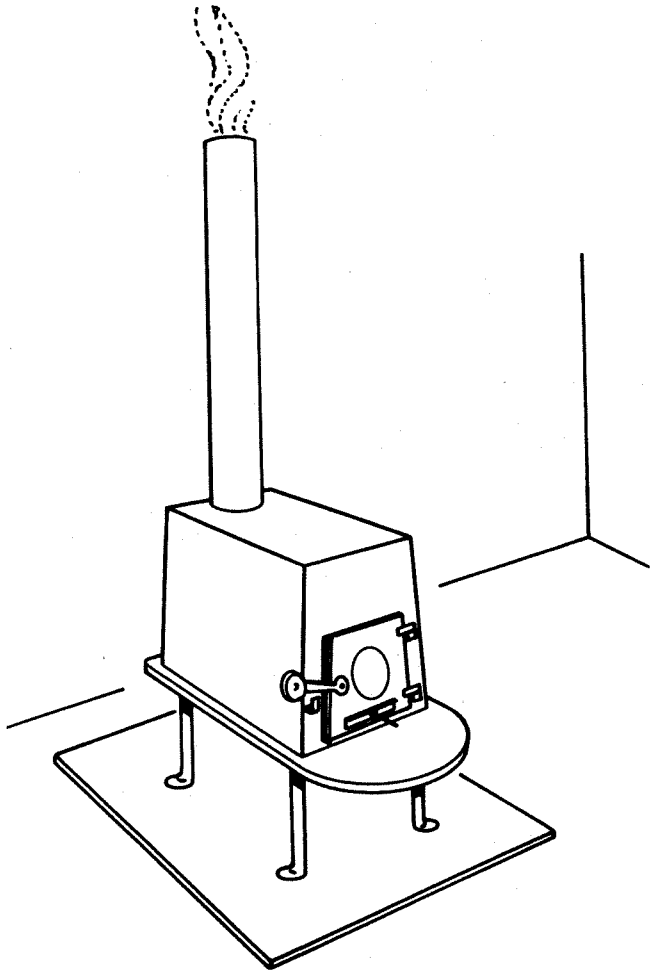


Fig. 5. Most gases are burned in a modern, airtight stove, leaving a light smoke, or no smoke, coming from chimney.

Charcoals likewise need high temperatures to continue burning. A contiguous cold surface or open space can absorb enough radiation from a charcoal particle so that combustion ceases. Therefore, a properly designed stove will maintain a high enough temperature in the combustion chamber to keep the charcoals burning and to mix the incoming air with the combustion gases.[2]

Heat Transference

The next task of a stove is to transfer as much heat as possible from the inside of the combustion chamber to the outside. This is also accomplished in a variety of

2. See Bernard Lewis and Guenther von Elbe, *Combustion, Flames, and Explosions of Gases* (New York: Academic Press, 1951).

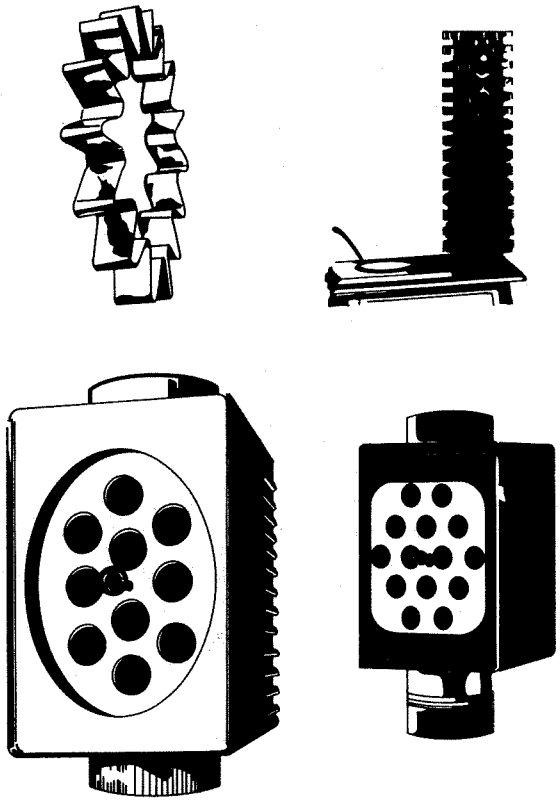


Fig. 6. Items used to increase heat radiation from stovepipe.

ways and with varying degrees of efficiency. Most simply, the mass of the stove is allowed to radiate.

Most stoves are of the radiant type; that is, of the energy they transfer from the inside of the stove to the atmosphere of the room, 60 to 80 percent is in radiant energy. The rest is natural convection. In the case of wood-burning heaters and soapstone stoves, radiation is blocked off and rechanneled to heat the surrounding and rising air almost entirely by convection. Other manufacturers attach blowers and all sorts of gadgets (Fig. 6) to squeeze as much heat as possible from the stove. There is a limit, of course, as to how much heat can be extracted because the flue must be kept hot enough to create an adequate draft.

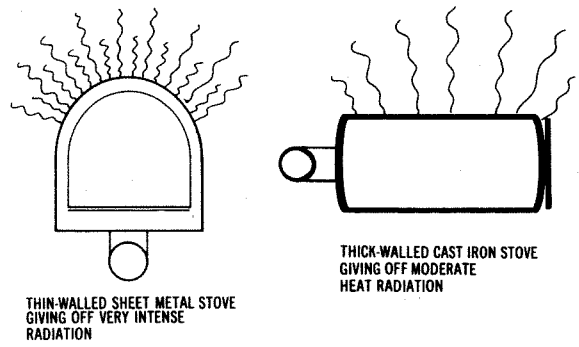


Fig. 7. Sheet-metal stove (left) radiates intensely for a short time, while cast-iron stove (right) radiates less intensely, but for a longer time.

There are other important aspects of the successful diffusion of heat. The surface area of the stove is critical in that, other things being equal, a larger surface will radiate more heat than will a smaller one. Some designers have ingeniously increased the surface area of their stoves without increasing the overall dimensions by fluting or embossing the sides with ornate designs, by creating inner chambers, or by stacking elaborate, arch-like heat exchangers on top of the stove.

The materials used in making a stove also affect the exchange of heat, but not so much as does the mass or weight of those materials. Virtually all modern stoves are made from either cast iron or steel. Both materials have nearly equal abilities to store and emit heat, given equal weight. A stove made from thin sheet metal, on the other hand, will transfer its heat faster and radiate more intensely than will a heavy-walled steel or cast-iron stove (Fig. 7). It will not, however, give off more heat in total.

The tasks of stove design seem relatively simple—encourage and maintain complete combustion, and transmit the resultant heat to the room—but accomplishing these tasks is a complex and technologically sophisticated feat.

CHAPTER 2

Chimneys and Flues

One of the most fascinating aspects of heating with wood is the chimney. Woodstove enthusiasts will talk excitedly about the ideal location of a chimney, or about the ideal height, width, wall thickness, and so on. Of course, there are standards recommended by the National Fire Protection Association, regional building authorities, and local (usually county) building inspectors. But these standards allow considerable leeway as to the choice of materials, location of the chimney in the house, chimney size (diameter), and other factors. It is just this great latitude that makes for such interesting conversation among wood-burners.

Houses With Chimneys

Many Americans are fortunate enough to own a house with a chimney or fireplace already there, as a quick glance at 30 or so houses along the road will confirm. In fact, once you are addicted to woodstoves and chimneys, the types of chimney caps in use and the location and size of chimneys become an endless fascination. What is more stately than a large, two-story house with a massive brick chimney (complete with elaborate raincap) towering above the crest of the roof at each end of the house? See Fig. 1.

Evidently, woodstove addicts are not the only ones who feel this way, since the value of a house on the local real estate market is considerably enhanced by one fireplace and even more so by two. For two years, my wife and I rented a large Southern mansion which had *four* fireplaces—one in the formal living room, one in the dining room, and one in each of two bedrooms. We were the envy of everybody that visited us.

Houses Without Chimneys

Even though chimneys are really a kind of status symbol, more and more new houses are being built without them. The added expense of a chimney or fireplace can be exorbitant. Most modern heating equipment does not require a chimney, but simply a pipe, and electric baseboard heaters do not even need that. So it is not uncommon any more to see houses without a sign of a chimney. If owners of such houses happen to become interested in woodstoves, for whatever reason, they must have a chimney built.

Build It Yourself or Have It Built?

If you are an experienced bricklayer, either amateur or professional, you will want to build your chimney yourself and build it right. The rest of us will have to hire a bricklayer, because a chimney is not the sort of thing a novice should attempt to build. For one thing, it is too complicated, and for another, its proper construction is too critical a factor in the safety of your life and possessions to entrust to an inexperienced person.

Nevertheless, it is important for the experienced bricklayer, as well as the homeowner, to know the correct way to build a safe chimney. It is important for the bricklayer because he may not be familiar with all the refined methods of building a chimney and with the newest building codes; it is important for the homeowner because he must find a masonry contractor who will build the chimney to rigid specifications—the *homeowner's* specifications, not the contractor's. Unfortunately, many modern bricklayers will cut corners in the absence of special guidance, and this practice may ultimately, if not initially, make your chimney a potential fire hazard.

Working with a contractor can be a trying experience; that is why it is essential to agree with him on exact specifications *before* he starts building. Many people are easily intimidated by contractors, but remember it is *your* money and *your* chimney, not the bricklayer's, and the person who pays the piper calls the tune. In the case

Fig. 1. Two-story house, showing chimneys with rain caps.

of a chimney, it is a very serious tune. Here follows, then, an account of an actual experience of having a chimney built, complete with the many decisions and choices involved and the reasons behind those decisions.

Chimney-building Preliminaries

The first decision to be made concerns the characteristics of the chimney required for the size stove you have purchased. We had bought a small Scandinavian stove having a flue opening 12 centimeters, or 4.7 inches, in diameter. The smallest thimble we could find at any local lumber yard was 6 inches in diameter, so we had to buy an expansion joint of stovepipe (also called a "reducer" or "flue adapter") to connect our 4.7-inch pipe to the 6-inch thimble (Fig. 2). This also influenced our choice of chimney flue diameter.

Choosing Flue Size

The traditional rule of thumb is that the diameter of the chimney flue should be at least as large as the flue-pipe collar of the stove. This allows as continuous a flow of smoke up the chimney as possible, with little or no resistance. You do not want the gases coming out of your stove to form a traffic jam at the entrance to the chimney, which would be the case if your chimney flue diameter were less than that of the stove collar. You should, of course, follow the manufacturer's recommendation concerning minimum chimney dimensions; our stove, however, came with no such advice.

A chimney flue which is much wider than the flue collar of the stove is not desirable because the flue gases tend to slow down as they fill up a larger area, thus allowing more time for them to cool off, which would slow them down even more since cooler gases are less buoyant. Cooler exhaust gases also cause more creosote condensate to be deposited on the inside walls of the chimney. We have friends who had much trouble with downdrafts because their stove was connected to a large fireplace chimney. The cold outside air can also creep down the sides of such oversized flues.

So, the choice for the diameter of our chimney flue narrowed down to 6 inches or 8 inches. We opted for the 6-inch flue because the velocity of the flue gases would be faster and less brick would be required to build it. We also knew from many conversations with friends who had wood-burning stoves that a 6-inch flue was adequate for closed stoves although not so good for open stoves, such as the Franklin and the Morsø 1125. These are frequently burned with the doors open, like a fireplace. We could now tell the masonry contractor that we wanted a 6-inch flue.

Where to Put the Stove and Chimney

Before we could get an accurate estimate on the cost of the whole chimney, however, we had to calculate how tall it was going to be, and before we could do that, we had to decide where we were going to put the stove. If we placed it in the middle of the house, the chimney would have to reach 3 feet above the place in the roof where it came out, and at least 2 feet above the crest of the gable—the highest point of the house (Fig. 3).

Our ancestors knew the advantage of putting the chimney in the middle of the house: the brick or stone of the chimney is easier to heat up, because it is mostly enclosed within the house. Such placement allows easy starts with little or no backdraft. Also, after an interior

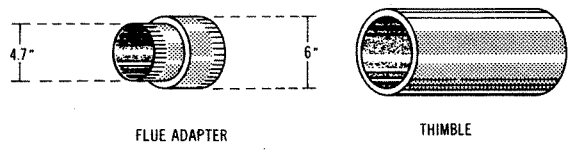


Fig. 2. Flue adapter (left) and thimble (right).

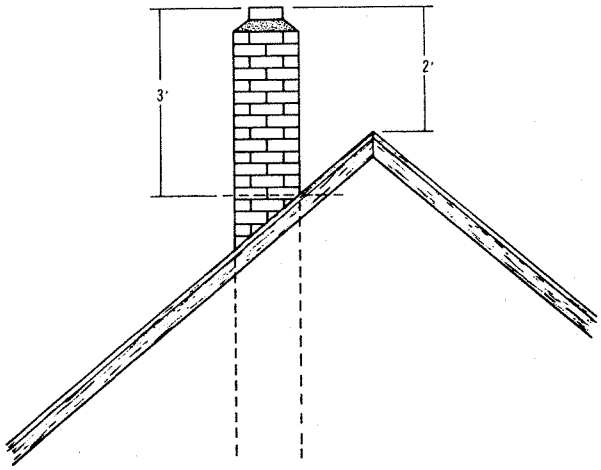


Fig. 3. Height of chimney above roof and ridge.

tral furnaces operate, of course, at much higher temperatures than do woodstoves; because of the relatively cool stack temperature of Scandinavian and other airtight stoves, it is extremely doubtful that a similar 15 percent increase in overall efficiency could be attained with a stove feeding an interior chimney, since it would not heat the brick as much as would a central furnace. Nevertheless, it would be ideal to have an interior chimney.

Our electrically heated house was built with no chimney at all, and to locate a chimney in the middle of it would have entailed considerable carpentry work and messiness on two floors, not to mention an added expense of several hundred dollars. Also working against such a location was the fact that most of our rooms are too small to house a chimney and stove without their dominating the room and limiting the amount of furniture that could be placed in that room. For example, placing the chimney and stove in the dining room (Fig. 4[*A*]) left inadequate space for a dining table. (The chimney in the scale-drawn illustration is 16 inches square, the stovepipe 20 inches long, and the top-vented stove is 27 inches deep by 13 inches wide.)

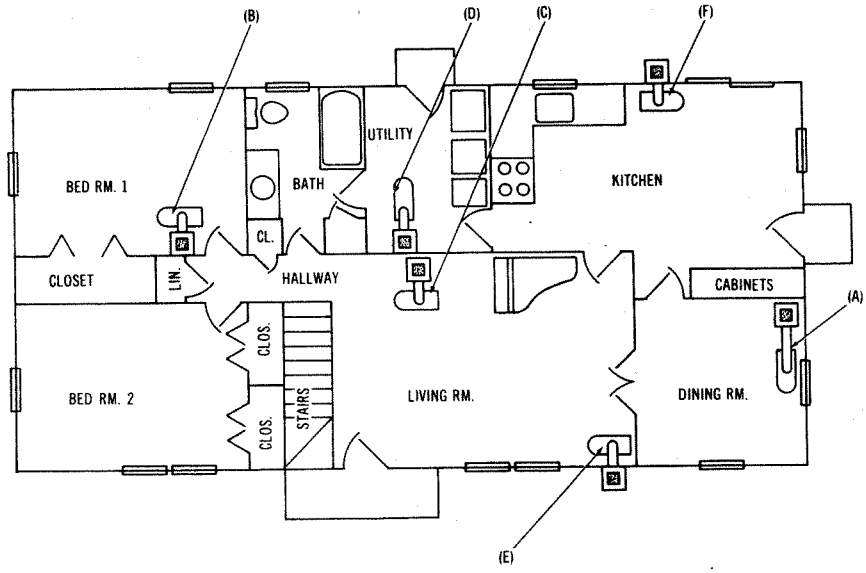


Fig. 4. Possible locations for stove.

chimney is thoroughly warmed up, it retains its heat over a longer period of time than does an exterior chimney, and it radiates this heat into the house rather than into the cold outside air.

Tests carried out in 1953 with central furnaces showed a net gain in efficiency of 15 percent when those furnaces were connected to interior brick chimneys.[1] Cen-

In the bedroom (Fig. 4[*B*]), the chimney and stove would leave inadequate clearance from bed to stove and also obstruct the entrance to the room. Living-room placement was ruled out because we have a grand piano which would not fit anywhere else, and even if it could be moved, the stove and chimney would block the main walkway through the house (Fig. 4[*C*]). They would not fit in the utility room, which was just as well because of the inadvisability of having a stove in the same small room with a freezer (Fig. 4[*D*]). So much for an interior chimney in our house!

1. W. H. Harris and R. J. Martin, "Heat Transmitted to the IBR Research Home from the Inside Chimney," *American Society of Heating, Refrigerating, and Air Conditioning Engineers Transactions*, vol. 59 (1953), pp. 97–112.

Even with an exterior chimney, the choices were not many: in the living-room outside corner (Fig. 4[*E*]) and the kitchen (Fig. 4[*F*]). The living-room location was on the south side of the house where the chimney bricks could absorb the rays of the winter sun and perhaps thus contribute to a good draft, as Ben Franklin pointed out long ago. However, it was not possible for simple aesthetic reasons: the chimney would have blocked entirely the view from an upstairs dormer window and also would have looked odd towering up in front of our house. The kitchen was our only alternative. (We had rejected an external chimney on the west side of the house because of a woods nearby.)

If you are planning to build a house and to heat solely with wood, then the chimney should be centrally located; that is, central to the main living areas—the kitchen, living room, den, and so on. If you plan to have a two-story house, the chimney and stove should go near the stairwell for maximum circulation of heat to the second floor. We only intended to heat the kitchen and living room (and the dining room when entertaining guests). We also wanted to do a limited amount of cooking (soups and stews) and have a ready kettle on the stove for a quick cup of tea or filtered coffee. The slightly simmering kettle of water adds just the right amount of moisture to the air to keep the humidity comfortable (a relative humidity range of 45 to 55 percent at temperatures of 68 to 72 degrees Fahrenheit is generally considered optimal). Placing the stove in the kitchen was ideal for us in this respect, and also convenient because the stove was right next to a big, sliding-glass door in the back of our house which allowed easy access to the woodpile. A large, cherished, Oriental carpet in the living room confirmed our decision to put the stove in the kitchen. Many times when wood is added to the fire, coals and sparks pop out onto the floor and a big hole burned into the rug was something we wanted to avoid at all costs.

All of this is merely meant to show you the practical problems of choosing a chimney site in a house that was built without a chimney. You may have different problems, but try to think of the ramifications of your decision: space, convenience, safety, and appearance.

How High to Make the Chimney

Now we were ready to determine the height of our proposed chimney. With this information, we would know how many bricks to order and the bricklayer could give us a definite price for the total job.

The National Fire Protection Association and most local and statewide building codes recommend a chimney 2 feet taller than any spot on the roof within 10 horizontal feet of the chimney (Fig. 5). This avoids back-puffing caused by turbulence trailing over the peak of the house (Fig. 6). Even if the chimney is the required height, some turbulence on particularly windy days may cause occasional back-puffing. If it persists, the chimney can either be extended another foot or two, or it may be capped. With a chimney that leads straight down to a fireplace, a cap is necessary to keep out rain and snow. Stoves, however, are usually connected by a pipe located at a right angle to the chimney. Thus, rain would run down to the bottom of the chimney and little (if any) could enter the stovepipe, making a rain cap less necessary. Most caps restrict the airflow of the chimney to some extent and hinder, if not prevent, chimney cleaning. Revolving ventilator caps can become gunked up with soot and creosote, which causes them to malfunction. For these reasons, we decided to try our chimney without a cap.

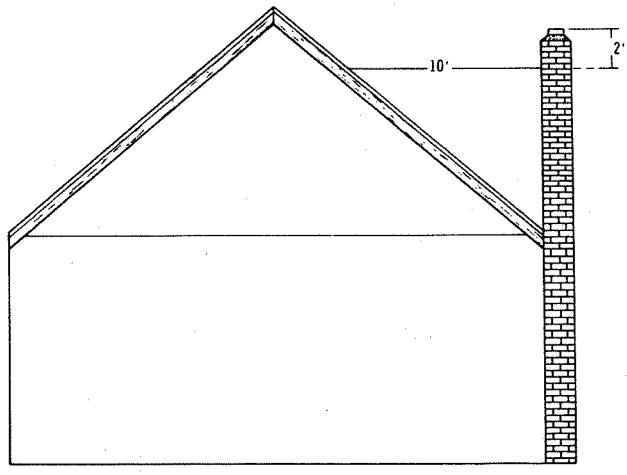


Fig. 5. Chimney height in relation to 10-foot distance from roof.

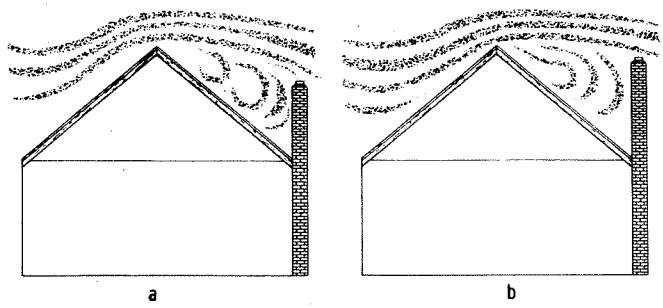


Fig. 6. Chimney height too low (a) causing back-puffing. Correct height shown at (b).

Just how do you calculate the height of a proposed chimney? About the most impractical suggestion we read was to climb up on the roof and take measurements with straightedge, level, and mason's cord. In the first place, it would take two people and a scaffold to accomplish that feat, and secondly, in our case, the roof has such a steep

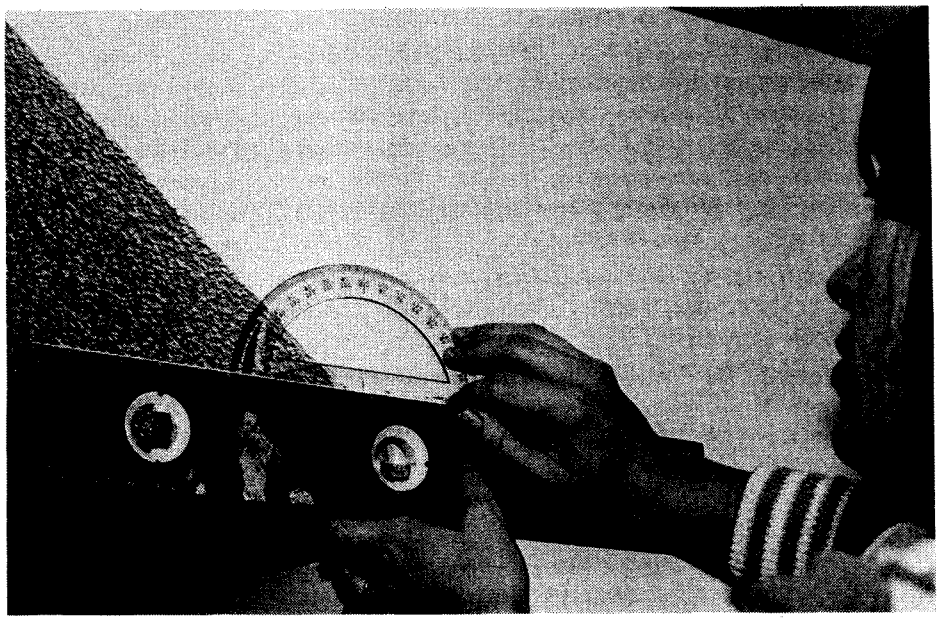


Fig. 7. Measuring roof angle, using level and protractor.

incline that it is unsafe to walk around on it. My wife refused outright, and I am not particularly fond of heights, so I proposed to solve the problem on graph paper.

Allowing one square on the graph paper to represent each foot of actual distance, I drew a gable view of our house exactly to scale. Step 1 in doing this was to measure the width of the house (27 feet, 8 inches) and the distance from the ground to the eaves (12 feet, 3 inches), which was a relatively easy task using a measuring tape and a common stepladder.

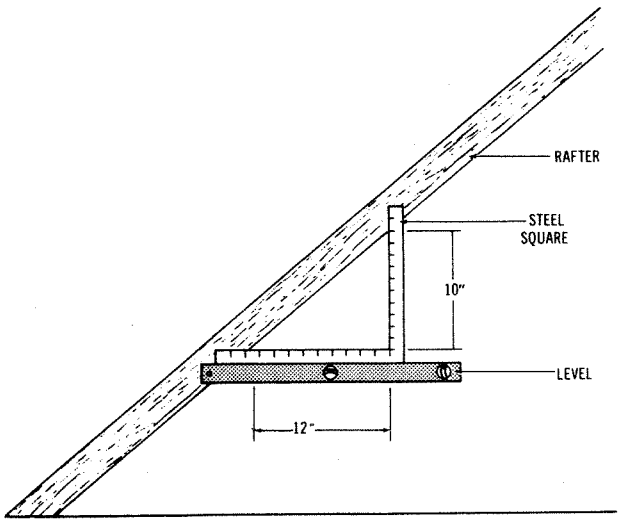


Fig. 8. Measuring roof pitch, using level and steel square.

Step 2 was to find the pitch (or angle) of the roof, and in our case there were two simple ways to do this. Our upstairs bedroom has a dormer protruding from the roof. My wife simply held a carpenter's level in a perfectly horizontal position against the interior dormer wall, placed the middle point of a protractor on the point where the roofline slanted down to meet the level, and then read the angle (40 degrees) on the protractor (Fig. 7). This could also be similarly done outside while you are on the ladder measuring the height of the house up to the eaves. Carpenters do it another way: they place one leg of a steel square on the side of a rafter in such a way that the leg is perfectly horizontal and the 12-inch mark falls exactly at the lower edge of the rafter (Fig. 8). Then they note at what point of measurement the rafter intersects the other leg of the steel square (in our case, it was 10 inches). This means the pitch of the roof is "10 on 12." So, I marked off 12 squares on the graph paper with a horizontal line and erected a line perpendicular to that 10 squares long and connected the two with a diagonal line, forming a triangle. The resulting angle was 40 degrees, which confirmed my wife's indoor measurements with a protractor (Fig. 9).

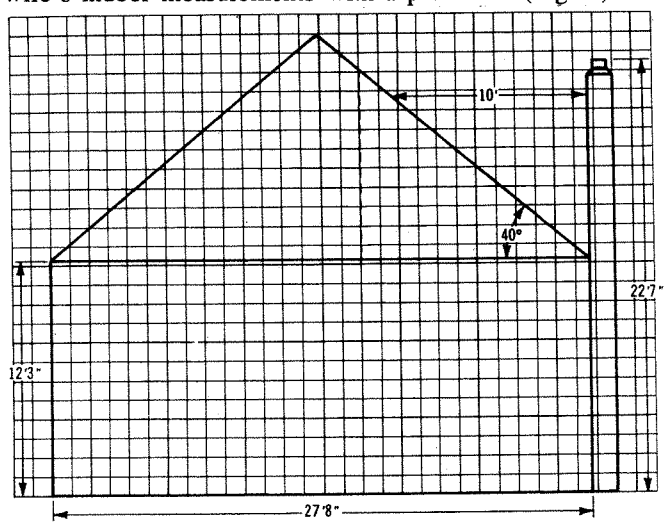


Fig. 9. Transferring data to graph paper for a scale drawing.

With the angle of the roof known, I could finish drawing the outline of the house. Next, I extended the line representing the wall of the chimney closest to the house until it reached a point 10 squares (10 feet) away from the roof on a horizontal plane. I then drew the chimney as being 2 feet taller than this and measured the height of the chimney as drawn on the graph paper. It was approximately 22-1/2 squares, or about 22 feet, 7 inches.

A mathematical way of doing this is even simpler. For every 10 inches of rise there is 12 inches of horizontal distance. The horizontal distance we want is 10 feet, or 120 inches, from roof to chimney. The height required in a roof pitch of 10 on 12 is thus 100 inches, or 8 feet, 4 inches. Add 2 feet above that together with the 12 feet, 3 inches up to the eaves and the result is 22 feet, 7 inches, the same as on the graph paper.

I could now call the contractor and tell him exactly how tall a chimney I wanted built. He could in turn tell me how many bricks, how much sand and cement, and the number of flue liners to order. I also told him there was an 18-inch overhang that would have to be cut out and that flashing would have to be put around the chimney where it came through the roof. I gave him the dimensions of the brick hearth and the wall area to be bricked-up behind the stove. These dimensions were arrived at by placing the stove 18 inches from the wall and allowing the hearth to extend 18 inches out at the side of the stove and also in front, where sparks, ashes, and coals might fall. (See Fig. 10. These clearances are discussed in detail in chapter 3.)

How Much Will It Cost?

From other experiences with contractors, I knew that I had to spell out in detail what I wanted done. If you agree with a contractor on a job and a price, and then tell him to do things that he had not calculated on, he will charge you extra. So, besides all the foregoing calculations, I also told him I wanted (1) a cleanout door, (2) eight inches of brick all around the thimble that went through the house wall, and (3) fireclay mortar used on all the flue-liner joints and any place else coming into direct contact with the hot smoke, gases, and flames. Needless to say, most of the bricklayers I called for estimates felt all of this was unnecessary. Some said they had never built a chimney to such exacting standards (which, incidentally, are the minimum standards of the National Fire Protection Association). No wonder fire insurance is so high, I thought, and so many houses burn down from chimney fires.

Again, I could only say it was *my* family's safety at stake, not the bricklayer's, so I wanted it done correctly or not at all. The estimates I received were astronomical. Most of the contractors, no doubt, either did not want the job or else thought I was crazy enough to pay any price for it.

At this point, my wife and I began looking into the cost of installing a modern, prefabricated, double-wall metal chimney. Here also we were surprised by high cost, for a metal chimney of the required height would have cost nearly as much as the brick chimney, and I would have had to install it myself. Hiring a carpenter to do it would have added another $150 or so and would have put the price well over the cost of a brick chimney, labor and materials combined. We did not particularly like the idea of a metal chimney in the first place, not knowing how long it would last compared to a masonry chimney. So it was back to brick.

We chose the low bidder and told him to start work as soon as he could. In the meantime, we procured our building permit and checked local building codes and the national building code recommendations as set up by the American Insurance Association to see if we had overlooked anything.

Chimney Construction

We had already bought our stove and had it neatly positioned where we wanted it, with stovepipe installed and

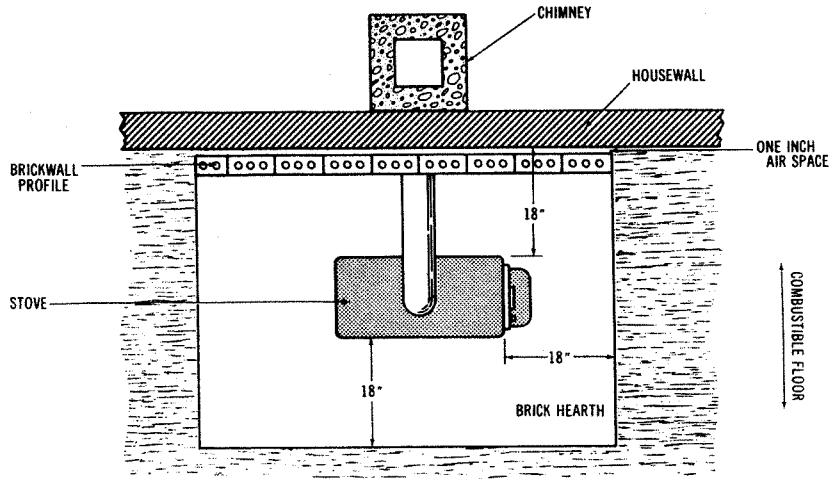


Fig. 10. Placement of stove on hearth area.

resting on the wall. Allowing for the height of the brick, we marked the wall to show where the center of the stovepipe opening would be, so the bricklayer could drill through and locate the chimney first thing in the morning.

Foundation

When the two workmen arrived, one started digging a hole for the foundation, while the other cut a hole 23 inches square in the wall to accommodate the 6-inch thimble (with half-inch-thick walls) and the 8 inches of brick to surround the thimble on all sides. The hole for the foundation was dug down to the existing footing of the house's foundation. This must be below the frost line to prevent frost heave and possible resultant damage to the chimney. Authorities recommend that the foundation slab for a residential chimney be at least 4 inches thick (for fireplaces, 8 inches thick) and extend 6 inches beyond the chimney on all sides.[2]

The exact size of a foundation, of course, depends on the weight of the materials making up the chimney and the load-carrying capacity of the soil. If you are building a chimney having 8-inch-thick walls enclosing several flues for a two-story house, then it is important to find out the weight of the materials. This can be done by calling the brick manufacturer or dealer and asking him how much the bricks weigh per unit (usually a "cube"). Add the weight of the sand and cement you ordered, plus the weight of 4 gallons of water (on the average) per bag of cement (1 gallon of water weighs 8.33 pounds). According to the Portland Cement Association, soft clay soil has a load-carrying capacity of 1 ton per square foot. If your soil conditions are questionable, consult an engineer or architect. Our soil is firm clay. The foundation measures 2.3 feet on all sides, or 5.3 square feet—enough area to bear more than 10 tons with our soil. Our chimney weighs approximately 5,825 pounds, so we feel reasonably safe about the strength of the foundation.

Masonry Up to the Roof

Immediately after the concrete was poured into the foundation hole, the bricklayer leveled it and placed one layer of brick all over the foundation for added support. This was allowed to set for two days.[3]

The bricklayers returned on the third day and began laying brick up to the level of the thimble, doing an extra-careful job of mortaring. To prevent leakage of smoke and gas fumes from the chimney, the layer of mortar on each course of brick was even, and completely covered the bricks. The end "buttering" must also be complete (in brick-veneer work, buttering is only partial). In other words, during the building of a chimney, all joints must be completely filled with mortar (Fig. 11). Brick and flue-lining were built up together, with the liner placed first and the bricks built up around it (Fig. 12). The inside joint of each flue liner must be struck smooth so that no drag will be created by excess mortar and so that no extra surface is created for creosote to build on. An air space was left between the flue liner and the brick (Fig. 13), and corrugated steel wall-ties were anchored (nailed with 8-penny nails) every sixth course of brick (Fig. 14).

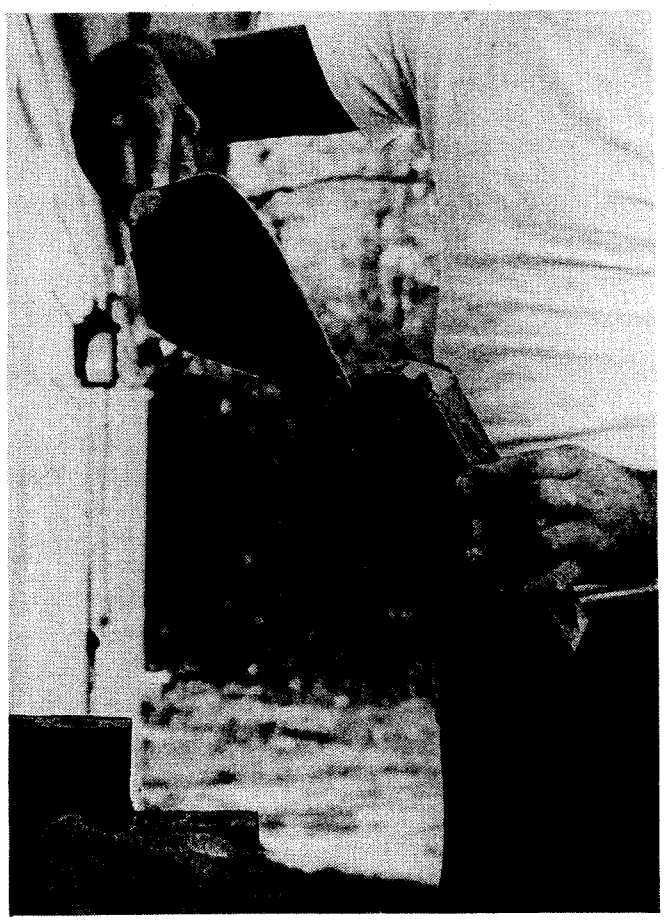


Fig. 11. Completely buttering end of chimney brick.

When the level of the thimble was reached, the bricklayer filled the 23-inch hole in the wall with the thimble, brick, and mortar (Figs. 15–16). The fireclay thimble was slanted upward into the chimney with a rise of ¼-inch per linear foot (Fig. 17). According to the National Fire Protection Association, all horizontal stovepipe should also slant upward this same degree.

We had thought about buying a 12-inch, double-wall metal thimble, but again decided to stick with brick for

2. See Louis M. Dezettel, *Masons and Builders Library* (Indianapolis, Indiana: Theodore Audel & Co., 1972), vol. 2, p. 183. See also David Havens, *The Woodburners Handbook* (Brunswick, Maine: Harpswell Press, 1973), p. 69.
3. Dezettel, *Masons and Builders Library*, 1:105. Other authorities recommend 78 hours.

Fig. 12. Flue liner is placed first and the bricks laid around it.

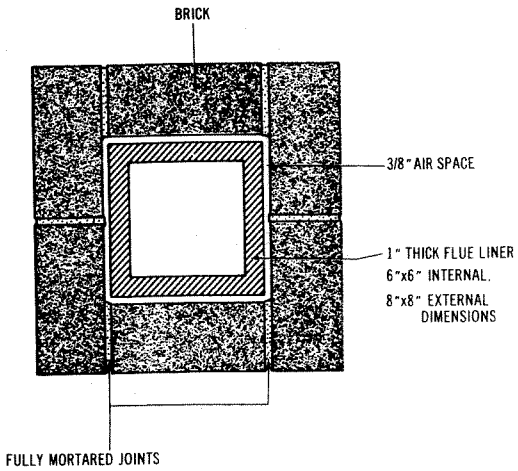


Fig. 13. Top view of chimney, showing wall brick, flue liner, and air space between liner and chimney wall.

durability. The fireclay thimble was also considerably cheaper—more than four times cheaper! Although the

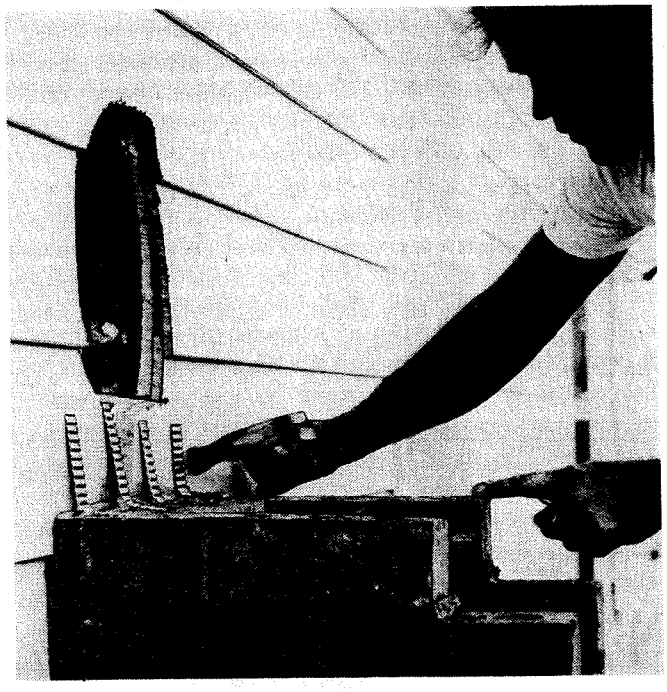


Fig. 14. Corrugated steel wall ties placed every sixth course of brick.

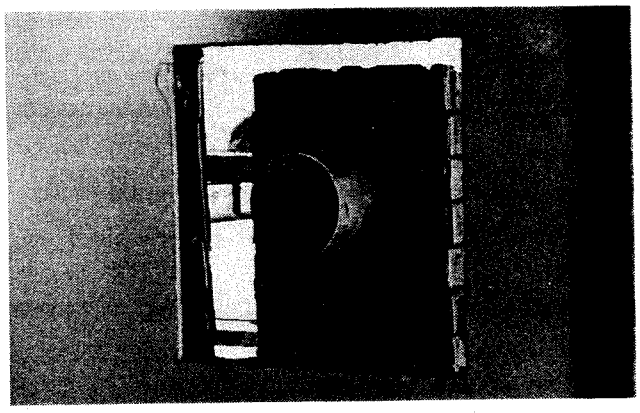


Fig. 15. Interior view, showing wall opening and thimble before bricking-in.

metal thimbles are undoubtedly safe (they are Underwriters Laboratories-approved), they are usually not made from very thick metal. When you see the effect of intense heat, creosote, and other acidic deposits on common stovepipe, then you wonder just how long a metal thimble will last. On the other hand, I have seen sewer pipe having a wall ¼-inch thick used for a thimble, with the requisite 8 inches of insulating material all around it. That should last a long time. The traditional fireclay thimble, however, has proven itself for many years. The metal thimbles have not.

The bricklayer then positioned the next flue liner temporarily in place while he drew the outline of the end of the thimble on it. He removed the liner and filled it with sand,

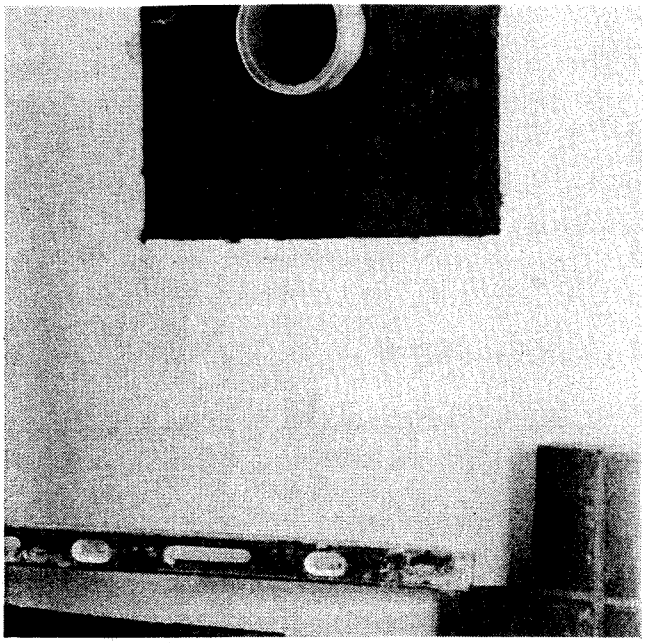


Fig. 16. Interior view after bricking-in, showing thimble (at top) and start of header course of hearth wall.

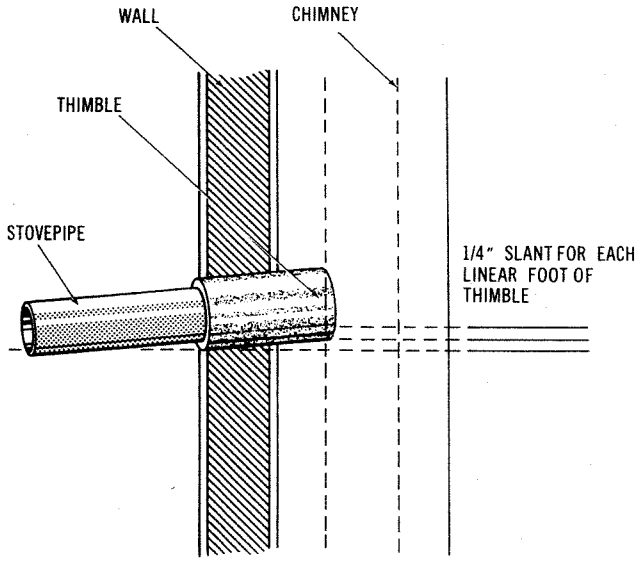


Fig. 17. Angle of thimble from horizontal.

packing it fairly tightly, and proceeded to knock out a hole the size of the thimble with his mason's hammer. After setting the liner in place again, with mortar this time, he pushed the thimble into the liner only until it was flush with the inside wall of the liner, and no farther (Fig. 18). The thimble was then sealed in place with fireclay mortar.

From the thimble to the top of the chimney, the bricklayer pargeted the inside wall of the brick nearest the house as an added safety measure. With mortar totally covering the brick, any possible future leakage of smoke,

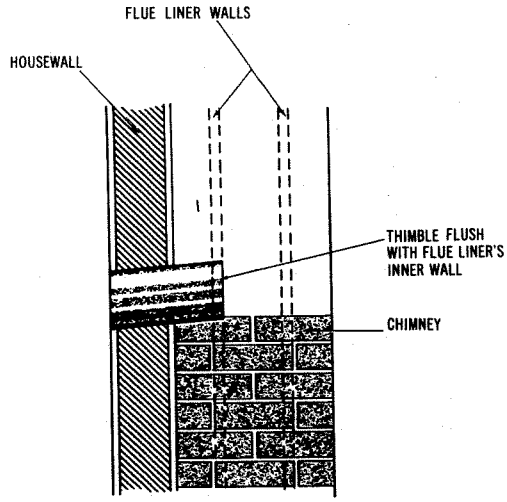


Fig. 18. Position of thimble with respect to wall of flue liner.

gas, or fire at the flue-liner joints would not be able to penetrate to the house wall.

Most bricklayers can do a bit of carpentry, and ours had to cut out a section of the eaves overhang for the chimney to pass through. The rain gutter had to be snipped with tin shears and repositioned so that rainwater would drain away from the chimney on both sides. Chimneys built inside a house are usually required to have 2-inch clearances from combustible material on all sides where they pass through the ceiling or roof, but this standard is not applicable to

Fig. 19. Metal flashing is inserted to prevent water leaks around chimney.

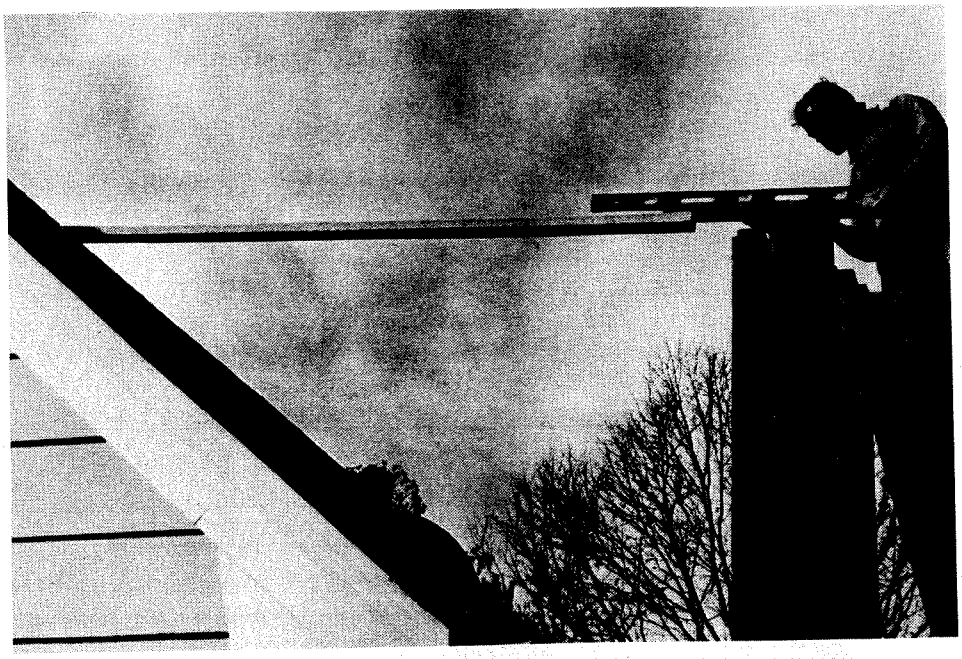


Fig. 20. Checking calculations by actual measurement.

chimneys built on the outside of the house. There, they may rest on the siding.[4]

Masonry Above the Roof

As the bricks are laid through the cutout section of the overhang, space is left in the joints between the bricks for metal flashing which prevents water from leaking in (Fig. 19). When the chimney reached a point approximately 10 feet horizontally from the roof, I asked the bricklayer to check my mathematical calculations by leveling a 10-foot board between the roof and chimney at that point (Fig. 20). From there the chimney had to go 2 feet higher, be topped out, and have the last joints tooled (Fig. 21).

After the metal flashing was installed and calked, the chimney was finished except for the cleanout door at the bottom. Although the bricklayer could not see the need for a cleanout door in a simple chimney without a fireplace, it is nevertheless handy to remove the soot and creosote-crust there when having the chimney cleaned.

Checking the Finished Product

Now the chimney was checked for leaks. This is always a tense moment for the bricklayer, because it is most difficult to repair a leaky chimney and leaks will occur if it is not built correctly every step of the way. The contractor started a smudge fire in the bottom of the chimney through the cleanout door and got the chimney drawing. Then his assistant covered the top with a wet cloth while they both looked all around the chimney for smoke leaks. None appeared, and we all sighed with relief.

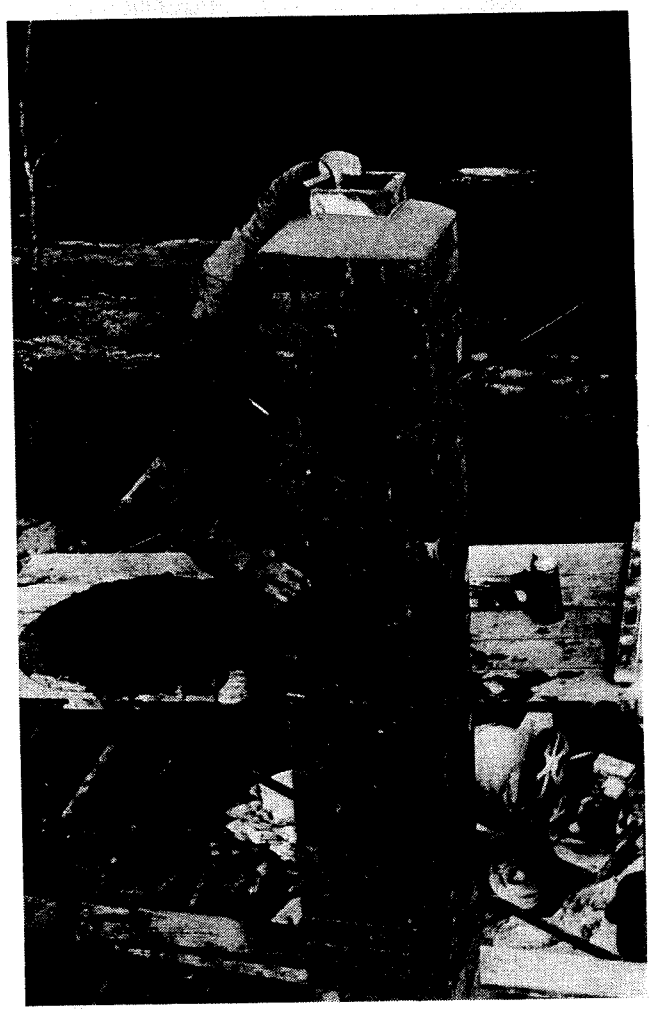


Fig. 21. Tooling the final mortar joints after topping out the chimney.

4. See National Fire Protection Association, "Chimneys, Fireplaces, and Vents," no. 211 (1972), p. 8, art. 802C.2.

When to Build Your First Fire

If the temperature is above 55 degrees when the chimney is built, and the weather is dry, the mortar only needs to cure from five to seven days before you can light your first full-fledged fire,[5] although in the case of a fireplace fire, authorities suggest waiting anywhere from two to six weeks. The waiting period is necessary because fresh mortar or concrete loses up to half of its strength if it is dried out too quickly. It might then crack and crumble, which are dangerous phenomena in a chimney.

Why Chimneys Are Like They Are

By carefully watching the many details of building a chimney, you become impressed by their complexity. Every feature of the chimney is based on safety, from the foundation to the top. The traditional chimney has evolved into a very efficient and safe means of exhausting gases from a fire, and the course of this evolution has no doubt been marked with countless tragedies. Without adequate foundations, chimneys have crashed. With chimneys too short, downdrafts have occurred which have asphyxiated sleeping inhabitants of the house with carbon monoxide in some instances. Before fireclay liners were common, mortar crumbled from between the bricks and allowed heat, smoke, and fire to come into direct contact with the frame of the house. The houses burned, while the chimneys stood many years after. You should learn from past mistakes, and the modern chimney is one example where the lesson has been learned.

5. Dezettel, *Masons and Builders Library*, 1:157.

CHAPTER 3

Stove Installation

If safety is the primary consideration in building a chimney, it is also fundamental to the installation of a woodstove. A perfectly safe chimney would be of little help if the stove is improperly connected to it. The entire heating system, from felling trees, sawing and splitting logs, starting and maintaining fires, to the placement of the stove, its connection to the chimney, and the chimney's exhausting of the smoke is formed as an integrated unit, like a chain. One weak link and the whole system is virtually worthless.

Clearances Between Stove and Combustible Surfaces

The placement of a woodstove with respect to walls and furniture, and its connection to the chimney, are of vital importance. Most important is the space between the stove and any combustible surfaces. Woodstoves without a metal cabinet or shield give off tremendous amounts of radiant heat. This radiation is readily absorbed by walls, floors, and ceiling, creating intense heat within those structures. If the heat is intense enough, the wooden framing becomes increasingly dry over long periods of time and is eventually charred. The spontaneous-combustion temperature of wood is around 700 degrees, but when the wood is totally dry and charred, it can ignite at temperatures as low as 200 degrees. How do we avoid such conditions? The easiest way, the National Fire Protection Association has shown, is by allowing sufficient air space between the radiant heater and the combustible surface. "Sufficient" is 36 inches. So if you have a radiant stove with no shield, and your walls are combustible (as most walls are, except those of brick), you must place your stove 36 inches from walls and ceilings. There is then enough cool air coming off the floor to keep the walls from igniting, given normal domestic firing conditions.

The recommended clearances for the bottom of the stove are another matter. In the first place, no stove should be set upon an unprotected combustible surface such as a wood floor. The danger of falling ashes, sparks, and hot coals is great, so a woodstove must be set on some kind of noncombustible surface. A sheet of 24-gauge metal, either alone or backed with asbestos millboard, is sufficient to prevent this danger, as are mortared bricks, stone, slate, or concrete. The protective floor covering, or hearth, must also extend at least 18 inches in front of the loading door and 12 inches around the sides and back of the stove (Fig. 1).

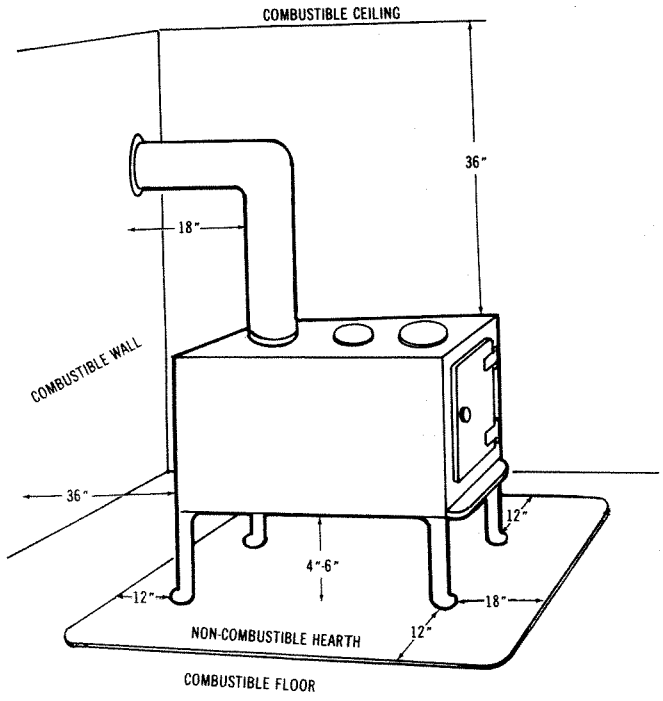


Fig. 1. Suggested minimum clearances from combustible surfaces.

The danger of radiant ignition, however, will not be reduced unless you allow adequate air space between the bottom of the stove and the protected floor. Some fire codes say 4 to 6 inches of clearance is adequate. This may be true with stoves that have the inside bottom of the firebox covered with firebrick, sand, or some other insulating material such as (in the case of Scandinavian stoves) a recommended 2-inch bed of ashes. With a thin sheet-metal bottom, however, a stove may be unsafe if only 4 inches off the floor. The National Fire Protection Association has cited instances of floor beams catching on fire spontaneously, although they were protected by 5 inches of concrete. The stove, however, had been placed directly on the concrete with no clearance. Many old-time stoves did not have legs, and such things occurred fairly frequently.

It is true that cold air rushing toward the stove will keep the bottom cooler than other parts of the stove. Nevertheless, if your stove has very short legs (4 to 6 inches), then you should be sure it has a castable-refractory firebox, firebrick, or some other insulating material in the bottom. If it does not, longer legs are advisable (if available), or the protective floor covering should be made considerably thicker. Most Scandinavian stoves have legs nearly 14 inches tall. Add 3 or so inches of brick on a combustible floor, and you have a safe clearance. Maintain a 2-inch bed of ashes, and the floor brick will remain cool.

By all means, make sure you follow minimum building codes for your area. If they do not exist or are not as stringent as suggested here, you may want to be on the safe side, because codes change and usually become stricter. It is easier to be safe when initially installing your stove than to be forced to change it later. Areas with lax building codes will probably become stricter because of pressure from insurance companies, national or regional fire protection associations, and building associations.

Protection for Combustible Surfaces

Most modern homes do not have the kind of space required for a stove plus a 36-inch clearance, so some kind of protection must be provided for combustible surfaces in order to move the stove closer to them and allow enough space in the room for other furniture. The National Fire Protection Association has set definite standards on types of protection acceptable. For example, if you cover a combustible wall with asbestos millboard, you provide no protection at all, since asbestos is a fairly good conductor of heat. But, if you set the millboard on spacers or conduits so that it is at least 1 inch from the wall, thus allowing air to circulate behind it, then it is safe to move the stove to within 18 inches of the protected wall. If you add a sheet of 28-gauge steel on top of that, the stove could be moved to within 12 inches of the wall. The steel will reflect a great amount of radiation, and what little heat it absorbs will be carried away continuously by the air current rising behind the board. A wall could also be covered with fireproof insulation (preferably 6 inches thick) and a heat shield,

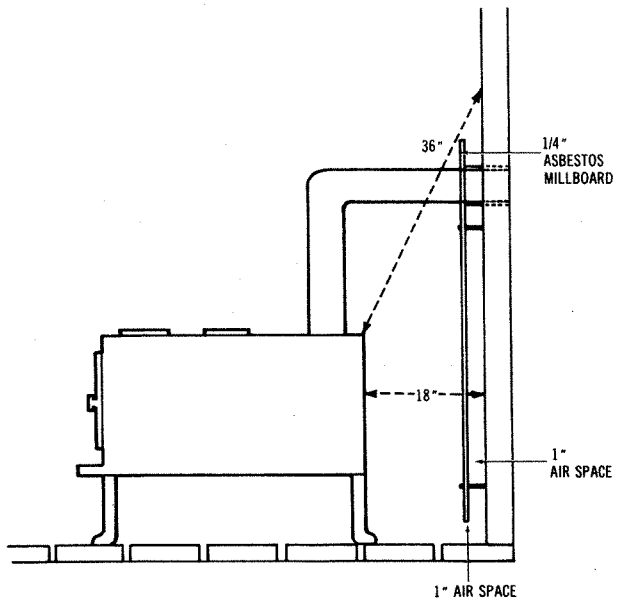


Fig. 2. Suggested minimum clearances from protected combustible walls.

or with brick or other thick, noncombustible material. Remember that whatever protection you use, it must extend far enough in all directions from the stove so that any unprotected surfaces are the required 36 inches away (Fig. 2).

The little air space behind the protective material is the key to close clearances between stove and wall. A 1-inch space must also be allowed at the bottom of the wall-protector in order to permit cold air from the floor to be drawn into the convection current of air behind the material.

Stovepipe Clearances and Installation

A separate set of clearances is required for stovepipe. All stovepipe must be at least 18 inches away from any combustible surface parallel to the pipe (Fig. 3). If the combustible surface is protected by ¼-inch asbestos millboard spaced 1 inch away, the stovepipe may safely be placed within 1 foot of it. If 28-gauge or thicker sheet-metal is used as the shield spaced 1 inch from the combustible surface, then stovepipe may be placed as close as 9 inches, according to the recommended standards of the National Fire Protection Association.

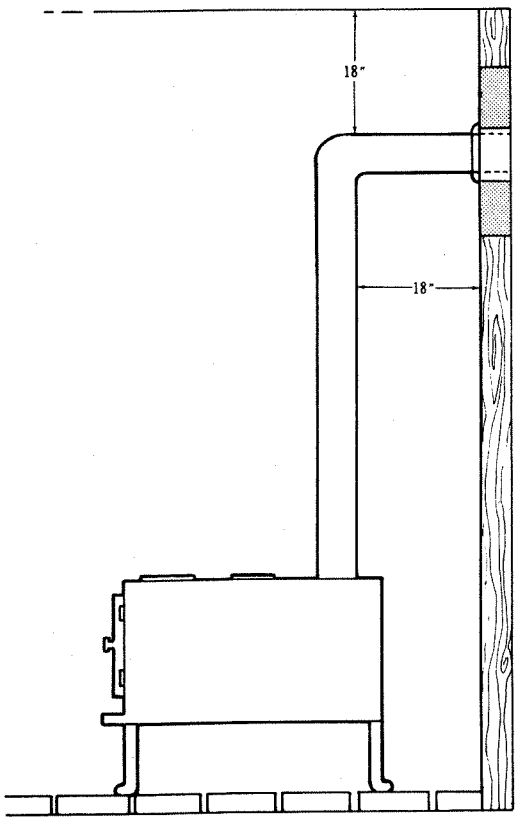


Fig. 3. Suggested minimum clearance of stovepipe from combustible surfaces.

Again, applicable local codes must be followed, but these are usually equal to or less stringent than NFPA standards. If they are less stringent, you may want to follow NFPA recommendations anyway, just to be on the safe side.

In some cases it may not be practical to protect the parallel wall when installing stovepipe. Then, an alternative solution could be insulating the stovepipe itself with asbestos paper and noncombustible fiberglass or other appropriate insulating material. You may even want to buy double-wall, insulated pipe. If so, make sure it is approved by a national testing laboratory and follow the directions carefully as to recommended clearances and installation. Insulated pipe unfortunately loses a certain amount of radiant heat up the chimney, the actual amount depending on how long the run of stovepipe is.

It has been shown that if the length of stovepipe is increased from 5 feet to 10, the heating efficiency of the entire heating system is increased by 3 to 8 percent. Extending stovepipe, however, is not in accordance with the recommendations of the National Fire Protection Association, which suggests that the stovepipe connection between stove and chimney be as short and direct as possible. Other recommendations are that (1) the horizontal portion of the stovepipe should slope upward

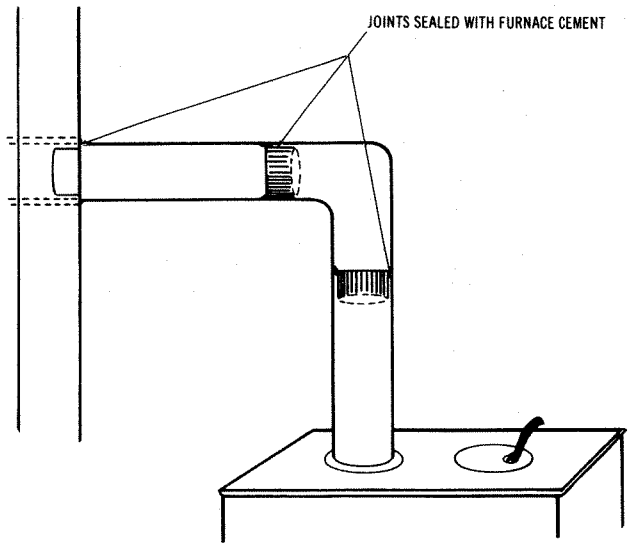


Fig. 4. Seal all stovepipe joints with furnace cement. Note that female ends of pipes face the chimney.

toward the chimney ¼-inch for every 12 inches of pipe length, and (2) the horizontal run should not be longer than 75 percent of the height of the vertical portion of the chimney above the stovepipe connection. If the horizontal section is more than 6 feet long, it must be supported, and the joints in all sections of the pipe should be secured with two or three sheet-metal screws. Ninety-degree turns in the stovepipe should be limited to two and they should be rounded rather than sharp.

Some of these recommendations have been questioned by old-timers and other woodstove enthusiasts. Very long, horizontal runs of stovepipe are quite safe, they argue, when well-anchored and each joint is secured with screws. It is possible, however, for flue gases to cool off too much in such a case. There is a limited amount of heat to be extracted from stovepipe before the cooler gases begin to affect the draft. The main reason for avoiding long runs is the instability of stovepipe when there is a chimney fire or if the fire in the stove itself is allowed to get out of hand. The stovepipe turns red and can shake and vibrate loose. This has happened countless times.

The quarter-inch slope has also been debated. Given a well-drawing chimney, stovepipe slanting *downward* to the chimney has functioned satisfactorily. You see this quite frequently in woodstoves connected to a fireplace opening. The flue collar of the stove is often higher than the top of the fireplace opening, so the connection has to run a little downhill. It should be avoided if possible, because you may have difficulty getting fires started when the stove and chimney are cold. There are quite a number of small, short stoves that will fit almost any fireplace opening; some, such as Better 'n Ben's, are built especially for fireplace installation.

Stovepipe comes in a variety of thicknesses (gauges) and colors (black, blue, metallic), but you should use the strongest, heaviest, and darkest pipe available. The standard gauge is 24, but 18-gauge will last longer and is safer in case of a chimney- or flue-fire. Black or blue will radiate the most heat. Scandinavian stovepipe is of exceptional quality. It is usually 18-gauge with the seams welded and the outer surface coated with black enamel. The joints fit unusually snugly. In spite of tight-fitting joints, however, you should always seal each pipe joint with furnace cement to make it airtight (Fig. 4).

The female ends of the stovepipe should face *toward the chimney* and not, as in earlier times, toward the stove. This makes it possible for creosote to flow back into the stove where it will be burned. If the joints are sealed with furnace cement, no smoke will escape. If furnace cement is not available, asbestos paper can be soaked and wrapped around the joints to seal them. It is not particularly pretty, but black paint can make this solution tolerable.

Most regulations and building code standards have been derived from tragic experience. As one pessimist put it, "If something can go wrong, it will." History has certainly borne out this dictum in the case of heating systems. So, follow all codes and even be more cautious wherever possible or practical.

Once you have taken the necessary precautions, then and only then can you begin to consider aesthetic factors. The first thing you will want to make as attractive as possible is the hearth. There are a number of attractive sheet-metal hearths on the market today, as well as preset tile panels with various colors and designs. If you have the time and inclination, you may want to make your own tile panel or lay your own brick in some unusual design. Or, you might get some ideas from fireplace designers. They have put freestanding fireplaces in a bed of pebbles, stone, or sand, or on slate or used brick. A slab of marble makes a particularly beautiful hearth. Even thin slabs of limestone are used, as are precast concrete slabs. Sometimes you can buy odd-sized brick, such as roman brick, face brick, or paving brick, for interesting patterns. The brick can even be painted with high-temperature automobile paint. Let your imagination and ingenuity be your guide, or get some ideas from the *Stove Book,* by Jo Reid and John Peck.

CHAPTER 4

Firewood

One of the main aspects of the ecological movement in the 1960s was the desire to save the forests. Avid environmentalists fought with the same passion to rescue a giant redwood or sequoia from big timber conglomerates as others did to save Vietnamese from napalm bombs. Massive political campaigns were organized in the U.S. and Canada to stop the practices of clear-cutting and slash-burning in national and privately owned forests. The Rockefellers, *National Geographic Magazine,* and the Sierra Club were enlisted to help salvage at least a small part of the remaining stands of 2000-year-old evergreens in California. A few virgin hardwood forests in central Illinois, South Carolina, and elsewhere became the objects of intense political action in the halls of national and state legislatures. A typical meeting of opposing forces saw young, college-science professors pitted against the wood industry's leading foresters. Arguments could get nowhere because they were based on fundamentally different philosophies: one aesthetic; the other, commercial.

Now, much of that is changing. With their realization that wood is a renewable and virtually nonpolluting resource, the environmentalists have come closer, if not capitulated entirely, to the traditional forester's view: save our woods by selective cutting and replanting (although that is not practical with the 2000-year-old sequoias).

The young scientists now quote passages from state forestry extension publications, commercial heating, refrigerating, and air-conditioning engineers' bulletins, and from that seeming bastion of conservatism, the U.S. Department of Agriculture. Their metamorphosis is consciously felt by many.

The Value of Wood

Some years ago, there was a rush to buy cheap land located in remote regions of the country. The scrub woods looked beautiful to their new owners, who carved out private hiking trails and left everything else in its rugged, primitive state. Oil, coal, gas, and electricity were anathema, but it was necessary to keep warm in the winter. The only things left to accomplish this necessity were wood and the sun.

Since solar heat was largely undeveloped and not sufficient for complete heating needs, the scrub woods suddenly took on a different beauty. Those pignut hickory and honey locust trees made some of the best firewood found anywhere. Firewood became a primary weapon of the self-sufficient homesteader in his battles against dependency on electric, gas, and oil companies and against what he saw as all the other real or imagined enemies of the "common man."

Utility Value

Wood became a panacea. Not only could you keep warm and cook meals with its fire, but you could also keep clean with wood-heated water, find protection from the elements with log cabins, and make furniture out of it for comfort.

So now, the latter-day homesteader is husbanding his wood resources with all the care and efficiency of a wood-industry forester. Trees take on value according to their suitability for firewood, for furniture, fence posts, log cabins, or for other practical purposes. And since the energy crunch of 1974, the homesteader has been joined by countless suburbanites moving ever farther from the turmoil of the metropolis.

Heat Value

A woodlot (Fig. 1) is now considered a valuable piece of real estate. When you calculate the amount of potential heat available, a good stand of hardwood trees is indeed valuable. It has been estimated that an acre of trees will produce one cord of wood each year, in new growth. That amounts to the heat equivalent of approximately 1 ton of anthracite coal or 240 gallons of fuel oil. At the rate of 45 cents per gallon of oil, that acre of woods is producing $108 worth of potential heat, year in and year out. A 10-acre plot of trees would be worth $1000 per year.

There are other value considerations. Most evergreen trees contain more resin than broadleaf trees and therefore will burn faster and more intensely. This is not particularly desirable when heating with woodstoves because we do not want to be loading the stove frequently, especially in the middle of the night. Evergreens also tend to cause much more creosote deposit to be formed in the chimney and stovepipe than do hardwoods. So the *burning* characteristics of wood are also an important factor. Some people refer to this aspect as the "coaling quality" of wood. On the other hand, evergreens make excellent kindling for starting fires, and

Fig. 1. A woodlot is a valuable piece of real estate.

Firewood Value

Thus, wood is valuable because energy is valuable. But, some kinds of wood are more valuable than others. The heat value is very nearly identical among *all* species of trees, per pound of wood. One hundred pounds of hickory will produce as many and no more Btu of heat as will 100 pounds of white pine. On the other hand, due to hickory's greater density, you will have to cut nearly twice as many pine logs to equal the weight of the hickory logs (Fig. 2). Cutting, splitting, hauling, and stacking are time-consuming and energy-consuming chores in themselves. If you have a lot of wood to cut, you will save considerable time and energy, and save wear on your tools, if you cut hickory rather than white pine. The relative *density* of wood, then, is a primary consideration in its value as firewood.

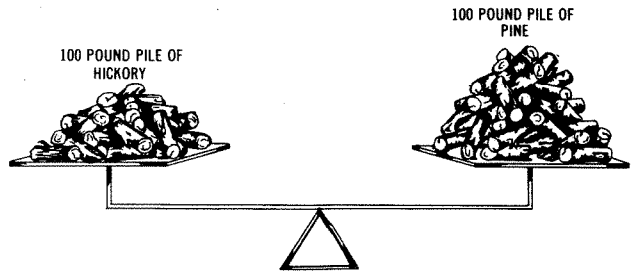


Fig. 2. One hundred pounds of hickory (left) balances an equal weight of pine (right), but takes up half the space.

some species, such as slash pine, are denser than many broadleaf trees.

Related to the burning characteristics, but not to particular types of wood, is the moisture content. Green

wood (freshly cut) contains a great deal of moisture and will burn slowly. In fact, a majority of the heat in the stove can be used up in vaporizing the moisture in such wood. Therefore, it is most important to burn only dry, well-seasoned wood. Wood at least 6 months off the stump is good; in most cases, a year will make it even better. Burning green wood also tends to cause a lot of creosote buildup.

Other, less important, factors in determining the value of wood as firewood are its "splittability," its susceptibility to rot, and its aroma. Wood from some trees, such as elm and hophornbeam, can be very difficult to split, and all wood is hard to split around the knots. You may have to cut such trees into short logs in order to save time and effort.

Fast rotting is a particular threat in the wood from some trees. It is best to saw a tree into logs as soon as it is felled, because the logs can then be stacked to dry. They should be stacked on a bed of rocks, stones, or cross-logs in order to avoid contact with the ground. Rotten, or "punky," wood has little heat value. One spring I cut down a number of black cherry trees that were covered with tent caterpillars. I did not take time to saw them into logs but merely dragged them off into the woods, out of the way. By late fall, they had already rotted to the point of near-worthlessness. I lost at least a half-cord of wood and the pleasure of smelling black cherrywood burn in my winter fires. It gives off the aroma of cinnamon. The wood from cedar (juniper) and from various fruit trees, such as apple, can also be pleasant to smell as it burns.

The most practical consideration in choosing firewood, of course, is its availability (and if you have to pay for it, its price). Some parts of the country have quite limited choices in firewood, so you may have to take what you can get. But if there is a choice, then cut or buy the densest wood possible. Here follows a nearly complete, alphabetical list of most North American trees used for firewood, with comments on density, susceptibility to fungi and rot, ease or difficulty of splitting, and in some cases, fragrance. The way to use this list is to find out the kinds of wood available in your area, either on your property or from a cordwood dealer or other sources. Find each available species in this list and note its characteristics.

Trees are listed in alphabetical order in each of two groups: the hardwoods and the softwoods. If you do not know the trees around you, buy a guide to trees, such as C. F. Brockman's *Trees of North America,* G. A. Petrides' *A Field Guide to Trees and Shrubs,* or *Knowing Your Trees,* by G. H. Collingwood and W. D. Brush of the American Forestry Association. If you are cutting your own trees, you need to know what you are cutting. Firewood-gathering experts can tell almost any tree in their area by the bark, grain, and weight of the log, without seeing the leaves of the tree. Once you know your trees, you will also appreciate the woods and forests more.

Hardwood Trees as Firewood

Alder: Red and sitka alder are low in heat value. Found only in the Northwest up to Alaska.

Apple: Very dense and fragrant.

Apple, crab: Dense.

Ash: Black ash needs long seasoning and is not very susceptible to rot, while blue ash and oregon ash need little seasoning. All are of medium density. White ash rots easily and is hard to split, but needs little seasoning and is the densest of the ash family.

Aspen: The bigtooth and the quaking aspen are not very susceptible to rot but are among the lowest-density woods.

Basswood: American basswood is low in density.

Beech: American beech rots easily and is extremely hard to split, but is as dense as some hickory and oak species. It also needs little seasoning.

Beech, blue: *See* HORNBEAM.

Beech, water: *See* HORNBEAM.

Birch: The common birch species (gray, paper, river or black, sweet, yellow) are medium- to high-density woods, but need to season for a long time and be guarded from rot. They are all easy to split.

Box elder: *See* MAPLE.

Buckeye: A rather poor, low-density firewood.

Butternut: A member of the walnut family, the butternut rots easily and is of low density.

Catalpa: This soft wood makes very poor firewood.

Cherry, black: This wild species, along with the domesticated fruit cherries, is of medium density and quite fragrant when burned. It is somewhat susceptible to rot. The pin cherry is a low-density wood.

Cottonwood: The balsam poplar in Alaska and Canada makes lots of ashes, as does the black cottonwood. The eastern cottonwood is the densest of the three species, but all are considered low-density woods and therefore poor for firewood purposes. They are all hard to split and need to season for a long time.

Dogwood: These are very dense, but may be protected in some states as the State Tree. Their ornamental value is really too great for them to be used as firewood. They are also very hard to split.

Elm: Of medium density, the elm tree (american) rots easily, needs long seasoning, and is sometimes hopeless to split by hand. The rock elm is as dense as some oak trees, and the slippery elm is only slightly denser than the american elm tree.

Eucalyptus: A very dense, native-Australian tree which is now not uncommon in Southern California and Florida.

Gum, black: *See* TUPELO.

Gum, sour: *See* TUPELO.

Gum, sweet: Also called red gum, this tree is of medium density, is very hard to split, rots easily, and needs a long seasoning period.

Hackberry: Needs long seasoning. Medium density.

Hickory, pecan: All four in this family (bitternut, nutmeg, pecan, and water hickory) make excellent firewood. They are very dense, require a long seasoning period, and unfortunately, rot easily. Easy to split.

Hickory, true: These are even more dense than the pecan hickories and represent the supreme firewood. The mockernut, pignut, red, sand, shagbark, and shellbark hickories are plentiful over the whole central and eastern portions of the country. A stove full of hickory will put out more heat than you will want, so a hickory fire must be closely watched. It is also an ideal wood to use in smoking meats (but only use the charcoals!). Like the pecan hickory, it is easy to split and rots easily. The shagbark and pignut, however, can be burned successfully with only a few months of seasoning.

Holly: Like the dogwood, this tree should be spared the ax because of its beauty. If one does die, however, it will make good firewood because it is of medium density.

Hophornbeam: The eastern hophornbeam is sometimes called ironwood because it is very hard, as dense as most hickories, but the tree is not very tall (usually 20 to 30 feet, except in the South) and only plentiful in certain areas. It has a very scaly bark.

Hornbeam, american: This is also a very dense wood. It makes good firewood, but not as good as the hophornbeam.

Ironwood: *See* HOPHORNBEAM and, in the softwoods, CASUARINA.

Laurel, california: Found only in California and Oregon, it is a dense wood.

Locust, black: The black locust is even denser than its distant relative, the honey locust, and needs very little seasoning. Its extreme resistance to rot makes it, along with the eastern red cedar, the ideal fence post. A good, 10-inch diameter, black locust post will stay firm in the ground for over 20 years.

Locust, honey: Needs long seasoning, but it is worth the wait, because it makes excellent firewood.

Madrone, pacific: Very dense.

Magnolia: The cucumbertree and southern magnolia are primarily ornamental. For that reason, and because they are only of medium density, they should be spared burning as firewood.

Maple: All maple varieties (bigleaf, black, box elder, red, silver, and sugar) are medium- to high-density woods, need long seasoning, are easily split, but rot easily also. The bigleaf and box elder are perhaps the least useful as firewood, and the sugar maple is the best. It is also fragrant to burn. They are abundant.

Oak, red: The red oak family (black, cherrybark, blackjack, laurel, northern red, pin, scarlet, southern red, water, and willow oak) are all very dense and make extremely good firewood. One nice, big log of red oak, well-seasoned, will put out a lot of heat and last through the night. Oak logs tend to rot, so do not let them lie in contact with the ground very long after cutting. They are hard to split, but it is worth the effort. All should be seasoned a good year.

Oak, tan: Found only in California and southern Oregon, the tan oak is a high-density wood.

Oak, white: The white oak family (bur, chestnut, live, overcup, post, swamp chestnut, swampy white, white) is just as dense as its sisters in the red oak family, with the southern live oak attaining an astounding density of 0.88. The latter is an evergreen tree only seen in any abundance in the lower South, where it is much cherished as a shade tree. Unlike most other oak trees, the live oak is extremely resistant to rot. The white oak is also not so susceptible to rot as the other oaks, but is hard to split.

Osage orange: A very dense wood that needs little seasoning.

Peach: Needs little seasoning and makes excellent firewood with a lovely fragrance.

Pear: Good firewood.

Pecan: *See* HICKORY, PECAN.

Persimmon: This makes excellent firewood because it is dense and gives off the aroma of cinnamon when burning. It is also not very susceptible to rot and splits easily. In the Southeast, it is quite plentiful.

Poplar, balsam: *See* COTTONWOOD.

Poplar, tulip: Sometimes called the tulip tree, it is a low-density wood and quite susceptible to rot.

Poplar, yellow: *See* POPLAR, TULIP.

Sassafras: This is a very common "weed" tree in the Midwest, is of medium density, and needs long seasoning.

Shadbush: Very dense.

Sugarberry: Like the hackberry, it needs long seasoning and is of medium density.

Sweetgum: *See* GUM, SWEET.

Sycamore, american: This American representative of the plane tree is very hard to split and is of medium density.

Tulip tree: *See* POPLAR, TULIP.

Tupelo: The tupelo family (black or sour gum, swamp, and water tupelo) is of medium density, needs long seasoning and is very hard to split.

Walnut, black: This tree is so prized for wood to use in furniture that you should think twice before cutting one of them down for firewood (lumber mills now shave these logs extremely thin for veneer). In fact, a walnut tree is perhaps the most commercially valuable

tree in America. It is of medium density and needs long seasoning.

Willow, black: All of the willow species are very resistant to rot, but are poor firewood.

Softwood Trees as Firewood

Casuarina, horsetail: Introduced from Australia, this tree is quite dense but very susceptible to rot. Also called ironwood, but not to be confused with the hophornbeam.

Cedar: All members of this family (alaska, atlantic white, incense, northern white, port orford, and western red cedar) are very soft woods, but because of their fragrance and their popping and crackling sounds when burning, are desirable firewoods, especially in a fireplace. They are very resistant to rot and are easily split.

Cedar, eastern red: *See* JUNIPER, VIRGINIA.

Cypress: In the same family as the cedars and bald cypress, the cypress is found mainly in the Southwest. It is of low density, but very resistant to rot.

Cypress, bald: Medium-low density. Needs long seasoning.

Fir: The species in this family (balsam, california red, grand, noble, pacific silver, subalpine, and white) are all of low density. The noble and subalpine, however, need little seasoning.

Fir, douglas: The four members of this family are of medium density, very easy to split, need little seasoning, and burn very fragrantly.

Hardhack: *See* CASUARINA.

Hemlock: Low- to medium-density woods, the eastern, mountain, and western hemlocks all burn with pleasant fragrance and rot easily.

Juniper, virginia: Also called eastern red cedar, the juniper is a "weed" tree throughout most of the Southeast, but makes very good fence posts because it is so resistant to rot. A poor firewood, it nevertheless is very fragrant. If burned in a fireplace, a screen must be in place because it can make violent pops and explode little coals out into the room.

Larch, western: Easy to split, not very susceptible to rot, and of medium density.

Larch, eastern: *See* TAMARACK.

Pine: This large family tends to rot easily (except for the longleaf pine), is very easy to split, and makes lots of ashes. Most members are of low density (eastern white, jack, lodgepole, ponderosa, spruce, sugar, and western white), but some are medium (norway, pitch, red, sand, and virginia), and a few are quite as dense as many good hardwoods (loblolly, longleaf, pond, and slash). The lodgepole and red pine need little seasoning; the rest, long seasoning. The relatively isolated southwestern pinyons or nutpines are of medium density.

Redwood: Very resistant to rot, easy to split, but very low-density wood.

Spruce: Very common in the northern regions of the continent and in certain mountainous areas of the West, the spruces (black, engelman, red, sitka, and white) all rot easily and are of low density. The red and white species need little seasoning.

Tamarack: Related to the larches, the tamarack is widespread across the northernmost region of the continent, from Alaska to the Atlantic coast. It is a medium-high-density wood that is fairly easy to split.

Yew, pacific: Not common to the rest of the country, but widespread along the Pacific coast from San Francisco to Alaska, the yew is a medium-density wood. Since it is one of only two species on the continent, the yew should probably not be used for firewood. It has beautiful, red, berry-like seed cups.

Where to Find Firewood

If you do not have an adequate supply of wood on your own property, and you do not want to pay for it by the cord, there are a number of other ways to find it.

Neighbors and Friends

Ask neighbors and friends if you may clear out any dead trees they have on their property. During one year, I had three such opportunities. A friend had a huge oak in his back yard topple over during a heavy windstorm. This tree produced nearly a cord of the best firewood. A neighbor allowed woodcutters to cut out a lot of hardwood on his farm and said I could have all the branches and treetops they had left. He was happy to have his woods and pasture cleaned up, and I was thrilled to get more excellent firewood. This wood dried out fairly quickly because it was a month or so before I could saw the limbs into firewood; by that time, the leaves had had a chance to die and help dry out the branches. If you fell trees in the late spring or summer, it is always good to wait until the leaves die before cutting the tree into logs. Another neighbor had trees felled by the telephone company when they ran a new set of wires along his property. Again, I could take what I wanted, and it was mostly choice firewood.

Other Sources

Many national and state forestry commissions will allow you to cut several cords of wood for a nominal permit fee. If there are orchards in your area, ask an owner for permission to clean up his prunings and trimmings, which will provide you with some of the best and sweetest-smelling firewood. Sawmills will usually let you have slabs, bark, and outer strips of wood for a small fee, if you load such wood and haul it away. Even cabinetmakers may have

scraps for you. Call some local building contractors and ask them if they are about finished with any jobs from which you could pick up the trash wood. Many times, they merely dump such wood into the country landfill. Most of the wood will be pine, but it is kiln-dried and makes the best kindling. City utility companies can also be a good source of potential firewood. They are always trimming trees along the streets to clear away traffic obstructions and make room for power lines. The sources can be endless, if you use your imagination and a little elbow grease.

Your Own Woodlot

The best source of firewood is your own lot. If you do not own land, but you are a dedicated wood-burner, you should look into buying a few acres or even a whole farm. Most frequently, land which is primarily woods is worth less than tillable fields and pastures. Scrub woods (that is, woods that have been culled of all the big, valuable hardwood and pulp trees) are quite common in many regions of the country, and this land is the least valuable.

Fifteen or so acres of scrub woods will make an excellent start for a woodlot, and there will be enough small trees to thin out over the first few years to keep you in firewood. Unless you know or have read quite a lot about culling, you should call your county agricultural agent and ask him to look over your woods to determine the types of trees to allow to stand, the amount of space required between trees, and other aspects.

If you intend to do some farming, you will want to have fence posts. Ash, locust, and eastern red cedar (juniper) make the best posts. Even if you do not need them, you can cut and sell them for as much as two dollars apiece.

Certain hardwoods are very much in demand for furniture. Find out from the county agent which ones are in demand in your area, and then see if you have any on your lot.

There are several good books and government bulletins on managing your own woodlot available, and numerous articles on the subject appear in magazines such as *Organic Gardening* and *Mother Earth News*.

The joy of owning your own woods for walks, privacy, and provision for all your heating needs is still possible in this age of the megalopolis. Who knows how much longer such a situation can last?

How to Cut and Split Firewood

After acquiring a source of firewood, you have the problem of cutting and splitting it. This is another very dangerous link in the whole wood-heating chain, and it is made even more dangerous by the enormous capacity for destruction possessed by modern chain saws, cordwood saws, and mechanical log splitters (Fig. 3).

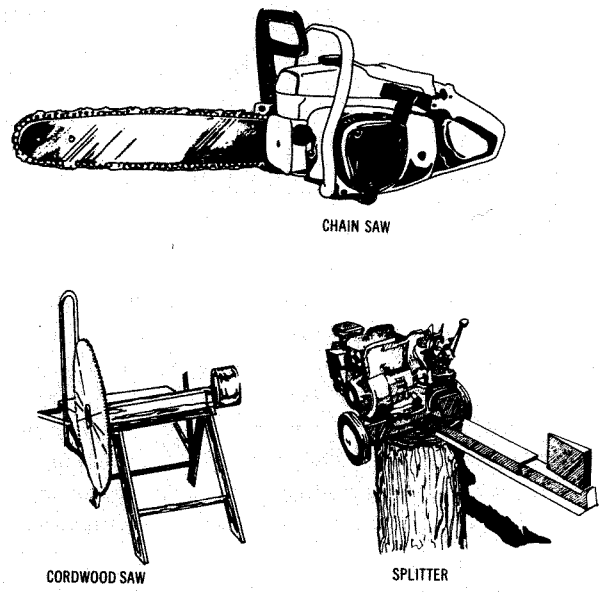


Fig. 3. Power tools for cutting and splitting firewood.

Cutting by Hand

If you are totally dedicated to farming or homesteading, you probably have the time and perhaps the inclination to cut all your wood by hand. Some do it. It is far quieter and safer, although even the old-timers had their share of accidents felling large trees with crosscut saws, axes, sledgehammers and wedges. But, cutting wood by hand is extremely time-consuming and impractical if you have to

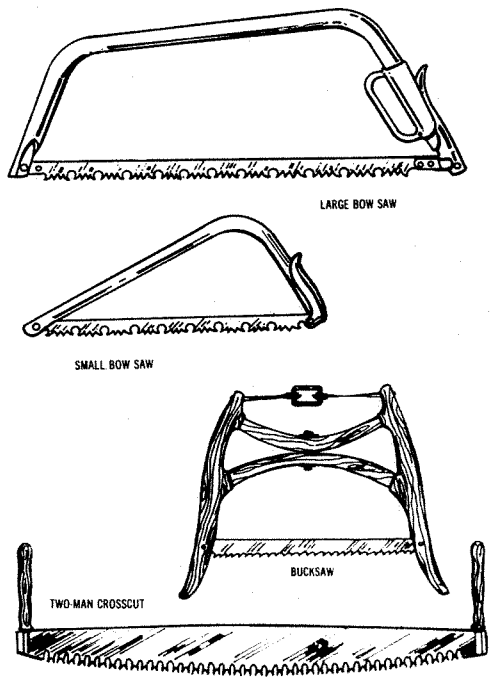


Fig. 4. Tools for cutting wood by hand.

Fig. 5. Home-made, heavy-duty sawbuck.

make your living doing something else. Most of us cannot or do not care to take that kind of time.

If you do have the time, you will need a large and a small bow saw (Fig. 4) and a two-man crosscut saw if you will be working with a friend. An old-fashioned bucksaw is also nice to have around the woodpile for sawing logs on the sawbuck (Fig. 5). The bow saw and bucksaw tend to get stuck in wet or green wood, especially hickory. Here, a single crosscut saw will work better, since its teeth are bent slightly to each side of the blade and cause a wider cut to be made. This saw also takes more energy to push, but the blade will not likely get stuck.

Cutting With a Chain Saw

The modern chain saw has contributed greatly to keeping our paper, lumber, and all other wood products relatively cheap. The time gained by using one is almost exponential: an entire cord of wood can be cut by one man in one day.

Buy a Saw or Rent One?—If you do not need much wood (say, a couple of cords per year), you may want to forego buying a chain saw and rent one instead from a tool rental agency. On the other hand, if you own a woods and want to manage it over a period of time by felling here and trimming there, it would be a nuisance to rent a saw frequently. There is also a certain danger in being unfamiliar with the weight and the cutting and starting idiosyncracies of a rented saw.

It is best to buy a reputable brand of chain saw with a bar at least 16 inches long, or longer if you can handle it. Keep in mind that the heavier models will tire you faster, and exhaustion is a very dangerous condition when working with a chain saw. Most accidents occur from exhaustion and carelessness, and even professional lumberjacks have accidents. So, you may want to try out a saw before you buy one, in order to determine the ideal weight and length of bar. If you plan to cut very much wood at all, you should not buy one of the extremely light, short-bar saws (under 14 inches). Another important consideration in buying a chain saw is the dealer. He should be close by, be a good and reliable mechanic, and have a good inventory of parts.

Observations on Using a Chain Saw—Before cutting with a chain saw, you should read the instruction manuals that come with your saw, or other bulletins, pamphlets, and books from the chain saw manufacturers. They are well aware that they make a very dangerous tool, and they have consequently invested enormous sums in publishing safety literature. Some of the advice will not make a lot of sense until you make you own mistakes. For example, you may think that running the blade into the ground (Fig. 6) would not hurt it too much. It does. The sand and grit in the dirt dulls every little tooth, and your next cut will be impossible because the saw is too dull. Then it is a big hassle to sharpen it or take it to the dealer to have it sharpened. Other mistakes could be more costly, and even fatal.

Personally speaking, I feel it is preferable to work with someone else when sawing. Then if a serious accident occurs, your companion can go for help immediately. Talk with people who use chain saws frequently and you will hear enough hair-raising accounts to make you be extremely cautious. If you cannot find someone to work

Fig. 6. Don't run the saw blade into the dirt.

with, let your wife or neighbor know you are going out to cut, and tell them about what time you will be back.

I also feel that working with a chain saw can be extremely tiring. To avoid fatigue, work in short blocks of time—say, for 15 or 30 minutes—and then rest for ten. I like to cut until the saw's gas tank is empty and then rest. This gives the saw a chance to cool off and be safer to refill with gasoline. If you spill fuel on the hot motor, it may explode, or burn you with a flash fire. The reservoir for chain lubricating oil (Fig. 7) must always be checked at refueling time. If it runs dry while you are sawing, you can dull or permanently damage the blade. Some chain saw operators do not like to depend on automatic chain oilers and prefer to use the manual pump.

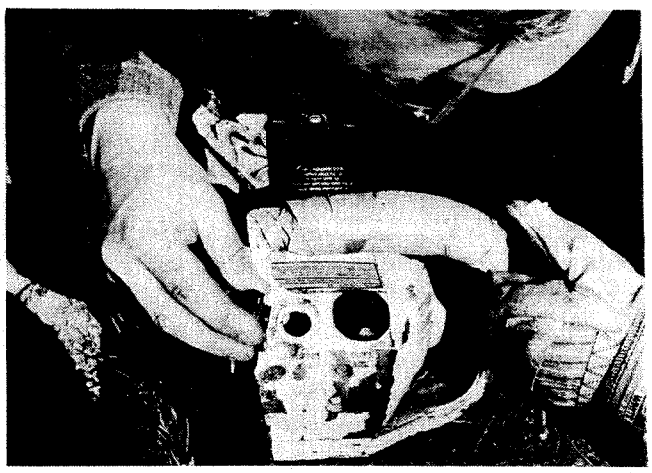


Fig. 7. Check the bar oil reservoir at refueling time, or sooner.

It is also important to wear snug-fitting, heavy gloves. They will absorb most of the vibrations and keep you from premature fatigue. Earmuffs or earplugs must be worn also, because of the noise of the saw. Too many people have had their sense of hearing permanently damaged for this to be an old wives' tale or a case of overcautiousness. Injury statistics are frightening, but if you are constantly vigilant, accidents can be avoided.

Preventive maintainance (Fig. 8) should be followed to the letter. Chain saw manuals carefully list the steps you can take to keep your saw running in tip-top order. Use the recommended mixture of gasoline and oil, the required viscosity of oil, and the correct tools for servicing. For example, if the manual says to sharpen your chain with a 5/32-inch cylindrical or oval file, then do not use a 7/32-inch file. This discrepancy may sound slight to you, but a chain saw is built to tolerances so precise that even a slight deviation from specifications can cause the saw to function inefficiently or improperly.

As a final observation, I feel that you should always try to let the saw do the sawing. Do not press down hard on the hand bar, for only a slight pressure is sufficient. The saw will partially feed itself because of its own weight and the direction of chain rotation. This means that you can saw in a relaxed manner but with a firm grip (Fig. 9). The main effort you expend will be in guiding the bar, holding it in position, and being alert and careful. You will be tired enough without pressing, pulling, and pushing unnecessarily.

The chain saw is a marvelous instrument that can save countless hours of effort over the years and pay for itself in the first two cords of wood cut. But, it is a sensitive and sometimes temperamental machine which demands attention and correct operation. This is essential for its sake and your own.

How Much to Cut at One Time

Cutting, splitting, and stacking can be backbreaking work if you are not used to moderately hard labor. But it is easy to get in shape if you just try not to do so much all at once. Some see it as a much more productive exercise than jogging. You will be using a lot of muscles in your arms, chest, neck, and legs, and you will know which ones they are after the first day's work, because they will all ache the morning after. If you cut and stack all during the year, the work is spread out over a long period of time and requires only about fifteen minutes a day (plenty, if done nearly every day). Some people, however, like to go into the woods for one or two weekends and get all the year's cutting done at one time. They will even cut four to six-foot logs in the field and bring them back to saw into stove-length sizes later, at their leisure. This means they spend less time in the woods and more in their back yard. From a safety point of view, this is perhaps desirable.

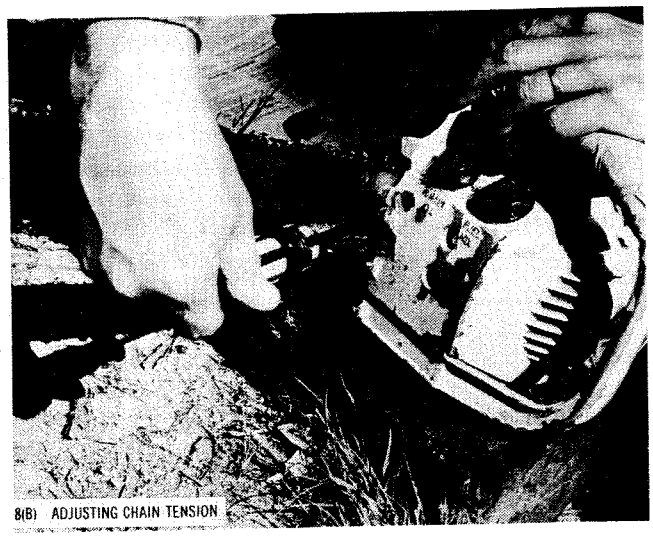
What Size to Make the Logs

Cut your logs at least two inches shorter than the depth of your firebox (Fig. 10). Longer logs will lie in the stove right up to the loading door and cause a lot of smoke to be let into the room every time you open the loading door. The charcoals and ashes of such long logs are also liable to fall out onto the floor, especially if you are trying to push the logs back with the poker or are raising them up a bit to get some air underneath them. Another disadvantage of trying to cut logs to exact firebox-length is that you may miscalculate, get a number of logs one-half-inch too long, and have to cut all of them again. Obviously, it is best to cut them too short than even a quarter-inch too long. Shorter logs can be used to good effect when adding wood to a fire that has already burned for an hour or two. Logs contract after being in the stove for a while and another log can be squeezed in periodically.

Splitting Logs

Some wood-burners hate the idea of splitting wood so much that they buy the largest stove with the largest load-

8(A) CHECKING CHAIN TENSION



8(B) ADJUSTING CHAIN TENSION

8(C) CLEANING OUT BAR GROOVE

8(D) CLEANING DEBRIS FROM BAR OIL OUTLET

8(E) CHECKING AIR FILTER

Fig. 8. Preventive maintenance on the chainsaw.

Fig. 9. Proper hand grip and proper stance.

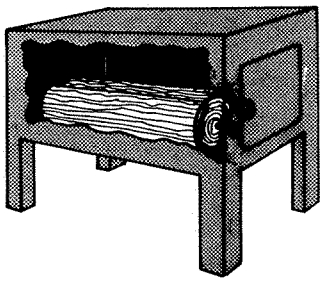


Fig. 10. Cut logs 2 inches shorter than the depth of your stove's firebox.

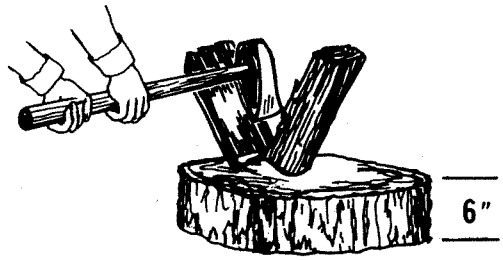


Fig. 11. Use a maul for splitting.

next day's fire; but, if large unsplit logs are burned continually, their lower heat production and smoldering burn will cause an unusual amount of creosote to be deposited in the chimney. Whole logs also take much longer to dry out than do split logs. Splitting, then, is essential to a good, hot fire.

To split wood most effectively, a heavy splitting maul should be used. The weight of the head will give plenty of momentum on the downswing, and the large angle of the blade is usually sufficient to break the wood apart on one swing (Fig. 11). It is most important to place the log on a solid surface, such as frozen ground or a 6-inch-thick cross-section from the trunk of a big tree. Putting the log to be split directly on soft ground is not ideal because such ground will cushion the splitting blow, and you want as much power as you can wield to go into that stroke. An ax, wedge, and sledgehammer can be used if you do not want to buy a splitting maul.

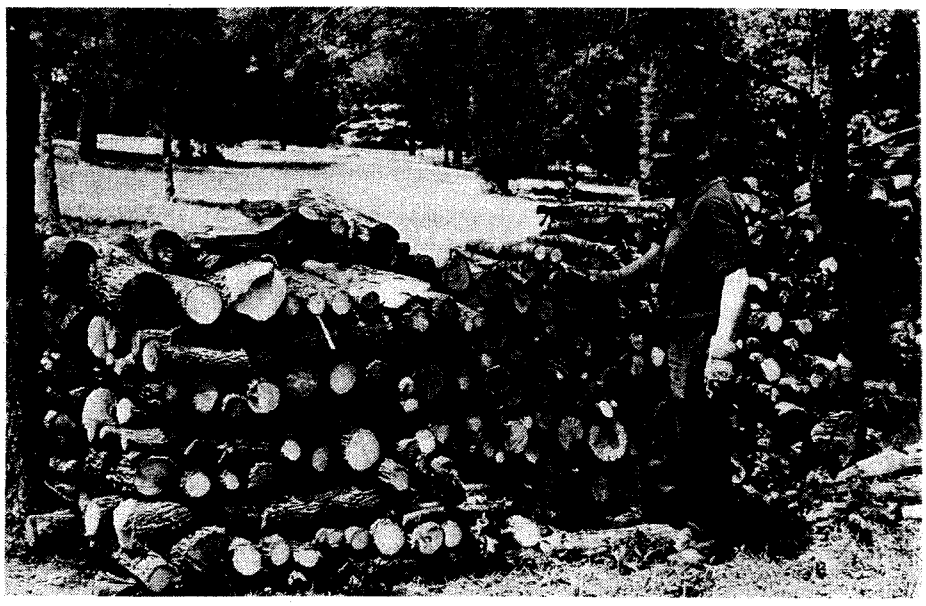


Fig. 12. A neatly stacked woodpile.

ing door in order to keep their splitting activities to a minimum. But, this has one major disadvantage. Large logs on the fire tend to burn much more slowly than they would if they had been split into several pieces. It is all right to throw in a big log at night, before going to bed, so that you will have plenty of coals in the morning to start the

How to Store Firewood

The next problem is storing the wood. Dried properly, firewood can give off nearly twice as much heat as it can

in its green (fresh-cut) state. This characteristic will vary according to the species of tree, but all woods burn better and hotter when seasoned, or air-dried. Wood seasoned one year will contain anywhere from 15 to 25 percent moisture, depending on the season, weather, and geographical area.

Almost everyone has seen a neatly stacked woodpile (Fig. 12), but not all woodpiles are stacked to best advantage. For example, many people simply stack their logs on the ground. The entire bottom layer of logs will most likely rot in less than a year because the logs will absorb a great deal of moisture from the ground. It is much better to stack wood on a bed of rocks, a rack, cross-laid pipes, or on anything else that will keep the wood off the ground and allow it to air-dry. Ideally, you should build a well-ventilated woodshed, but the price of building materials today can make that prohibitive. Actually, a pole building or lean-to would suffice, although it may not look as attractive as a regular woodshed painted the same color as your house. One ingenious solution is to build a solar-heated woodshed out of fence posts and polyethylene film. This must have a southern exposure and be ventilated enought to prevent condensation. The inventor claims all his firewood dries out in less than six months.[1]

No matter what your solution may be, firewood should be stored fairly close to the house simply for the sake of convenience. Few people want to walk a hundred yards first thing in the morning for an armload of logs.

After you know where to put the wood, you should decide on some order in which to stack it. This can be by age, by species of wood, or both. Do not cover well-seasoned wood with green wood or you will have to dig around for the wood that is ready to burn.

Logs of different species burn at different rates. Consequently, a stoveload of mixed woods having varied seasoning will not burn at a consistent rate. If you use all hickory, all oak, or all maple, the logs will burn steadily. Throw a log or two of pine in with some hickory, and the hickory will begin to burn too fast; later it may nearly be snuffed out by the large amount of ashes produced by the pine. Also, it is nice to smell only one kind of wood burning at a time. Stacking wood by species and dryness (Fig. 13) is not all that difficult because you will be cutting only one tree at a time.

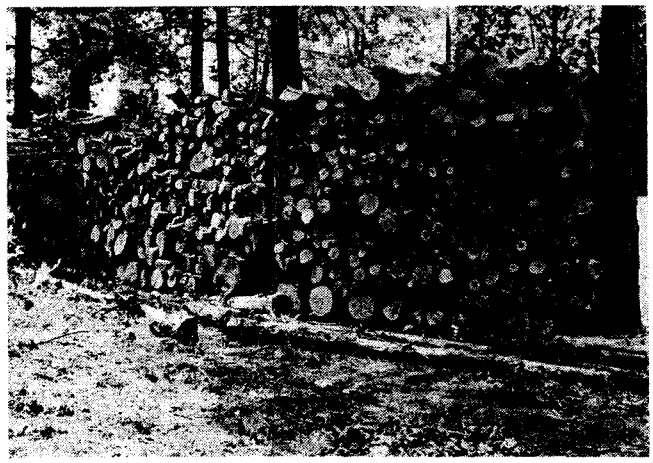


Fig. 13. Woodpile consisting of pine in upper right, oak below, and winged elm at left.

One final bit of advice: do not stack wood right next to the house. The wood could contain termites, carpenter ants, or other varmints that might infest your home. This has been discounted by some authors, who claim that the queen would not be among any termites found in such wood (since she and her eggs or young would be underground) and there would be no danger of infestation. Any termite or ant, however, may be a scout and could easily communicate his discovery of your house. Termite inspectors always say never to have any wood lying under or around your house. They know what they are talking about and have seen many badly infested houses.

Finding, cutting, and storing wood takes work, but the rewards of cheap and abundant heat, independence, and good exercise can fully justify the effort.

1. *Wood 'n Energy*, vol. 1, no. 4 (February, 1977), p. 8.

CHAPTER 5

Firing the Stove

Man has been lighting fires for eons and has discovered countless ways of getting the flames roaring. With the modern airtight stoves, there are almost as many ways to start a fire as there are types of stoves. In a Tempwood, for example, you ignite paper and kindling on top of a load of wood (Fig. 1). In the stoves with grates, the kindling is started under a pile of wood (Fig. 2). The Scandinavian box stoves require a kindling fire in the front of the firebox only, with logs added later (Fig. 3). The basic procedures, then, are dependent to a certain extent on the kind of stove you have. But, there are a lot of tricks and precautions to be observed in operating any stove. Some of these will be learned from experience, while others can be gleaned from books, articles, and from other wood-burners.

Draft Problems

Whatever your type of stove, getting a fire started in a cold stove can be a problem. Quite often, the smoke from an ignited ball of paper will billow back into the room, even if the paper is put near the flue collar. Some determined souls suggest disconnecting the stovepipe, stuffing lighted paper into the chimney, and then quickly reconnecting the pipe. The draft problem is sometimes caused by weather conditions, sometimes by heat loss out of a higher part of your house, sometimes by a nearly airtight house, but usually by a cold flue. If you have the patience, open the door of your stove for 30 minutes and let the flue warm up. By that time, the chimney should draw easily. If there is an inversion, however, you may get a breeze of stale chimney air blowing into your house.

Starting the Fire

The usual way to start a fire is to lay splits on a couple of sheets of paper that have been crumpled into balls

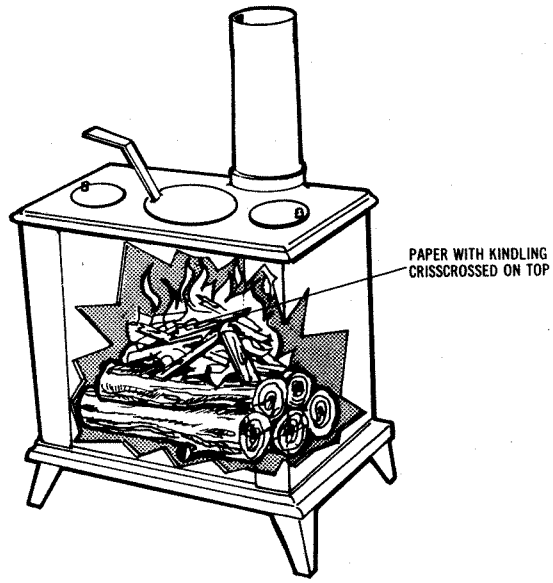


Fig. 1. Kindling goes on top of logs in a Tempwood.

four to six inches in diameter. The splits can be laid crosswise or in teepee fashion (Fig. 4). You can also put a few sticks of kindling over that, but not so much as to smother the paper. Air must get in and get out. Kindling should be the driest wood you can find. Scrap lumber is excellent because it has been kiln-dried and is usually some variety of pine, which contains volatile resins. Pinecones, corncobs, fuzz sticks (sticks of wood with shavings not completely cut off), bark, and sumac twigs are some of the many kinds of kindling that have been used effectively (Fig. 5). There are no doubt countless others.

Have a large crate of kindling next to your woodpile, not just for starting fires from scratch, but also for rekindling an early-morning fire which may have nearly gone out. Kindling added to a few remaining coals will

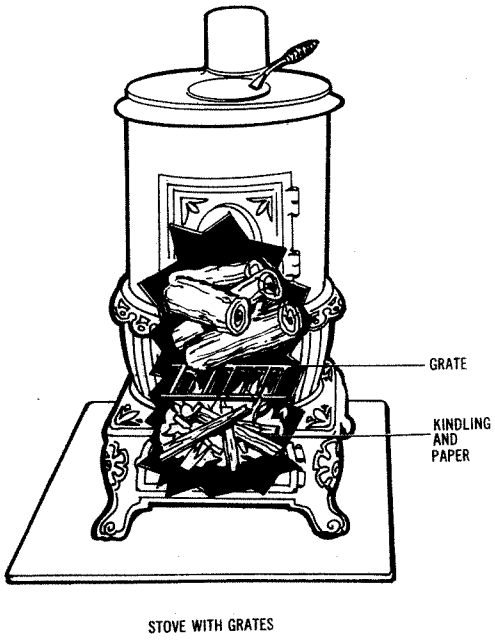


Fig. 2. Kindling and paper go under the grate and logs on top.

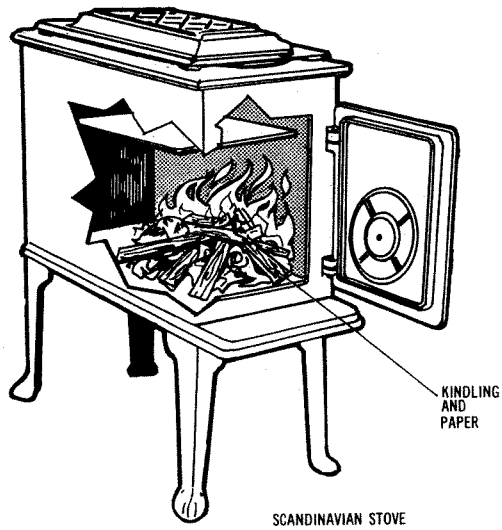


Fig. 3. Kindling burned in front part of firebox and logs added later.

get your fire roaring in no time. Always keep this crate well supplied with kindling so that you will *never* be tempted to start a fire with any kind of flammable liquid. Practically everyone who has been burning wood for a decade or so knows of someone who squirted lighter fluid, kerosene, or even gasoline into his stove for a quick start and ended up with severe burns. A stove is enclosed on all sides, and this causes the fumes from a liquid fuel to become concentrated enough to produce an explosion or flash fire. This can happen even with charcoal-lighter fluid. So, if you cherish your life

Fig. 4. Arrangement of kindling and paper.

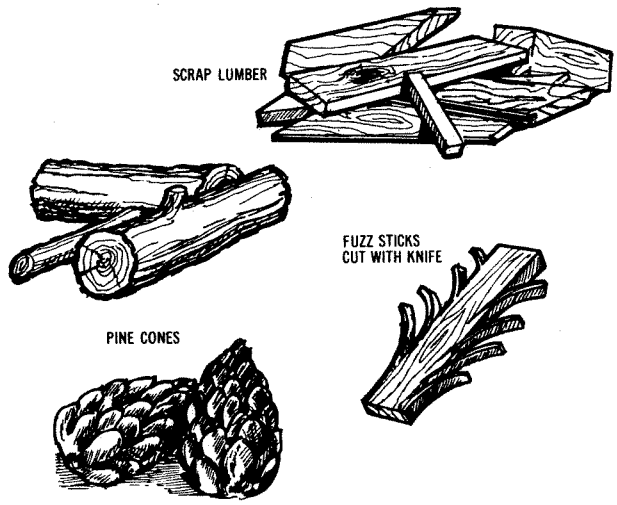


Fig. 5. Types of kindling.

and health, *do not* try to start a woodstove fire with flammable liquid of any kind.

Maintaining the Fire

After the kindling has produced a few coals but is still flaming strongly, the larger logs may be placed on top of it. Do not add too many, lest they suffocate the flame. With the Scandinavian-type box stoves, I have noticed that the most combustion takes place right in the middle of the firebox, leaving the logs along the sides burning relatively slowly. If small logs (around 2 inches in diameter) are placed in the middle and larger logs at the sides, this uneveness becomes pronounced; the large logs will smolder, and the stove will let smoke into the room almost every time you open the loading door. If the smaller logs are placed along the sides and the large ones in the middle, they both tend to burn at the same rate all the way toward the back of the stove, producing an even heat with a minimum of smoldering and smoking. In the late evening, of course, none of this will

make any difference because then you will want to use the largest logs possible to achieve the longest burn. Once the fire is burning nicely (after 15 to 30 minutes), adjust the manual draft control (if your stove has one) for the desired heat. This adjustment will only be learned by trail and error.

How Hot a Fire to Have

How hot should a fire be maintained? That question has been debated at some length by woodstove enthusiasts. The manufacturers of the Vermont Downdrafter recommend installation of a thermometer in the stack immediately above the stove and suggest firing the stove hot enough to keep the stack temperature between 300 and 400 degrees Fahrenheit (Fig. 6) for minimum creosote buildup. "Above 400 degrees you're probably wasting heat. Below 300 degrees you'll run into sooting problems," they say in their pamphlet titled *Buyer's Guide to Woodstoves* (1975).

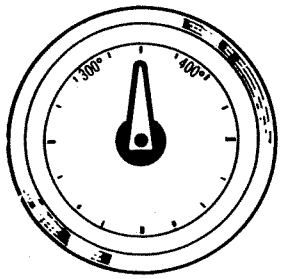


Fig. 6. Stack temperature should be 300-400 degrees F.

Laboratory tests conducted by the Norwegian stove maker Jøtul show that every one of its stoves operates at peak efficiency when burning around 3 to 5 pounds of wood per hour. This would be a very easy test to duplicate with any Scandinavian-type stove. Simply have a hot bed of coals in the stove on which to put 5 pounds of wood (weigh four or five small logs on a baby scale or bathroom scale); then, adjust the draft so that in one hour's time they will be nearly incinerated. Keep doing this for several hours and observe the stove's heat output. That should be the optimum burning rate.

Overfiring the Stove

No stove should be overfired. It is not good for the metal of the stove, and it is not good for you. Both iron and steel oxidize rapidly at extremely hot temperatures. Iron can also develop hairline cracks, and steel will warp enough to cause a loading door to fit improperly; both conditions allow extraneous air access to the firebox. Intense heat radiation can cause your skin to dry out, chap, and crack. Then there is the danger of a chimney fire when the stove is stoked like a furnace.

Match the Stove to the Area—Many times, people overfire their stove because they are trying to heat too much area for the size stove they own. Many owners of the small Scandinavian stoves have made exaggerated claims about the heating abilities of the smaller models. "I heat 2600 square feet with my Jøtul 602," says one. "My Morsø 2B0 heats a four-bedroom house," says another. This is all relative. What is the temperature in the respective rooms? Do they heat all the rooms all the time, or do they close off some rooms part of the day? Where is the stove placed? How hot are they firing it? What part of the country do they live in? These are all critical questions.

Before buying a small or large stove, decide what temperature you want in the house (say, 65 to 70 degrees) and then determine how large an area you want to heat to that temperature. Remember, of course, that the room with the stove will be hotter than adjoining rooms. Then, talk with your woodstove dealer. He can advise you realistically on the size of stove you need. Too large a stove would also be impractical, because you would have to underfire it; this would cause creosote and soot problems in the flue.

Match the Fire to Your Needs—With the right size stove, there should not be any problem in maintaining a moderately hot fire just right for your needs. This can be done with frequent feedings of small logs or by allowing the entire load to burn down to a small bed of coals and then reloading. Many manufacturers of identical types of stoves disagree as to which method is best. If I have the time, I like to add small-diameter logs as soon as space in the firebox becomes available. This keeps a relatively hot fire going for the coldest weather. If I am busy with other things, and the weather is not too severe, I often put a load of large logs onto a bed of coals and let it burn unattended for 4 to 8 hours. The latter method may cause more creosote buildup, but you can't let your entire wood-burning activities be dominated by creosote concern.

It is a decided advantage to keep a fire going throughout the winter, if at all possible. Starting fires in a cold stove is not always easy, as we have seen, and frequent startings definitely create a large amount of creosote. If the fire is kept going, the flue remains reasonably warm and the chimney draws nicely.

Timing Your Firing

One other aspect of maintaining a fire is timing. This is critical before going to bed at night or before leaving the house for several hours. For example, when you are ready to go to bed, you should have a nice little pile of coals in the stove on which to lay the night's load of logs. Allow the logs to catch, and burn with the draft open for 15 minutes or so (while you are bathing,

brushing your teeth, and preparing for bed). Then, turn the draft down to the setting that will result in another nice bed of coals first thing in the morning. If you have a roaring inferno in the stove at the time you are ready to go to bed, a full load of logs will not last through the night. One way to achieve optimum timing is to burn a rather hot fire from, say, 6 P.M. to 10 P.M., using small amounts of wood. Then, allow the last batch of coals to burn at full draft between 10 and 11 P.M. The house will be slightly overheated (around 72 degrees) but will cool off quickly during the night, when the stove is set to burn low. By 11 P.M., there should be just the right amount of coals to start the night load of wood (assuming you go to bed at 11:15 or thereabouts). The same kind of timing is required when planning to leave the house for 4 or more hours.

Some wood-burners who own the old potbelly and other nonairtight stoves have problems moderating a fire. Their stoves have so many gaps around the door and at the joints that they cannot regulate a hot fire very easily without resorting to all sorts of drastic devices such as laying sheets of magazine paper over the logs, installing draft correctors (draft-spoilers), using green firewood, and even dousing the fire with water. The easiest and simplest solution is to get rid of such a stove and buy a modern airtight model that can pay for itself in two years by requiring half the wood. That means half the effort cutting, half the effort splitting, stacking, and stoking—a considerable savings! And, no more runaway fires.

Woodstoves and Safety

These are the basic procedures in operating a woodstove. As in anything else, skill will come with practice, and with skill comes efficient operation. The nice thing about operating a woodstove efficiently is that this is the safest mode of operation, too. Safety is basic to every step in heating with wood. Here are more hints for safely working with and around woodstoves:

1. Make sure your chimney cleanout door (if you have one) is sealed tightly, since extraneous air hinders the draft. I have never seen one that did seal well. They are usually crudely made cast-iron doors and frames. I simply calk mine around the cracks. When I need to shovel out the soot after cleaning the chimney, I gouge the calking compound loose until the door will open. Later, it can be sealed again.
2. Do not let ashes accumulate to excess in the stove, or embers may fall out onto the floor.
3. Do not poke around on the fire too much. Certain woods react by spitting out sparks.
4. Exercise extreme caution when putting a pot of cold water on an iron stove. If you accidentally spill cold water onto the hot stove, the stove may crack and be damaged permanently.
5. Conversely, always be careful when taking a pot of stew or other boiling liquid off the stove. Almost every grandparent can tell of someone in the family who was burned by hot spills.
6. Children should not play around a radiant stove. The convection heaters with cabinets are much safer with children in the house. Some people even put a little wrought-iron railing around a radiant stove to keep the little ones back. A raised hearth also helps, especially if it extends a considerable distance around the stove (18 or more inches). The best practice is to impress upon your children the dangers of a stove. This is one thing they should be taught not to use until they are mature.
7. Buy one or more smoke alarms. Some are expensive, but there is a lot of competition in this market, so you may find them on sale at quite reasonable prices.
8. One or two fire extinguishers are also essential, especially if you live in a rural area or are otherwise outside the jurisdiction of a city fire department. If you cook a lot on a woodstove, you will need a special fire extinguisher for grease fires, although a large box of bicarbonate of soda will also help.
9. Agree on a meeting place outside the house in case a fire occurs. Many people have died going back into a flaming home to try to rescue loved ones who were safely outside on the other side of the house. It would be good to have an actual fire drill.
10. Rope ladders are necessary for escape from upstairs bedrooms.
11. Do not dry clothes over the top of a stove. Buy a fold-up drying rack for such purposes and place it at least 36 inches away from the stove. The clothes will be dry by morning.
12. Never be away from the stove for any length of time with the loading door open. Wood can spark, logs may shift, and coals fall out.
13. Buy a large quantity of ice cream salt to throw on the fire if a chimney fire occurs. If you have an airtight stove and your cleanout door is sealed, a chimney fire may be put out or at least controlled by closing the draft entirely.
14. Use a chemical soot remover regularly, according to directions.
15. Do not burn trash. The few Btu gained are not worth the attendant soot buildup.

These hints, along with the many safety suggestions already made in other chapters, show how important safe stove-operating procedures are. Observe them.

CHAPTER 6

Fringe Benefits of Wood Heat

The main purpose of heating with wood is to keep warm, and this method of keeping warm carries fringe benefits not found with other fuels. The most important single benefit is economy.

Economy

Oil, gas (natural and propane), and electricity, which constitute the majority of home-heating fuels, have become exorbitant in price and sometimes scarce. If oil producers and their sympathizers achieve national deregulation of natural gas prices, we are liable to see drastic increases in the price of that fuel. One town in Texas, where prices of natural gas sold within the state are already deregulated, has had its supply of gas completely cut off because neither the municipal government nor individual users there can afford to pay for such an expensive fuel.

The international oil monopoly composed of the major foreign-oil exporting states has been raising its petroleum prices an average of 10 percent each year and has threatened to raise them by as much as 25 percent.

Some of the major utility companies have brought suit against oil companies that have been buying up uranium sources around the world and driving up the price of that fuel, which is used in nuclear reactors for the production of electricity. It is therefore highly unlikely that home-heating fuels will ever become cheaper or even have their prices level off in the foreseeable future.

Coal is this country's most abundant energy resource, but switching to coal is not without its problems. In the first place, government has encouraged industry to increase its use of coal. This, industry has done, but the increased use is causing short-run shortages of the fuel, which tend to drive the price up. With the present inflated state of the economy, once prices go up they tend to stay up. There are also shortages of railway cars to deliver the coal. On the other hand, some agencies of government have imposed such severe environmental restrictions on burning coal with a high sulfur content that some industries are closing down entirely. Various parts of the country also have restrictions on residential burning of any but anthracite coal. Thus, coal has an uncertain future as a home-heating fuel.

The same is true of solar heat. Although there is intense development in this area right now, a commercially viable, inexpensive solar heating system seems to be a thing of the future. The most efficient systems presently require a lot of plumbing or massive concrete storage tanks. Some "passive" systems, such as an interior concrete wall painted black and situated behind tremendous double-pane windows, require homes of such unusual architectural design that savings and loan companies will not grant a loan to build them. And, all solar heating systems require some kind of backup heating unit to use on cloudy days.

Wood Versus Other Fuels

Wood is the only cheap fuel that is readily available in most parts of the country. It is also the only fuel which allows complete independence from commercial energy sources. You cannot go out and drill your own oil or gas well, nor can you produce enough electricity on your own (with wind- or water-power) for heating purposes. Digging your own coal mine is also out of the question. But you *can* chop down your own tree. So, the only requirements for heating cheaply with wood are trees, tools, a stove, a little muscle-power, and time. Modern man has more leisure time than ever before, and with modern timesaving machines such as the chain saw, he can easily cut enough wood in four or five days

to heat a large modern home all winter, even in the colder regions of the country.

Most people who heat with woodstoves cut, split, and stack their own wood. The heating fuel is therefore practically free; that is, not counting the cost of running and maintaining the chain saw. The initial investment in a stove can be regained in one to three heating seasons, depending on how much you pay for the stove and how much you have been paying for heating fuels during previous years (or better, depending on the price you would have been paying *now* for your previous heating fuel).

Some critics of wood-heating point out that with an expensive stove, accessory purchases (such as a chain saw), and perhaps a costly chimney installation (either a new masonry chimney or a double-wall stainless steel vent) the break-even date on your investment may be long into the future. Some critics, however, are ignorant of the wood-burner's motivation. People who heat with wood are not just looking for a "return on the investment," just as most Americans never figure on a return on their investment when they install an air conditioner, an electric kitchen range, a refrigerator, or any other modern appliance.

Wood-burners want to heat with wood because, after the initial investment, it is cheap heat. Also, it allows them to be independent of inflated energy prices over which they would otherwise have no control, and it is ecologically safe. Wood heat produces free energy for cooking, baking, canning, smoking, and for the heating of water. Wood-burners use wood for heat because it is presumed to be healthier, because it is available during emergencies such as brownouts and blackouts, because it offers more purposeful exercise, and for many other reasons, each valid in its own way to each wood-burner. But, economy is foremost.

Calculation of Wood's Economy for Heating

In the long run, there is no doubt that wood heat is cheapest. How does one prove this? It is a complicated calculation because there are so many variables.

What Variables are Involved—The first variable is outside temperature. It obviously takes much more heat output from a woodstove, coal furnace, oil or gas burner, or electric heater to maintain a comfortable 68-degree indoor temperature when the outside temperature is zero than when it is 50 degrees.

The next variable is the size of the area you intend to heat and the amount and type of insulation around the area. If you have a large house with 10-foot ceilings, little insulation, and no storm windows, it is going to be nearly impossible to heat the entire house by the convection of one stove alone, no matter how large the stove is. When woodstove manufacturers claim in their advertising that their stove "heats five rooms," they are referring to a well-insulated area of from 1000 to 1500 square feet with 8-foot ceilings.

Another, critical, variable is the efficiency of the stove. Any fuel has a certain amount of potential heat per given unit of weight or volume. If you were to set fire to a pound of wood which lay on the floor of your living room, and all windows and doors were closed, you would extract 100 percent of the available heat from that wood. You would also die of asphyxiation from the smoke and other harmful fumes given off by any burning fuel (the wood, in this instance). One hundred percent efficiency is therefore attainable, but completely impractical because some of the heat must go up the chimney along with the smoke. The trouble with fireplaces and with traditional American stoves of the past is that anywhere from 65 to 95 percent of the available heat goes up the chimney instead of heating your room and body. Because fuel was relatively plentiful and cheap in the past, this did not bother most people, and few truly efficient stoves ever came onto the market in those days.

The final variable is the type of fuel to be burned. Oil and gas have been standardized as to heat output, but different kinds of coal give off different quantities of heat. Likewise, a 20-inch log of hickory will give off nearly twice as much heat as a white pine log of the same size. The reason for this is the greater density of the hickory log. As mentioned before, wood gives off the same amount of heat *per pound*, but a pound of pine occupies twice the volume of a pound of hickory. It is more efficient, then, to burn a denser wood, since more heat will be produced from a given volume of logs.

Another factor affecting efficiency is the moisture content of the firewood. Green wood will have considerable moisture content, depending on the species of tree, what season of the year the wood is cut, and what part of the tree the wood comes from (heartwood or sapwood, low on the trunk or high near the branches). If a log has much moisture, much of the available heat will be used to vaporize that moisture rather than to heat the room.

What to Calculate—With all these variables you could easily despair of being able to measure accurately the economic differences in heating fuels. Perhaps the most practical way is to look at your average heating expenses over the last two or three winters and compare them with wood-heating expenses. If you have not yet decided on buying a woodstove, some calculation is necessary.

How to Begin Your Calculation—The best way is to start with a given number of heat units, or Btu. Say, for example, that you need a total of 18.12 million Btu in

order to heat your home for two months to an average temperature of 68 degrees. How much wood, oil, electricity, gas, or coal would it take to produce that much heat?

According to fuel ratings from the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, it would take one cord of high-density wood, burned in a modern, airtight woodstove capable of achieving 70 percent efficiency. (This and the following statistics are taken from a chart on page 34 of the *Morsø Wood Heat Handbook* [Stratford, Connecticut: 1976]. The quantity 18.12 million Btu equals 70 percent of 25.9 million Btu, which is the approximate "available heat" in one cord of high-density wood.) To produce the same amount of heat with other fuel would require 199 gallons of oil, 5,294 kilowatts of electricity, 24,160 cubic feet of gas, or 2195 pounds (1.1 tons) of coal (Table 1).

Table 1. Amounts of Fuel Needed to Produce 18.12 Million Btu of Heat

Fuel	Quantity	Millions of Btu Available	Efficiency of Heater	Millions of Btu Delivered
High-density Wood*	1 cord	25.9	70%	18.12
Number 2 Fuel Oil	199 gal	27.87	65%	18.12
Electricity	5294 kwhr	18.12	100%	18.12
Natural Gas	24,160 ft³	24.16	75%	18.12
Bottled Gas	263.18 gal	24.16	75%	18.12
Coal	2195 lb	27.89	65%	18.12

*Air-dried to 20% moisture content, the average for most wood dried more than six months in the open air.

Table 2. Number of Cords of Wood Needed to Produce 18.12 Million Btu of Heat

Operating Efficiency of Stove	Cords of High-density Wood[1]	Cords of Medium-density Wood[2]	Cords of Low-density Wood[3]
70%	1.00	1.21	1.51
60%	1.17	1.41	1.77
50%	1.40	1.69	2.12

1. One cord equals approximately 25.9 million Btu available heat.
2. One cord equals approximately 21.4 million Btu available heat.
3. One cord equals approximately 17.1 million Btu available heat.

How to Proceed With Your Calculation—Now call a cordwood dealer, a heating oil distributor, and the electric, gas, and coal companies to find out the average retail price of each quantity of fuel needed. In early-1978 in the Southeast, for example, a cord of seasoned hardwood cost $75.00 in the larger cities. Heating oil was 45 cents per gallon, so 199 gallons would cost $89.55. Electricity in the same region is admittedly cheap, compared to other parts of the country, at 3.9 cents per kilowatt-hour (kwhr). Electric heat, then, would cost $206.47. Natural gas rates were also on the cheap side (because of interstate price regulations), so at $2.61 per thousand cubic feet, that 18.12 million Btu would cost $63.06 when burned with a heater operating at 75 percent efficiency. Bottled gas is sold by the gallon or pound. At 46 cents per gallon, the same amount of heat produced by bottled gas would cost $121.06. Coal was $75.00 a ton, which would amount to $82.50. So, in the Southeast, heating for two months with natural gas was the cheapest, followed by wood, coal, oil, bottled gas, and electricity, in that order (these calculations reflect optimal conditions).

Seasoned, high-density wood has a high amount of available heat per cord of wood. You would need 1.21 cords of medium-density wood, such as elm, sweetgum, or red maple, to produce the same amount of heat (1.0 cord of such wood contains approximately 21.4 million Btu of available heat. Thus, with 25.9 million Btu needed for a stove of 70% efficiency, 25.9 ÷ 21.4 = 1.21 cords of medium-density wood). It would take 1.51 cords of low-density wood such as cottonwood, black willow, or aspen (1.0 cord equals approximately 17.1 million Btu of available heat).

Seventy percent is nearly the peak efficiency for a woodstove, according to reliable tests. Most modern, airtight stoves would probably operate at from 50 to 60 percent efficiency on the average, day in and day out. A stove operating at 60 percent efficiency (Table 2) would therefore need 1.17 cords of high-density wood to produce 18.12 million Btu (18.12 million Btu usable heat equals 60 percent of 30.2 million Btu available heat. Thus, 30.2 ÷ 25.9 = 1.17 cords). A 50 percent-efficient stove would need 1.40 cords (18.12 million Btu usable heat equals 50 percent of 36.24 million Btu available heat. Thus, 36.24 ÷ 25.9 = 1.40 cords). Using medium-density wood, the stove operating at 60 percent efficiency would burn 1.41 cords, and at 50 percent, 1.69 cords. Using low-density wood, the 60 percent-efficient stove needs 1.77 cords, and the 50 percent-efficient stove, 2.12 cords.

How to Evaluate Your Calculation—Although it will take more cords of medium- and low-density woods to heat your home, these woods generally cost less from a cordwood dealer. And, of course, there will be other variables in your calculations. Oil prices differ in various parts of the country and generally rise 10 per-

cent each year. The Edison Electric Institute (90 Park Avenue, New York, NY 10016) has published a list of the average cost of electricity (per kwhr) in each state, which shows that in July 1977, New York averaged 5.1¢ per kwhr, Florida 4.1¢, California 3.6¢, and Washington 1.7¢, including fuel-adjustment charge and sales tax. Natural gas prices are even more varied and volatile. Coal prices vary greatly with the distance hauled and the variety of coal.

In summary, if you have to buy your wood and pay top-dollar for it, heating with some other fuel may be more economical. The energy market, however, is so unstable that you cannot depend on cheap heat from one year to the next, and this is probably true of the price of cordwood too. If you have your own woods, or if you exercise a little ingenuity in finding sources of free wood (discussed in chapter 4), then wood heat will definitely be the most economical and will remain so. In the latter instance, independence from fluctuating energy prices is also a decided advantage.

Ecological Safety

To many people, the ecological aspects of burning wood are paramount. There is practically no air pollution if the wood is burned completely in a modern, airtight stove. Most of the chemicals and minerals released during combustion would have found their way into the atmosphere or soil during the decay process anyway, if the wood had been left on the floor of the forest. Wood is also a renewable energy resource, which gas, coal, and oil are not. Many wood-burners are very conscientious about planting trees each year to make up for the trees they cut down. This maintains photosynthesis, which is essential to a balanced ecosystem. By burning wood, we are also lessening the consumption of oil, electricity, gas, or coal. With less oil burned, maybe there will be fewer oil spills along our shores. With less electricity consumed, there will be less pollution from burning coal and less atomic wastes to dispose of. Ecologists also point out that by selective cutting and thinning, our woods and forests will grow faster and more productively, thus providing more wood for lumber, pulpwood, or firewood.

One further ecological contribution is the recycling of wood ashes by using them to fertilize the garden (primarily as a source of potassium), and to raise the pH level of the soil, since ashes are alkaline. Old-timers also made soap from wet ashes, and some people claim ashes can be used as a tanning agent for leather.

Free Hot Water

A few years ago, when the Arabian oil embargo made most of us energy conscious for the first time, people began turning off their Christmas tree lights, TV sets, and electric water heaters—especially the water heaters. We had our water heater connected to one switch in the fuse box so that when we turned it off, no other appliances would be turned off with it. We discovered that our electric bill was $10 to $15 lower after we began the practice of turning on the water heater only when we needed it. It is a "quick-recovery" model, so in 20 to 30 minutes there was plenty of hot water for a bath or dishes. We limited our "hot-water periods" to two times a day, or less. In the winter, however, when heating with the woodstove, we always have several big pots of water simmering on the stove to provide us with ready hot water for tea, coffee, cooking, dish washing, and face and hand washing.

All this is free, and there are further advantages. You should never use hot water out of your tap for tea or coffee because mineral and chemical sediment in the bottom of the water heater can give the hot water an unpleasant taste. With a stainless steel teakettle always perking on the woodstove, however, there is plenty of fresh, hot water for tea and coffee. We also keep a stainless steel pot (six-quart) on the stove to provide hot water for washing and rinsing dishes. Six quarts of boiling-hot water, when cooled down to hand-soaking temperature with cold tap water, makes enough hot water for the dishes of a family of five adults.

There are a number of attachments that can be added to your stovepipe to provide larger quantities of hot water (Fig. 1). Some woodstove manufacturers offer boilers made expressly for their stoves. In German farm homes, you find wood/coal stoves which heat an entire house by means of a hydronic heating system and are also used for

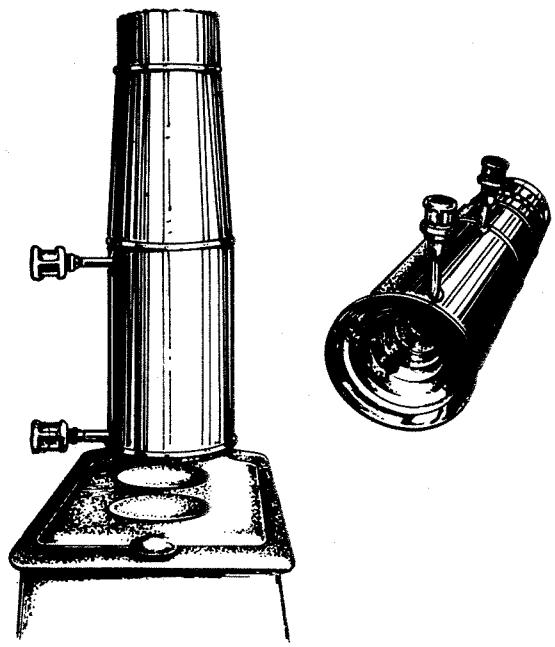


Fig. 1. Stovepipe water heater.

cooking and baking. This type could well be the stove of the future for energy-conscious Americans who paradoxically do not want to give up their heavy consumption of hot water. Also, in the future we may see heat extractors for hot wastewater. The number of Btu we presently dispose of in the sewer or septic tank is staggering: heat from hot water used for numerous wash and rinse cycles in our automatic washing machines and dishwashers, and for baths, showers, and other daily grooming. Some people are turning to cold-water washes, but this is not always satisfactory with very hard water, regardless of modern cold-water soaps. Some people also leave the water from their bath or shower in the tub for several hours to allow most of its heat to radiate into the room.

Improved Indoor Air Quality

A further advantage of having water heating continually on a woodstove is an improved humidity level in the air. Many people suffer from nosebleeds in the winter because their home's central heating system does not provide enough moisture in the air. Hot-air systems are particularly poor in this respect because the constantly flowing air absorbs moisture from the skin. Electric heating units have been criticized for causing a lot of burned dust particles to be in the air, which may be unhealthy to breathe.

The ideal humidity level is between 45 and 55 percent (humidity meters are inexpensive and generally available in hardware and large general-merchandise stores.) When the humidity goes below 45 percent, you can take the lid off of a pot of simmering water on the stove. If the humidity climbs above 55 percent, simply take the pots and kettles of water off of the stove. Too much humidity can cause windows to "sweat," and the resulting condensation can rot the woodwork. If you are in a part of the country where the humidity is consistently too low or too high, it may be necessary to buy a humidifier or dehumidifier, as the case may be.

It must be remembered that our perception of heat (a psychological phenomenon) is enhanced with increased humidity, so our sense of comfort and health is helped by maintaining adequate humidity. This is probably why heat from a woodstove feels better to many people: the humidity is high, your body is absorbing heat radiation from the stove, and the air is circulating at a nearly imperceptible speed so there are no chilling, forced-air drafts. The air is also constantly being exchanged, so there is no sense of stuffiness in the room (even after frying fish!). Many modern houses with central heating systems are so tight that the air often seems stale, but this is not the case in a house heated with a woodstove.

Food Preparation

Cooking is perhaps one of the most enjoyable fringe benefits of heating with wood. In the first place, it is more economical than cooking done with an electric or gas range, and secondly, the food tastes better when cooked slowly in a heavy pot.

Surface Cooking

Unless you have a regular wood cookstove, the types of cooking you can do on a wood heating stove will be limited. Some stoves have two levels with different surface temperatures, so that a certain amount of fast cooking can be done on the area closest to the flames and slow cooking done on the other level (Fig. 2). On some stoves, cooking is not possible at all. If you are interested in this feature, be sure there is a cooking surface on the stove you buy.

The main dishes you will want to prepare on your woodstove are soups and stews. Every national cuisine has its favorites, but American cookery is particularly diverse in its soups. There are the standard vegetable, vegetable-beef, chicken noodle, pepper pot, navy bean, split-pea, tomato, and leek-potato soups. Regional specialties are clam chowder, turtle soup, and "Hoppin' John"—a Southern, New Year's Day treat. Our stews are equally varied: beef stew, brunswick stew, kidney, irish, lobster, and oyster stew, to name only a few. The French, Germans, Italians, Spaniards, and Scandinavians all have their own special "one-pot" meals that can be prepared easily on a woodstove.

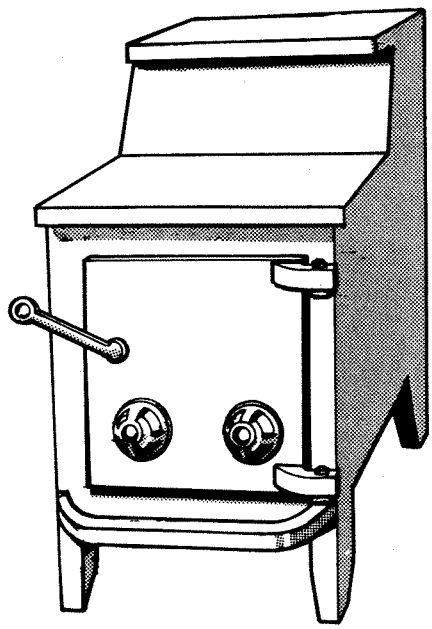


Fig. 2. Stove with two-level, two-temperature cooking surface.

The recent boom in crockery cooking has added countless recipes to those possible on a woodstove. The secret of crockery cooking is gentle, even heat all around the sides of the crock, which keeps food from sticking to the bottom. If you cook with a heavy, cast-iron or cast-alumi-

num pot, however, and keep the pot on that section of the stove where it will only simmer gently, you will find that food will not stick or burn because cast iron and aluminum conduct heat around the bottom and up through the sides of the pot to produce a very even heat. If you are cooking vegetables and meat, it helps to put the vegetables on the bottom in the pot since vegetables cook more slowly than meat on a low heat.

Actually, any regular recipe can be converted to slow cooking. Simply allow 8 to 10 hours on low-heat for most dishes and at least 6 hours for any dish containing eggs or meat. There is normally less evaporation when cooking at a low temperature, so you may have to decrease the amount of liquid in a standard recipe. Do not open the lid often, if at all, because it takes longer to recover lost heat when cooking slowly. A glass lid can help you see what is going on.

Baking

If you own one of the more inefficient-type stoves, such as an old potbelly, Franklin, or parlor stove, you may want to acquire a stovepipe oven (Fig. 3) for limited baking—limited, because these ovens are not large enough to bake several-layered cakes, but one-layer cakes, biscuits, corn bread, and muffins are possible. Some companies sell stove-top ovens. These merely sit right on top of the stove, and some come with a thermostat (see the discussion of these in the chapter on accessories). With some stoves, canning and smoking of meats are possible.

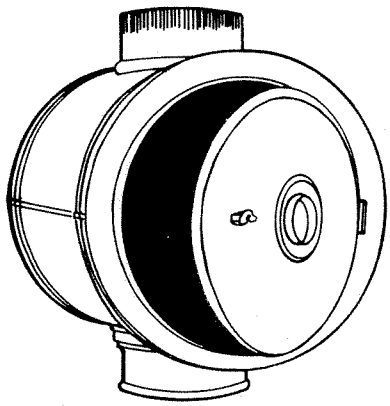


Fig. 3. Stovepipe oven.

Self-sufficiency in Emergencies

Most of us have experienced power failures at one time or another. These have resulted from electrical storms or ice storms, and also have occurred during peak-load periods such as summer hot spells or severe winters. Whatever the cause, the results in this highly electrified world are frightening. Furnaces cannot function because they have electric thermostats and blowers. Rural and suburban water systems are crippled because they depend on electric pumps. Electric ranges, air conditioners, and lights go off. A woodstove alleviates some of these inconveniences by keeping you warm and allowing you to cook your meals.

During a prolonged power outage in the winter, some people may be forced to leave their houses and seek heated shelter. When they return a few days later, their water pipes may be frozen. With a woodstove, you will not need to leave, and it is a relatively easy matter to find makeshift lighting (candles or kerosene lamps) and to fetch water from another source that has not been affected by the outage (for example, a nearby municipal water supply).

Electrical failures, however, are not the only emergencies one might face. Natural gas supplies were so low in the winter of 1976–77 that some industries were forced to shut down, and there was a very real fear that domestic heat might have had to be curtailed. Also, no one seems to know what the effect of another oil embargo might be.

If more and more people turn to wood, solar, and other alternative fuels, the effects of such shortages will be minimized.

Exercise

On the car bumpers of some wood-burners, you see stickers enjoining all to "STOP JOGGING—SPLIT WOOD." To ecologists, jogging does seem a terrible waste of energy when those few minutes a day could be spent instead by splitting wood or gardening or doing something which seems more purposeful than jogging, yet still achieve the same results: to make one healthy and trim and able to live a full life. One man I know cuts all his wood—about four cords per year— by hand, without a chain saw. He has never had to start a jogging program to lose weight.

Besides productiveness, there is also something primitively satisfying about chopping wood, a satisfaction that perhaps goes back to that long stretch of time in man's evolution when he chopped wood to use as a major means of his survival. A more modern explanation, however, would be that man loves to chop wood because it relieves his hostilities and aggressions. Whatever the reason for it, cutting and splitting wood gives plenty of exercise and a certain sense of satisfaction.

The benefits of heating with wood are as varied and valid as the wood-burner makes them. To some, a woodstove satisfies a profound sense of nostalgia, of going "back to nature." To others, it is entirely practical, and no doubt many are just jumping on the bandwagon of the woodstove movement. No matter what the motives to join it may be, it is a positive, constructive movement that offers many benefits to those who make the effort—and it hurts no one.

CHAPTER 7

Types of Woodstoves

Scandinavian-type Box Stoves

Americans would not be turning to the use of woodstoves were it not for the importation of thousands of box stoves from Scandinavia—primarily from Norway and Denmark. These are not at all like the drafty, old, iron coffins of earlier times that consumed large quantities of logs in a few hours and thus required frequent reloadings. The Scandinavian models are airtight and have a unique inner baffle system which makes them more efficient than any stove most Americans have ever seen.

Besides being efficient, these stoves are extremely well made and attractively ornamented with scenes of the North Woods embossed on the side plates. They are also coated with a glossy enamel finish which gives the entire surface a sheen of extraordinary luxury, somewhat like the ceramic tile plates American tourists have been collecting from Copenhagen (Royal Copenhagen) and Holland (Delft) for decades. In all, they have an air of classic beauty that allows the stoves to suit almost any interior decoration style, whether it be Early American, Late Victorian, or Modern Functional.

The idea of efficiency in stoves is, of course, not new. When the caveman abandoned his wall-banked fire for a clay or brick oven, it was because of the oven's greater efficiency. Many millenia later, a stubborn descendant of those cavemen, Benjamin Franklin, was still trying to find ways of making the open brick fireplace give off more heat. The Scandinavians, however, were ready to come out of the "stone age" and utilize the advantages of iron.

The first secret of the Scandinavian stove's amazing performance is the use of baffles. Thick plates of iron are placed strategically inside the firebox, one on each side and one on top (Fig. 1). All three baffles serve primarily to maintain a high temperature in the combustion

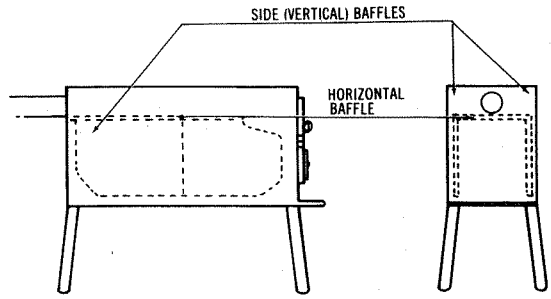


Fig. 1. Scandinavian woodstove interior baffle arrangement from side (left) and front (right).

chamber by bouncing the flames, heat, and radiation back toward the fire. This causes more complete burning of volatile matter in the early stages of combustion and keeps the temperature extremely high for the continued combustion of charcoal in the final stage. The top baffle is particularly instrumental in the burning of initial gases because it creates much turbulence in the fire chamber. That is, it thoroughly mixes the gases with other flames and entering oxygen and keeps the flames in the chamber for a relatively long period of time before they exit up the flue. This latter effect means the top and front of the stove will have more time to absorb heat from the flames than they would have if the flames were allowed to go directly up the chimney, as in traditional box stoves (Fig. 2).

The recommended firing procedure with Scandinavian stoves is to rake the few red coals to the front of the stove and load the wood on top of them. The logs then burn from front to back "like a cigarette"—as it is stated in promotional literature. The wood toward the back of the stove will be going gradually through the combustion cycle (discussed in chapter 1), resulting in a steady release of volatiles throughout the burning of one load of wood. The top baffle focuses these gases at the front of the chamber where the flames are, thus forcing

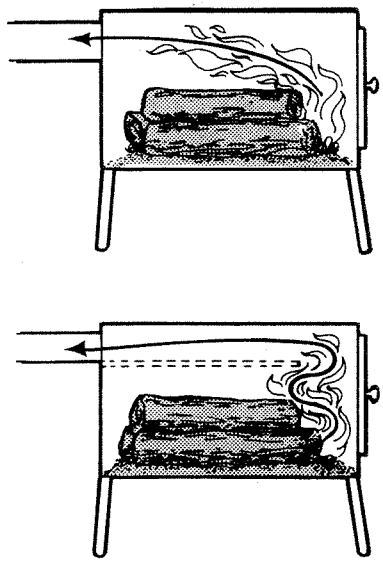


Fig. 2. Direct flame-path in traditional box stove versus "S"-shaped flame-path in Scandinavian baffled stove.

them to ignite. The two side baffles help keep the walls of the stove from "burning out" by intercepting the most intense heat of the fire before it can reach the walls. Some corrosion of the inner walls of a stove is inevitable since iron (as well as steel) oxidizes rapidly at extremely high temperatures. This rusting, however, is considerably retarded by the baffle plates. They also make it less likely that the side walls of the stove will crack, which can happen when an intense fire is built in a cold stove.

These characteristics of the Scandinavian stove, the side and top baffle plates, are probably extensions of traditional fireplace technology, since the top baffle is similar to the "smoke shelf" and the side baffles function somewhat like the firebrick around the three sides of a fireplace. Apparently, the Scandinavians were first to apply these principles to the box stove and certainly developed them to a great degree of efficiency. It is perhaps unfortunate for the Norsemen that the principles of their stoves are so simple that they could not be patented. They would have been millionaires, since by now there are dozens of American manufacturers copying the design more or less faithfully.

The Scandinavians have not stopped, however, with the development of baffles. They have borrowed another idea from traditional heating technology and have developed it in a unique and characteristically simple way: the porcelain enamel coating. Europeans have been decorating their stoves with vitreous tiles for centuries (see, for example, the amazingly beautiful stoves in Jo Reid and John Peck's *Stove Book* [New York: 1977]). It was soon discovered that these tiles serve not only an aesthetic purpose but a functional one as well. A tiled stove retains heat longer and radiates longer and less intensely than one of untiled iron. You could therefore sit closer to a tile-covered stove without becoming flushed with heat radiation, and the heat output from the stove would be spread out over a longer period of time since the peak output of a tiled stove is reached after the fire has begun to die down (see Jay W. Shelton, "Steadiness and Control in Wood Heating Systems," *Wood Burning Quarterly,* vol. 2, no. 1, p. 13). These heavy-tiled stoves also take a long time to warm up, so instead of covering their cast-iron stove with thick tiles, the Scandinavians compromised by adding a thin coating (or two) of vitreous enamel, which along with the side baffles, reduces radiation to a comfortable level without making the stove take forever to heat up. Besides being attractive in shiny or matte finish, the enamel is much easier to clean than cast iron, and stove blacking does not have to be used each year to prevent rust.

Even less original, but equally simple, and critical to the excellent efficiency of Scandinavian wood-burning stoves is the fact that they are all airtight; that is, they are sealed so well around the joints, and the door is fitted so tightly, that no unregulated extraneous air can reach the firebox. All air for combustion must enter by means of the finely fitted, easily regulated air intake port. This feature alone distinguishes the Scandinavian stoves from the typical American potbelly and parlor stoves of earlier times, whose doors fitted so poorly that the fire and charcoal sucked in as much air as it needed—and consequently burned out in short order. By carefully regulating the amount of air entering an airtight stove, you can easily make one burn (the cycle of one loading, igniting, and burning) last overnight or even longer if necessary. The stove also has more time to extract and radiate a maximum amount of heat from the fire.

There is, of course, a point of diminishing return in this process, since too slow a burn will allow too much of the gases to exit up the chimney without burning. These unburned gases contain a high percentage of moisture, which is deposited on the walls of the chimney or flue, causing creosote to form. In large quantities, the creosote may ignite at a later firing and cause a dangerous chimney fire (discussed in chapter 5).

Nevertheless, complete control of air entering the firebox is a necessary feature in any stove that is designed to attain a maximum degree of efficiency. Some American wood-burning circulators, such as the Ashley and Riteway heaters, have been built airtight for a long time, but the principle was never applied on any mass-production level to cast-iron stoves. Perhaps the necessary amount of manual labor and quality control in the foundry would have been too great to make them economically competitive, or maybe some stovemakers felt

that sufficient control of the fire could be had with the stovepipe damper. It cannot. Close the damper too tightly and noxious gas can escape into the house. Open it even slightly and still too much air can reach the fire for it to last overnight. To achieve an overnight burn in this case, you have to throw in a very thick log, a green sapling, and some large chunks of coal. Scandinavian stoves do not require a stovepipe damper, although some people think the turbulence caused by the damper in a long run of stovepipe would result in more heat radiation from the pipe.

After attaining airtightness in their stoves, the Scandinavians turned to the development of an intake port that would not only preheat the incoming air, but would also distribute it directly toward the coals for primary combustion and indirectly toward the rising flames and gases for maximum secondary combustion (complete combustion of volatile matter is probably only attainable in a laboratory). Most manufacturers have their own patented design to accomplish this, either with a hollow door or with a plate behind the door; either one creates a kind of chamber which preheats incoming air and directs it in two streams: one toward the bottom and one toward the top of the firebox (Fig. 3).

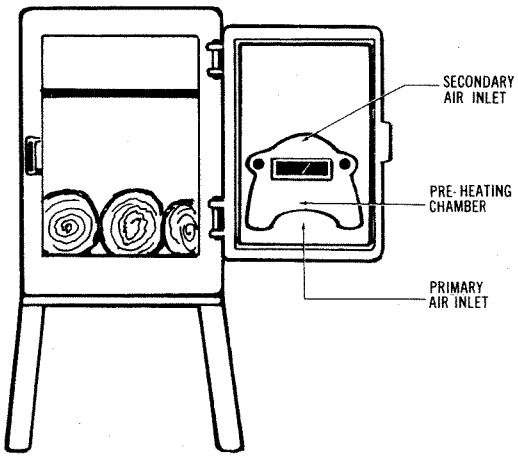


Fig. 3. Preheating chamber with primary and secondary air inlets.

All of these technical aspects of stove design would be for naught if the Scandinavians did not carry them out with the highest level of craftsmanship. The cast iron is of the best quality, the assembly is neat, and all moving parts (door and draft-control vent) fit tightly and function smoothly. Add to this the beauty of the enamel finish and the intricate molded artwork on the sides (some designs are by famous artists), and it is little wonder that the Scandinavian stoves have taken America by storm. These stoves arrived on the scene just in time to show increasingly energy-conscious Americans that wood-burning stoves could be both efficient and attractive. You do not have to tend them as frequently as the old potbelly stoves and you do not have to chop as much wood—two very important considerations in modern American families with both husband and wife working.

American manufacturers were slow to adopt the characteristics and principles of the Scandinavian stoves. Embedded in our psyche, perhaps, is the nostalgic picture of warming our feet in front of grandma's parlor stove or watching old men sit around the potbelly stove at the general store and spin yarns. How else does one explain the amazing comeback of the old, inefficient Franklin stove, which, by the way, has little to do with our Founding Father Ben. The energy crunch, for one thing, made many of us think twice before buying one of the old monsters, no matter what our sentiments were. So, we bought the little Scandinavian stoves in ever-greater numbers, and more and more Americans became convinced of the enormous heating capacity possible with such a simple stove. A few odd souls began experimenting with their own idea of a Scandinavian-type stove. At first, these prototypes were made out of steel, which seems to be more plentiful than iron, or at least more readily available (there are not too many iron foundries around any more). Also, the technique of welding steel is far more widespread than is the casting of iron in molds. Larry Gay of The Stoveworks in Marlboro, Vermont, fashioned a straightforward box stove out of 7-gauge steel and included the baffles and airtight door found as features of the Scandinavian stoves. He also increased the dimensions of the door and firebox somewhat to accommodate American-sized logs (or to accommodate a disinclination to split much wood), and offered a couple of soapstone slabs to mount on the sides of the stove in such a manner as to make it a convector, rather than a radiant stove. Best of all, his stove cost nearly $100 less than the same-size Scandinavian models. Admittedly, this stove, called The Independence, is no aesthetic masterpiece (Fig. 4). There are no scenes of the North Woods embossed on the sides, no colored enamel surface, and no contoured edges, all of which make the Scandinavian models so charming. Gay's stove, however, is just as sturdy and durable. It is an example of good old American utilitarianism.

Other American versions are even more starkly practical. For example, the Southeastern Vermont Community Action group called "SEVCA" received a little government money and proceeded to make Scandinavian-type stoves out of recycled propane tanks in order to assist low-income people in coping with the energy crunch. The Sevca, as their stove is called, is even more efficient than the Independence, since it has a large heat exchanger on top (similar to the arch on some Scandinavian models such as the Morsø 1BO and 2BO and the

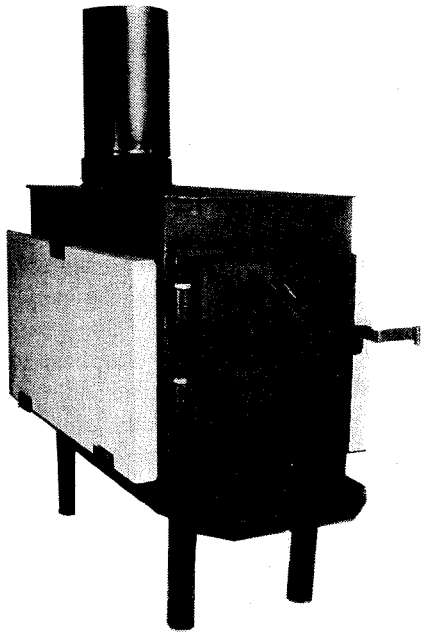


Fig. 4. American-made, Scandinavian-style box stove using soapstone slabs for convection heating.

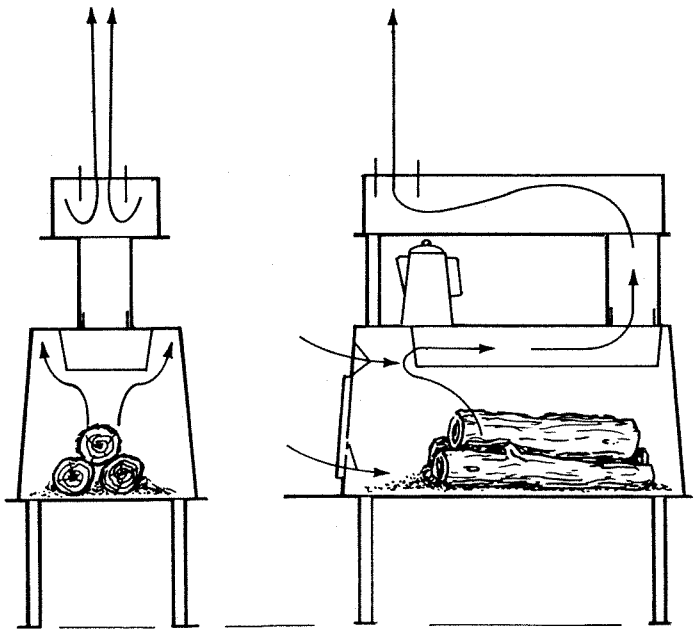


Fig. 5. Front and side views of Solis 6 stove.

Jøtul 606). But, this gain in efficiency is at the cost of aesthetic appeal.

One small manufacturer, Ram Forge, has tried to remedy a lack of beauty to a certain extent by affixing racks on the sides of a steel stove to hold 32 hand-painted ceramic tiles. Another company, the Quaker Stove Company, has added a cast-iron door and frame in the shape of a deer with antlers onto the steel body of one stove. Another concession for beauty is the combination of a traditional Shaker box-stove design with Scandinavian-type baffles. This was done by the Solis Energy Works in their stove, Solis 6, and also done along more historically accurate grounds by the Hinckley Foundry of New Market, New Hampshire, in their "Shaker." These two companies also decided to build their stoves out of iron, rather than steel.

The Solis 6 (Fig. 5) represents really one of the more original adaptions of Scandinavian stove principles on the market. The sides, back, front, and top of the stove are cast as one piece to eliminate any chance of extraneous air entering the firebox along its edges. Other cast-iron stoves are made with separate plates for each side which are sealed together at their edges by tongue-and-groove joints and furnace cement. The horizontal baffle in the Solis 6 is actually a trough, which allows the flames in the firebox to touch all sides of this "secondary combustion chamber," for more complete burning of the gases. The heat exchanger on top should make the Solis one of the most efficient stoves available.

Foregoing the aesthetic and concentrating on extracting ever more heat from a stove is the path followed by most of the manufacturers of Scandinavian-type stoves who still use steel. New Hampshire Wood Stoves, Inc., for example, has seemed to say, "If one horizontal baffle is good, then two or three are even better." Thus, their Home Warmer models with enclosed heat exchanger on top (Fig. 6) have a double "S" flame path, perhaps a longer one than any other stove. The Home Warmer also features an effective preheating chamber for primary and secondary air. Heathdelle Sales Associates, in its Nashua stoves, has added the principle of heat manifolds completely enclosed within the firebox to the basic Scandinavian design (Fig. 7). This company has thus created a stove that when used with the accompanying blower can extract about as much heat from a

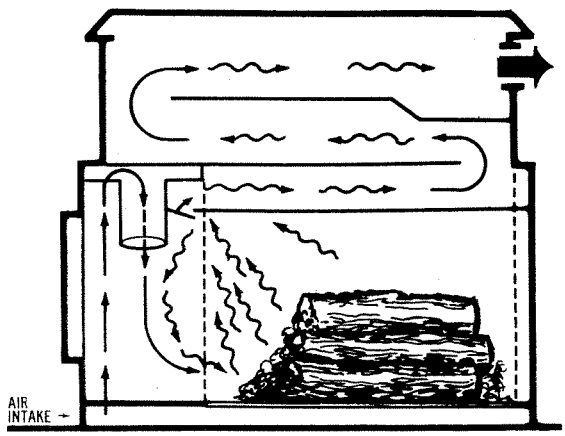


Fig. 6. Flow-pattern and baffle arrangement in Home Warmer stove.

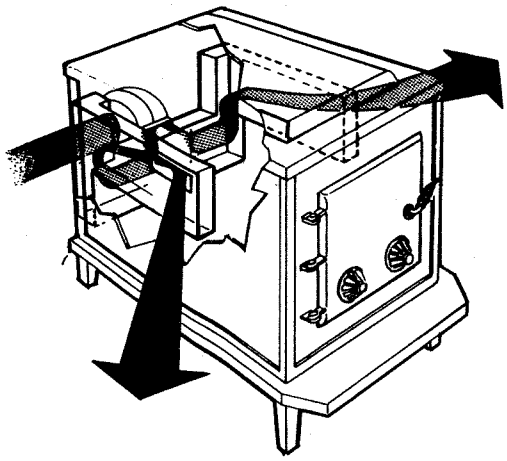


Fig. 7. Heat manifolds used in Nashua stove.

pound of wood as is physically possible—given the fact that some heat is needed to carry the smoke up the chimney.

Major stovemakers in the United States were no doubt just as skeptical of the Scandinavian stoves' capabilities as most laymen were, so they continued to hold off making similar stoves until 1977, when they entered the market with their own models. The Portland Stove Foundry in Maine, traditionally one of the most popular stove manufacturers in the Northeast, has always made a box stove (The Atlantic) and with perhaps very little retooling, they have added a baffle, ground their stove plates down to a tighter fit, and created a Scandinavian-type box stove—Portland's new No. 224 Atlantic. The Atlantic has "uniquely recessed panels" which make vertical side baffles unnecessary, says the manufacturer. The stove is attractive in a traditional American way and the price ($279) is more than competitive with similarly sized models by other importers or manufacturers.

The Portland Stove Foundry was fortunate, because it already had a cast-iron box stove in its line and could adapt it to the Scandinavian-type without too much difficulty. The Birmingham Stove and Range Company in Alabama, however, was not inclined to stick to traditional American patterns, and ended up producing a near-replica of the Jøtul 118 in their Nordic, which is also marketed by their sister company, the Atlanta Stove Works, as the Woodsman. It does not seem as well-made as the real Scandinavian stoves. The spin-wheel draft controls do not screw in with the precision of those of the Morsø stoves, for example, and the bare-cast-iron finish of the Nordic cannot match the enameled coating of the Jøtuls. On the other hand, the Nordic is solid, airtight, efficient, and over $100 cheaper than the Jøtul 118. It even has a few unique features which include a hand-controlled damper in the back of the horizontal baffle to allow a direct flame path out the flue for quick starts, and side baffles shaped to act as a heat shield for redirecting the unburned gases back over the flames (Fig. 8).

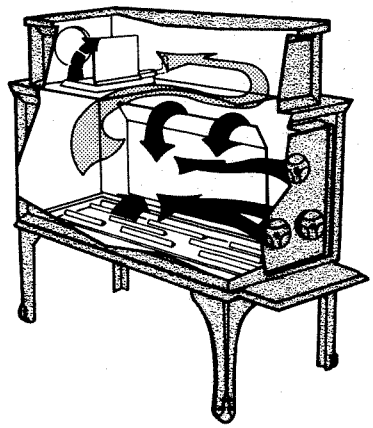


Fig. 8. Cutaway view of Nordic stove with flip-open damper and contoured side baffles.

Other companies have gone a similar route in unabashedly copying the very successful Jøtul stoves. Colonial Stove Company, for example, imports the Viking 22 and the Viking 33, which are patterned after the Jøtul 602 and 118, respectively, and are priced over $100 cheaper. Garden Way Catalog has imported the Irish Reginald 101 to compete with the Jøtul 602; likewise, the Upland Stove Company with its Upland No. 17, and Warmglow Products with its Maxi-Heat 2.

There is one cast-iron, Scandinavian-type, American-built stove, however, that is no mere imitation—the Cawley/LeMay 400 and 600, by the Cawley/LeMay Stove Company of Barto, Pennsylvania. Starting with the basic ideas of the Scandinavian box stove (baffles and airtight firebox) designers C. Robert Cawley, Jr., and Robert C. LeMay, Jr., incorporated many qualities into their models that are perhaps more appropriate to certain new American lifestyles. The stoves are, for example, much wider than the Scandinavian counterparts: 18 inches, compared to 14 inches for the Jøtul 118. The loading door is correspondingly larger, allowing larger logs and a larger load. The greater width also means that there is a larger cooking surface on top. With this in mind, Cawley and LeMay have added two removable cookplates and a ridge around the edge of the top to keep pots from being slipped off the stove accidentally. They even offer, as an option, a cast-iron shelf that unfolds along the side of the stove on which to set canning jars, ladles, and pots. A further technical feature is a rotating cast-iron flue elbow which can be adjusted to accept the flue pipe at any point within a circle. A cast-iron elbow also withstands the terrific heat in that area better than thin-gauge stovepipe. The horizontal

baffle has a unique feature: an ignition grid in front of the baffle which "acts as a thermal reservoir, stabilizing the temperature of the remaining volatile gases and creating a turbulence to thoroughly mix these gases with oxygen." The stoves also provide an enameled knob on the loading door which remains comfortable to the touch (not true of most Scandinavian stoves, whose doors can only be opened safely when you are wearing gloves), a "boro-silicate glass window" in the door which allows viewing of the fire without opening the door, and not least, some very attractive wildlife scenes embossed on the sides after designs by Martha H. Cawley, artist and sculptor. The only thing unattractive about these stoves is the price: $560 for the 600 and $475 for the 400, but then most nice things aren't cheap.

Potbellies and Other Traditional Stoves

It is hard to speak of the traditional American potbelly stove as "atrocious," since it brings back so many fond memories in most of us who are over 40. Staying at grandmother's house in the country during Christmas vacation was unforgettable with the tea kettle gently hissing on top of the huge black stove, which was decorated here and there with nickel-plating on the foot-rest, waistband, or crown. It was a welcome sign to hear grandpa come in very early in the morning and stoke up the fire so that it would be roaring hot by the time you arose and got dressed, standing on the hearth. The difference in temperature between the bedside, where powdery snow drifted under the windowsill, and any point a few feet away on the asbestos pad around the stove was considerable—no doubt 60 or 70 degrees. The stove was a welcome sight, too, when we all came in after milking the cows and slopping the pigs in a drafty barn.

But that is all sentimental nonsense. When the stove was really stoked up you could not get within ten feet of it without shielding your face from the radiation, and many a night you would wake up in a sweat because that big green log grandpa had thrown in had finally dried out and caught fire. There was no way to dampen it sufficiently, because the cracks around the loose-fitting doors allowed as much air to enter as the fire needed to blaze away. It was also a never-ending task to keep the big belly filled with wood during January and February. How many man-hours went into felling trees, sawing them into sections, and splitting the fatter logs, not to mention hauling them from the woods to the house on a mule-drawn mud sled!

You still have to do the cutting and splitting today, but only a fourth as much when using a modern, efficient, airtight stove. Of course, it was not just the potbelly's fault. With judicious operation of the flue damper, as much as 25 percent of the wood's heat value could be coaxed out of the stove (and that was more than twice as efficient as the fireplace!). But, the fragile houses of yesteryear had no more insulation than their plaster and wood between you and the elements. All windows were single-pane, and the frames of windows and doors alike frequently allowed great drafts of cold wind to enter. This further diluted the already small percentage of heat-output from the stove. It is no wonder, then, that large quantities of wood were burned. If it had not been for the availability of cheap coal as a supplement, the woods in many areas would have been stripped bare in not too many years.

Unfortunately, traditional potbellies, parlor stoves, and box stoves are still being manufactured, imported, and sold today, in ever-increasing numbers. People with no knowledge of the inefficiencies of these stoves think they are relieving the energy crisis, only to find out the amount of muscle energy they have to expend is hardly worth the effort.

It is not just the loose-fitting construction of these stoves that makes them so inefficient. The basic design of logs on a grate with primary air entering under the coals (updraft stoves) contributes to a fast-burning characteristic. The lack of baffles or any device to retard the exit of gases and flames is also a factor in their basic inefficiency.

One manufacturer has tried to remedy this situation. The Portland Stove Foundry in Maine makes a wood parlor stove, the Home Atlantic, out of superior cast iron poured into molds of natural bonding sand. All sections are hand-ground and hand-filed for close fits, so that there is a minimum of extraneous air allowed into the firebox. The Home Atlantic (Fig. 9) comes with a patented "smoke chamber" that fits on the back of the stove around the flue collar and recirculates smoke and hot gases for more heat extraction.

Abundant Life Farm of Lochmere, New Hampshire, is

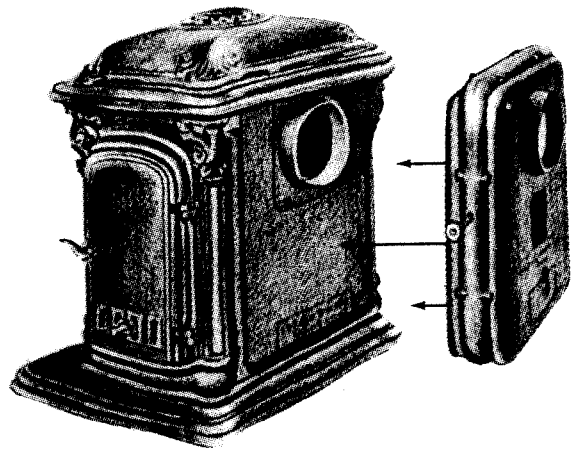


Fig. 9. Home Atlantic parlor stove and patented smoke chamber.

another manufacturer of efficient traditional-style parlor stoves. The all-cast-iron Comforter is airtight and has an angled baffle and preheated air supply, which should result in high efficiency. Its low profile also makes it particularly attractive to people who want to install a stove in their fireplace.

So, if you are gripped by nostalgia, but efficiency is still of some importance, you should buy the Home Atlantic or the Comforter or some similarly well-made parlor stove, if you can find one. The usual potbellies, parlor stoves, and box stoves, however, should be avoided unless you like a lot of exercise (see chapter 9 for a list of manufacturers, importers, and dealers who can provide traditional stoves).

Automatic Circulating Heaters

American inventors realized very early the necessity of controlling more completely the oxygen intake of the firebox. As early as 1836, Isaac Orr patented an airtight stove, and the term came to refer to all stoves with tight joints (that is, sealed) and controlled drafts. But, for some reason, this characteristic was considered desirable only with sheet-metal stoves and never had much credence with makers of potbellies and other traditional cast-iron stoves. What made airtightness absolutely essential was the adoption of the thermostat to regulate the draft. After all, what good would a thermostat be if the fire in a leaky old potbelly was going to burn at its own rate? The principle of airtightness coupled with thermostatically controlled draft represented, for American stoves, a major step toward increased efficiency.

One of the earliest and most popular stoves to incorporate these principles was the Ashley (Fig. 10). The Ashley is basically a box stove turned sideways, with the flue exhaust centered at the top of one side. Primary air enters the firebox on the opposite side at fire-level, travels diagonally across the fire and out the flue collar. When adding the "bimetal helix coil" thermostat, Ashley designers decided to place it at the entrance to a long vertical chamber in the front of the stove, where it could control the draft by closing or opening a damper. Incoming air is sucked down the chamber by the fire and preheated to a considerable extent before it enters the firebox at portals on each end. The preheating of incoming air to any degree helps to encourage the combustion of gases and to maintain high firebox temperature. Assisting also in this regard are the cast-iron firebox liners (baffles).

Ashley has added further refinements: an automatic secondary-air inlet at the back near the flue, which opens at the cooler temperatures of initial combustion of the wood and then closes entirely during the hotter charcoal stage. The Ashley, and most other heaters of this type, are covered with a thin metal cabinet having a baked-enamel finish, which intercepts the intense radiation coming off the stove's sides, causing it to heat the air between the cabinet and stove and to create strong convection currents. One can thus sit close to the stove without being unduly heated by radiation, and the stove itself can be placed as close as approximately 24 inches from a combustible wall. The most beneficial aspect, however, is that children will not be burned badly, if at all, by accidentally touching or bumping into the cabinet, since the outside wall of the liner is normally cool enough to touch briefly. All of these heaters are available with a blower (manual or automatic) to circulate the heat more evenly throughout the room.

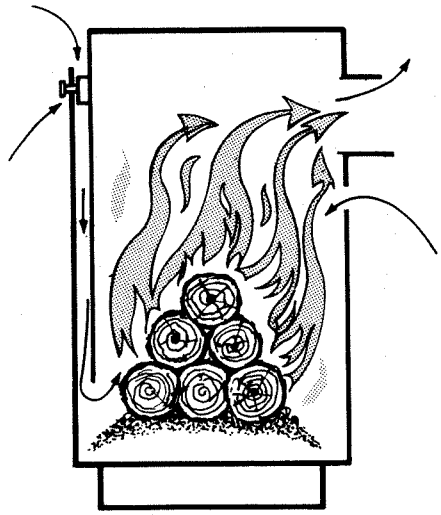


Fig. 10. Draft-flow pattern of the Ashley stove.

The Ashley and its counterparts belong fundamentally to the box-stove family in shape and draft-flow pattern. Once the air enters the firebox, it has a direct diagonal path to the flue. There are no baffles to retard this flow pattern (as in the Scandinavian-type box stoves). The efficiency, therefore, is due to the airtightness, the preheated primary air, the cast-iron side baffles, and the thermostatic control. The fan could also make a slight contribution to an increase in efficiency by drawing large quantities of cooler room air over the stove, thus extracting more heat than would be the case with natural convection.

One circulating heater, the Riteway, does not have this draft-flow pattern (Fig. 11). Air enters the Riteway combustion chamber right above the coals, flows across them, and after much turbulence, exits at the same level on the opposite side of the chamber (cross-flow pattern). In this pattern, all gases rising into the turbulence must exit at or near the coals, which insures their burning if enough oxygen is present. Riteway engineers have seen to this latter need by installing a secondary-air duct at the rear in which the air is preheated before entering a large gas-combustion flue placed inside the firebox. Here, relatively complete combustion occurs before gas, smoke, and other residue finally leave the stove.

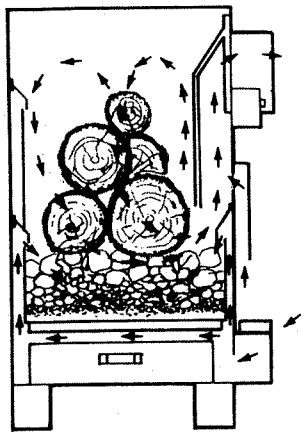


Fig. 11. Air-flow pattern in the Riteway 2000.

Tests at Williams College have shown the Riteway to be slightly more efficient than other wood-fired circulating heaters, perhaps because of its peculiar draft flow, but certainly because of an effective, thermostatically regulated, magnetic damper and a long primary-air chamber extending under the grate and up over side-liners in direct contact with the fire. The incoming air must become extremely hot by the time it reaches the coals.

The fundamentals of the thermostat on most of these stoves are the same from brand to brand: a bimetallic strip (two different metals bonded together) bent into a coil which tends to wind up or unwind as the temperature decreases or increases. The contraction and expansion of the strip can be made to open and close a damper. In the case of the Ashley and many other heaters, the thermostat opens and closes the damper in a slow continuous motion. Riteway's damper, however, is held shut by a small magnet until the force of the bimetallic strip becomes greater than that of the magnet, at which time the damper door opens suddenly. This means that the firebox gets a large amount of primary air with the damper open and only a small amount of secondary air when closed.

Secondary air is essential. Some models on the market do not have secondary-air inlets, and in such stoves, when the primary-air damper is closed tightly, gases build up and sometimes suddenly explode. Smoke and sparks may be blown out of the damper and through seams in the smokepipe. It is particularly dangerous to open the loading door after the damper has been closed because the sudden rush of oxygen into the chamber can ignite the gases, causing severe burns. It has happened (see Carl English, *Buying a Wood Stove* [Camas, Washington: Homestead Press], p. 26). For this reason, one should think twice before buying a thermostatically controlled airtight heater without a secondary-air duct.

All of the thermostatically controlled stoves discussed have large fireboxes and wide loading doors. This allows them to put out large amounts of heat over a short or long period of time, depending, of course, on the adjustment of the thermostat and the amount of wood loaded. For the lazy wood-burner, it is nice to be able to flick the thermostat and sit back for eight hours without worrying about the fire. It is also nice to be able to load fat logs into the stove, because it means less splitting. No log wider than 10 inches can fit through a Scandinavian box stove's loading-door opening. Thick logs also burn slowly, if that is desired.

There is a wide range of circulating heaters on the market, each offering somewhat different accessories. You should read the specification charts of each stove carefully before deciding on which stove to buy. If a durable heater is desired, it is imperative that the stove's walls be of a low-gauge steel and that metal baffles or firebrick be used to line the inner sides. A wall of thin sheet-metal can burn out in one year.

On the other hand, if you want a cheap source of heat for a garage, toolshed, or workshop, then a thin-sheet-metal stove would be ideal. It heats up fast, and since it would only be used occasionally, the walls would not likely burn out anytime soon.

Another singular advantage of most circulating heaters is that they are relatively inexpensive. The most reputable of the lot, the Ashley Imperial C-60 and the Riteway 2000, sell for $300 to $400. A Scandinavian box stove with similar heat-output capabilities will retail for $450 and up.

The disadvantages are sometimes subjective and therefore of importance to some people. Many wood-burning enthusiasts accuse the circulating heaters of being less durable than cast-iron stoves. If steel is of the same thickness as iron, it will definitely last as long as the iron, but circulators quite frequently have steel walls that are thinner than the walls of cast-iron stoves. Even the Ashley and Riteway firebox walls are not as thick as those of a Scandinavian stove, but there are many Ashleys and Riteways that have been around for 40 years or more. These firms also give reliable service.

More subjective is the frequently expressed criticism of their looks. Some people feel the cabinets of circulating heaters are simply ugly and (to them) reminiscent of a lower-middle-class lifestyle.

The only remotely valid reservation one can have about these stoves, however, concerns the reliability of their thermostat mechanisms. If a thermostat malfunctions and holds the damper open, the stove, stovepipe, and chimney could heat up dangerously, possibly even causing a chimney fire if there is a considerable creosote buildup inside the chimney walls. This, in turn, might cause the house to catch fire. Of course, this could happen in nonthermostatically controlled stoves if one forgets to regulate the draft carefully before going to bed or before leaving the house for a long period of time.

Combination Wood/Coal Burners

Burning coal, to some of us, is a form of ecological suicide. We think of riding along the highway viewing large columns of smoke coming out of the smokestacks of the Gary, Indiana, steel plants, or we have visions of the pea soup fogs of London in the old Sherlock Holmes films. And, if it is not pollution that immediately comes to mind, we might remember the miserable lot of the coal miners in D. H. Lawrence's novels, or the massive gashes in the countryside of southern Ohio and Kentucky, where mechanical monsters have clawed out the precious commodity. No, coal does not particularly set well with modern environmentalists. But, for a nation that is becoming dependent on Middle Eastern oil for its energy, a turn to coal is not an unthinkable alternative, especially given the political ramifications of oil dependency.

Likewise, on a regional level, coal as a domestic heating fuel might be a necessary compromise. In some parts of the country, wood is scarce. In others, a poor quality of wood makes heating with it impractical. Coal, on the other hand, possesses decided advantages over wood, environmental considerations aside. Coal has, pound for pound, 56 percent more heat value than wood, and specially designed coal-burning stoves attain a higher degree of efficiency than do most wood-burning stoves. If these facts are coupled with the necessity of buying wood by the cord, then heating with coal is definitely more economical.

Let us look at these statements more carefully. In laboratory tests, oven-dried wood has been found to produce an average of 8,600 Btu per pound. The coal one usually buys for domestic heating purposes (bituminous coal) will produce 13,500 Btu per pound; that amounts to 56 percent more than wood. More careful reckoning would take into consideration the fact that seasoned wood is normally 20 percent water, which means that a pound of this wood would produce only around 8,000 Btu. Coal, however, contains 6 percent moisture at most, after sitting outside one year. When the coal is freshly mined, it can have as little as 3 percent moisture.

In the only comparative tests known between coal- and wood-burning stoves of the same manufacturer, the coal stove achieved a peak efficiency of 90 percent, while the best woodstove reached 76 percent. These tests were made in the Jøtul laboratories in Oslo, Norway, on 5 November 1974, and published in *Jøtul, a Resource Book on the Art of Heating With Wood*. The coal stove used was a No. 507 burning coke, while the woodstove tested was the No. 118.

Those percentages may be on the high side, because results of tests in the United States at Williams College show woodstove efficiency of not over 60 percent and averages of about 50 percent with most modern, airtight stoves. The relative efficiencies of the two types of stoves used in the Jøtul tests, however, may be accepted. Another test, this time of a combination wood/coal stove, the French-made Petit Godin, was conducted by the British Coal Board, which found the model to have an overall efficiency of 72 percent. The Surdiac, a freestanding, fireplace-type wood/coal stove, was rated up to 89.6 percent efficient by "an official European laboratory," as the Surdiac promotional literature claims. So, not only does coal give off more heat per pound than wood, but in an actual firing situation an efficient coal stove would be able to produce more heat than a less efficient one, per pound of coal consumed.

And then there is the question of the cost of coal and wood. Coal, in the fall of 1977, was selling at $75 a short ton (2000 lbs.) at the average retail coal lot, and each ton represents a heat potential of 27 million Btu (13,500 Btu/lb. × 2000 lbs. = 27 million Btu). Assuming conservatively that a coal stove under normal use will be 65 percent efficient, the total heat output would be 17.55 million Btu.

A cord of wood also could have cost as much as $75 in 1977. If one considers the average cord of wood to contain 80 cubic feet of solid wood, and the wood to be a very dense hardwood such as hickory (44.8 lbs. per cubic foot), then a cord of such wood would weigh 3584 lbs. and have a heat value of 30.8 million Btu (8,600 Btu/lb. × 3584 = 30.8 million Btu). Now, assuming conservatively that a modern, airtight woodstove will be 50 percent efficient, the total heat output would amount to 15.4 million Btu, or over 2 million Btu less than a ton of coal.

There are many variables, but these figures are generally acceptable. The cost of coal is said to have been high in 1977 because of great demand and a shortage of rail cars to carry it. The price, therefore, could be lower in later years. On the other hand, governmental policies will probably tend to encourage more and more industries to shift to coal because of balance-of-payments difficulties, availability, and other politico-economic reasons, all of which may keep the price high. In some parts of the country, coal is much cheaper than $75 a ton. In coal mining regions, for example, you may drive your pickup truck to the mine and buy a load for as little as $32 a ton. The price of a cord of wood will vary all over the country from $50 in the summer to over $100 in January. But, the price in a relatively large city in October and not that in a small town in July should probably be taken as the average, because more city-dwellers will buy wood by the cord. The price could go much higher than $75, as thousands buy woodstoves each week. The woodstove craze seems to be at its peak in the big cities, where wood is scarcest.

All of this means that if you have to buy your wood, it is most likely to be less economical to burn than coal. And, there are a number of other reasons why coal should not be ruled out as an alternative fuel source for the home.

A coal fire takes a minimum of tending, and then usually only twice a day. Coal puts out more intense heat, is easier to store than wood, and is cheaper than all fuels other than wood cut on one's own property and natural gas in certain areas where the price is still regulated.

In opting for wood and coal, you can find several attractive, modern stoves that burn both fuels and burn them efficiently. To be able to burn coal, a stove must have a grate that is capable of withstanding very high temperatures. A coal fire requires much more oxygen than one of wood. A stove must be able to allow large quantities of air to enter the firebox from below the fire, so that it can get directly to the coals. For this reason, it is important to empty ashes from a coal stove frequently. They must not be allowed to smother the coals; otherwise, the grate may be destroyed by intense heat. A coal stove must also have walls capable of maintaining very high temperatures in order to burn the volatile matter above the coals. Here too, there must be a considerable amount of oxygen present. In fact, some stoves, such as the Jøtul No. 507, allow a draft to enter at *three* levels: under the coals, at the same level, and above the coals. Many of the old, American potbellies and cannonball stoves were similarly designed. The Jøtul, however, has a horizontal baffle at the top of the firebox that functions in the same manner as one in the Scandinavian box stove. The Lange 6304RA has a similar design, with two levels of draft. An even taller and thinner model is made by the French, the Petit Godin 3720. Its gasketed door makes it airtight and therefore quite efficient.

The Abundant Life Farm stove-builders in New Hampshire manufacture The Comforter (discussed previously), an all-cast-iron wood/coal stove which looks something like a traditional American parlor stove, but is airtight and features a Scandinavian-type baffle with a "venturi." The venturi, or cutaway section of the baffle, focuses combustible gases into a narrower path than is normally taken in Scandinavian-type stoves. "Heat fins" at the front of the stove direct the preheated air to first-, second-, and third-stage air portals to achieve more complete burning at all stages of the fire. The body is made of quarter-inch cast iron, and at selected stress points, malleable iron which is specially heat-treated "to prevent cracking or warping" is used, according to the company. A cookplate on top, where the burning gases converge, makes this a more functional cookstove than most stoves, where the top is usually only hot enough to make slow-cooking recipes or to simmer water.

Another French import, the Chappee 8033, also utilizes the top-baffle design with great effectiveness in burning wood or coal. Here, the baffle is able to be moved with a lever to allow the direct exit of smoke and gases up the flue when the stove is being loaded and ignited. After the fire has developed some coals and the hearth door and upper grill are closed, the baffle is lowered, forcing the gases up toward the front and top of the stove before they exit. Before loading the stove again, the baffle is raised to prevent back-puffing out the front when the door is opened. The stove is made out of cast iron with a vitrified enamel finish and includes a cooking surface and mica window.

Monarch, an old company (started in 1896) in Wisconsin, has gone a different route with their combination Super Room Heater model CR24D. Their designers have taken the traditional American airtight circulating heater and made it rugged enough to burn coal. The firebox, grate bed, door, and flue collar are all cast iron as is a special "flue deflector" which, like a small baffle, prevents some heat-loss through the chimney. The "Super" has a heavier-gauge steel cabinet than most wood-burning heaters, and utilizes the usual automatic draft control with an optional blower kit. This must be one of the more durable heaters on the market.

Along the same line, Riteway builds a combination wood/coal circulating heater having their special cross-flow design (which was discussed in the section on automatic circulating heaters). The Riteway Model 37, unlike the Monarch, is made out of 14- and 10-gauge steel, rather than cast iron. The firebox is lined with heavy (2700°) firebrick, and included is an extra-heavy cast-iron grate with reinforced ribs. The flue baffle, direct damper, and draft louvers are also cast iron. This massive stove (weighing nearly 400 pounds) is, according to some reports, as efficient as any stove on the market. Other combination wood/coal circulating heaters are the R-76 by Shenandoah, which comes with optional heavy-duty shaker and outer grates for burning coal; the Wondercoal, by U.S. Stove Company; Suburban Coalmaster; the Homesteader 240DG, by Atlanta Stove Works, and others (see chapter 9).

A different type of wood/coal burner on the market today is the specially constructed freestanding fireplace stove. Manufacturers and importers offer many models of this type, but the French and Belgian stoves are the best-designed and give great efficiency. For example, the Nestor Martin Castel Coal Convector No. 479.38 has a coal-storage reservoir and self-feeder which allows a burn of up to 100 hours on one loading. An extra-deep ash pan helps make this possible. The cast-iron firebox is airtight and thermostatically controlled, and the porcelain-enameled steel cabinet makes the stove function as a circulator. The tempered-glass door gives the effect of a fireplace. Burning anthracite coal, the heater will generate up to 60,000 Btu per hour.

The Belgian Efel Kamina has similar features, but will only burn for 30 hours on one loading. However, the Efel may function more efficiently than the Nestor Martin because of a Scandinavian-type horizontal baffle; importers of the Nestor Martin claim combustion is so

complete in their stove that no bulky clinkers are formed.

A stove of proven efficiency is the Surdiac, which was tested by official European laboratories to operate up to a peak efficiency of 89.6 percent. It can also burn up to 100 hours on one load of 25 pounds of coal, is airtight, thermostatically controlled, and includes a cooktop surface. A heat exchanger in the back not only increases efficiency, but also allows the stove to be placed within 6 inches of a combustible wall, according to the manufacturer's recommendations. One special feature is that all parts coming directly into contact with the most intense heat of the fire are made of a special alloy of iron and stainless steel to prevent burnout. As formidable as its performance, however, is its price, which ranges from $685 to $950 (as of 1977).

Similar American models are not advertised as airtight and are thus of questionable efficiency. The Monarch HR24B and HR24D have a firebox made out of heavy-gauge steel coated with porcelain enamel inside and out and have a cast-iron grate. These models do not come with a glass window. They operate either with doors closed (as a circulator) or open (as a fireplace).

The Impression by KNT is also an open fireplace, with a 1/8-inch–mesh screen covering the front viewing door. To compensate for the inherent inefficiency of this mode of burning, KNT designers have covered the 1/8-inch–steel firebox with a metal cabinet and installed a blower that forces air first around all sides of the combustion chamber and then out the front into the room. The standing grate and firebrick lining on the bottom make it possible to burn coal.

Malm Fireplaces of California has built the Fargo Heater to operate as a fireplace or as an airtight stove. It also functions (with doors closed) as a thermostatically controlled heater with blower. The manufacturer uses 3/16-inch plate steel throughout.

Arizona Forest Supply's HB465 forced-air fireplace will burn wood, coal, paper, and "buffalo chips," according to promotional literature. It is similar to the Fargo in that it is made out of thick steel and has a blower and thermostat, but the HB465 also includes a patented baffle, five heat-exchanger tubes, and a secondary-air inlet. AFS claims that the stove will readily achieve 100,000 Btu per hour.

Some combination wood/coal stoves are obviously designed primarily to burn wood, and only a grate and maybe a firebrick liner have been added to make them capable of burning coal. Others are intended to burn coal. Some are efficient and some are not. Some are attractive while others are not. There is also a great range of prices. You should keep in mind that most coal found in the U.S. contains sulfur and will cause some pollution of the atmosphere, while wood will cause only traces of pollution. Wood is renewable but coal is not. On the other hand, coal puts out more heat per dollar than wood, if you are forced to buy the wood. Many of the airtight wood/coal burners will operate cleanly, with few traces of soot, ashes, and dust—unlike the old cannonball stoves of rural American train stations and general stores. But, when burning coal, you do have to empty ashes much more frequently than with the airtight wood-burners—as often as twice a day, depending on the size of the ash pan and the amount of coal burned. And finally, you should consider the flexibility of the wood/coal stove. Wood prices may go sky-high. So may coal prices. If both go up, it will still be cheaper to heat with coal because the best coal stoves are more efficient than the best woodstoves. All in all, there are plenty of reasons and plenty of stoves from which to make a choice.

Freestanding Fireplace/Stoves

Thanks to their Anglo-Saxon heritage, Americans will not give up the idea of a fireplace, no matter how wasteful it may be. But, the energy crunch has hit some pocketbooks harder than others and created the problem of how to have a fireplace satisfy the ancient tribal instincts on the one hand, yet act as an efficient heating source to satisfy our modern sense of economic necessity on the other. It seems like a classic case of "you can't have your cake and eat it too," except that you should never underestimate the American genius for compromise. Thus, the fireplace and the stove were merged into one unit. It is a marriage of illusion, however, because a stove operated with its doors open, like a fireplace, is about as inefficient as a true fireplace. The reason for this is obvious. No matter how much the fireplace/stove is radiating heat into the room and no matter how much air may be forced over the unit by fan or convection, the open doors will allow large amounts of heated room air to be sucked up the chimney. It is sheer folly to think that by having a freestanding fireplace/stove you will be achieving any significant degree of efficiency. It is true that your body, the furniture, and walls will absorb the heat radiation, but it is also a certainty that the resulting heat will soon be carried up the chimney by the frequent change of room air. A change of room air means that cold air will be drawn in from outside through cracks around doors, windows, and elsewhere. The only thing that can retard this consequence of an open freestanding fireplace/stove is a damper placed in the stovepipe. Even this is not practical with roaring fires, since smoke and gases will come into the room if the damper is closed too tightly.

Although small gains can be made, it is a delusion to assume that a fireplace/stove is more economical than a regular masonry fireplace. It *may* be, but only by a few percentage points. If the fireplace/stove is used primarily as a stove (that is, with the doors closed and only occa-

sionally with them opened for romantic effects), a number of new models on the market will attain an efficiency nearly as high as that of some of the most efficient wood-burning stoves. To do this, fireplace/stoves have to be air-tight and incorporate such efficiency-increasing principles as baffles, secondary combustion chambers, and perhaps heat exchangers of some kind. Many do.

The Scandinavians again paved the way with combination fireplace/stoves such as Jøtul's Combi-Fire No. 4 and Morsø's No. 1125. These attractive, yet massive, models are all-cast-iron, with firebrick lining, log grate, baffle and airtight doors. In tests at their own laboratory, Jøtul found that the Combi-Fire No. 4 achieved a peak efficiency of 76 percent burning five pounds of wood per hour and producing 29,000 Btu per hour—as efficient as their biggest box stove, the 118. Even at peak output of 51,000 Btu per hour at a burning rate of 11 pounds of wood per hour, the Combi-Fire No. 4 operated at 64 percent efficiency. This was, of course, with the doors closed. With doors open, it could hardly have been more than 15 percent. These fireplace/stoves have been so successful that distributors have started importing other Scandinavian models such as the Lange No. 61MF and the Trolla 800. Some American distributors and manufacturers offer models quite similar to the Jøtul (Colonial's Viking and Warmglow's Maxi-Heat 1).

A more original way to meet the problems posed by combining a fireplace with a stove is offered by Vermont Castings, Inc., in their Franklin-style Early American Defiant (Fig. 12) and Vigilant. These are Franklins only in appearance. The thermostatically controlled stoves have a similar draft-flow pattern to the Riteway (cross-flow), but have various features incorporated from other stove types. For example, with fireplace doors closed, the stoves are airtight. Primary air, just as in the Riteway, enters at fire-level, flows across the fire, and causes gases to be released. As this mixture begins to exit at the same level on the other side of the firebox, it is met by preheated secondary air. Instead of leaving the stove immediately, as in the Riteway, the exhaust then travels under, around, and over a horizontal baffle, in an "S" pattern. This "S" pattern is reminiscent of the baffled Scandinavian stoves, while the thermostatically controlled damper and initial cross-flow over the coals are similar to characteristics of the Riteway heater. There is, however, no cabinet or circulating fan. The Defiant and Vigilant can also be operated as an open fireplace, with the smoke bypassing the baffle and flowing directly up the flue.

The Upland Stove Company has brought out a similar model fireplace/stove which is airtight and employs a Scandinavian-type horizontal baffle, half of which is adjustable to allow a direct flame-path up the flue when burning with the doors open. The Upland's 6-inch flue collar will not allow as much room air to go up the chimney

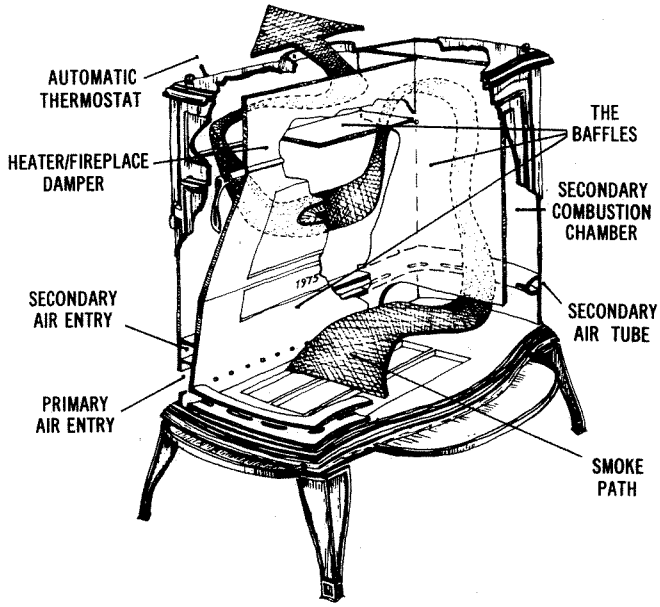


Fig. 12. Cutaway view of the Defiant stove.

as do the collars of most models in this category. This feature alone should make the Upland somewhat more efficient when burning in the fireplace mode.

Apart from the many Franklin models, most of the fireplace/stoves on the market today are versions of the step stove. Fisher Stove Works was perhaps the first to offer a larger version of their stove, which has two large swinging doors on the front that seal tightly when closed. Their success prompted numerous imitators, all employing the step-stove design. Like the Fisher, they are all made out of heavy plate steel, and most are lined with firebrick. By installing a grate in the bottom, some can be made to burn coal safely. Others have baffles (Timberline) and heat exchanger tubes within the firebox (All Nighter). Several unique designs have appeared (the Fireview and the Twin Spin Fun Fire) in which the fire is enclosed in glass. Their manufacturers claim a high degree of efficiency. All in all, there are over 67 freestanding fireplace/stoves on the market, and that is not counting the traditional cast-iron Franklin stoves.

Step Stoves

A sign of the intense competition in the woodstove market is the great number of stoves that more or less copy the basic design of an already-successful stove. In 1973, an unemployed welder in Springfield, Oregon, by the name of Bob Fisher decided to build his own woodstove. It may have been the first heavy-plated steel stove to be used for domestic purposes. It is certainly a very efficient and convenient design with two levels for different cooking temperatures, a firebrick lining for maintaining high firebox temperatures, and a unique recessed flue collar which

causes a great amount of turbulence inside the firebox for complete mixture of smoke and gases with existing flames. Ashes rarely have to be emptied from the stove because combustion is so nearly complete. The patented airtight door seal makes draft regulation by the two large spinning knobs on the cast-iron door as precise as the Scandinavian stoves. The step-stove design also prevents smoking when the door is open for reloading.

Owners of Fisher stoves have spread their enthusiasm so that today, subsidiaries all over the United States and Canada are manufacturing Fisher's five models, and there are now as many as 27 other Fisher-like stoves on the market. Not all of them are blatant copies, however. All Nighter Stove Works, for example, has brought out several step-stove models having a hot water jacket to fit around the flue collar, heat exchanger tubes inside the firebox, and a blower to force air through the tubes (Fig. 13). Several companies have tried to improve on Fisher's recessed flue collar by recessing it farther into the combustion chamber, as in the Huntsman (Fig. 14) by Atlanta Stove Works. Others have incorporated the Scandinavian horizontal baffle, as in Lakewood Stove Company's Canadian Step-stove, and in Timberline's stoves.

Modern Box Stoves

Less pretentious than the step stoves are the simple rectangular box stoves, which traditionally were used primarily in bedrooms, bathrooms, and other small chambers requiring little heat. Modern stove builders have continued the box-stove tradition, but with larger models and a few refinements. The Scandinavian-type stoves are box stoves, of course, but their baffle system and heat-exchanger arches make them much more technologically sophisticated. Steel is the main construction material in the modern versions, because it is plentiful and easy to work, but

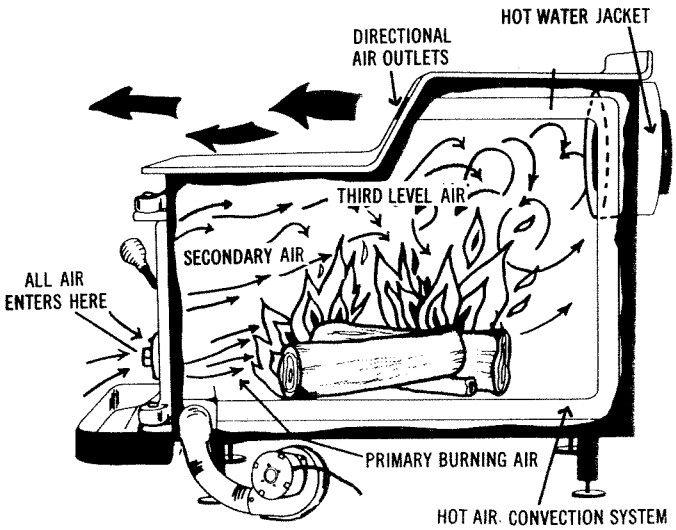


Fig. 13. Cutaway of All Nighter step stove.

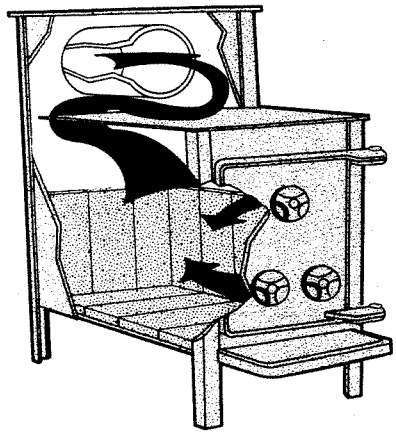


Fig. 14. Huntsman stove, showing recessed flue collar.

at least one manufacturer uses iron: Hinckley Foundry, in its Shaker stove. Most of the models are airtight and lined with firebrick (the All Nighter Box Moe, the Dam Site stoves, the Jones Standard, and the Thermo-Control models). Some have unusual baffles which make them burn quite differently from Scandinavian types (Dam Site, Thermo-Control). The draft-flow pattern in these models is similar to Riteway's.

An even more unusual draft-flow pattern is found in the Downdrafter, manufactured by the Vermont Woodstove Company (Fig. 15). This is also basically a box stove with thermostatically controlled draft, airtight firebox, and circulating fan. The design, however, represents one of the few true downdraft-stoves on the market. Primary air enters above the fire and is pulled downward through the coals, taking gases with it. Secondary air then meets the gases under the grate, where they ignite and travel out around a side baffle. The Downdrafter has no cabinet and is therefore technically a radiant stove, but a powerful fan blows air through special heat-exchange chambers inside the stove. The heated air circulates into the room from the front of the stove. The thermostatic controller senses flue-pipe temperatures and on that basis regulates both the air intake damper and the blower. The Downdrafter is considered by many to be one of the most efficient stoves available.

Unclassified Stoves

A number of stoves hardly fit into any category. They are either unique in their draft-flow pattern and appearance, or they resemble other stove-types except for a few characteristic differences. An example of the latter type is the French-made Supra 402 which in almost all aspects is a true circulating heater; but, unlike its American counterparts (Ashley, Riteway, and others) the Supra is not automatic. It even has a small smoke baffle which retards the exhaust but does not cause a front-to-back burn, as in the Scandinavian box stoves. It also has a heat-proof window

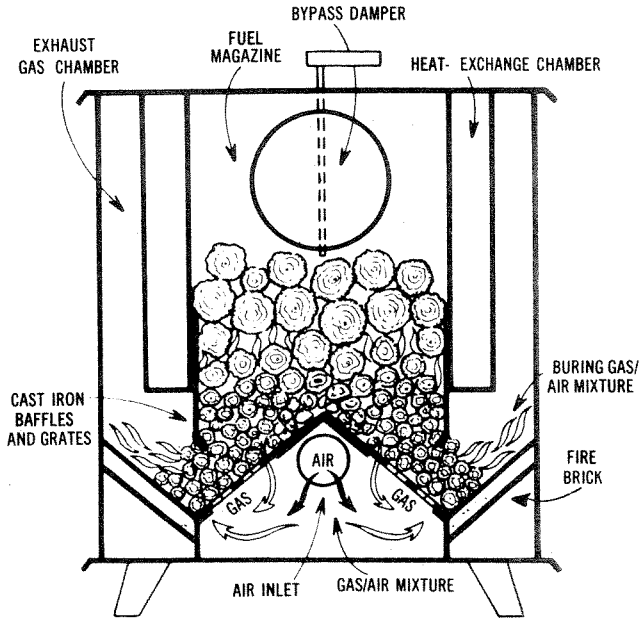


Fig. 15. Draft-flow pattern in Downdrafter box stove.

in the front and looks like a freestanding fireplace/stove but cannot be operated with the door open.

The Gibraltar fireplace-like stoves by Self Sufficiency Products also have large windows in front but are not fireplaces. The Vermont Iron Stove Works makes highly original-appearing stoves of singular beauty, such as the Elm. The draft-flow pattern is like the traditional box stove, but their tightness and mass should make them a lot more efficient. Even more revolutionary in design is the Free Flow Stove, a collection of pipes welded together to form not only the firebox but the entire stove. Its special baffle forces the draft to make several turns within the stove before leaving.

If a stove can be made out of pipes, then it can also be made out of steel culvert—the huge pipe that is used to line a ditch where it passes under a road or driveway. The Culvert Queen, by The Stoveworks of Marlboro, Vermont, puts out a tremendous amount of heat (55,000 Btu per hour), is obviously sturdy (guaranteed a lifetime), and is cheap ($205). Because it utilizes the downdraft principle, it is also extremely efficient. This downdraft principle was first introduced on the American stove market by Mohawk's Tempwood stoves. The Tempwood is so simple, it is ingenious—elegant, a mathematician would say. Draft enters the stove at the top through two little portals, is drawn down onto the fire in the firebox, and then after much turbulence, makes its way out the flue. Combustion is nearly complete because of the turbulence, which causes secondary combustion of gases, and because the air is actually preheated before it reaches the flames. Unfortunately for the Mohawk people, the principle cannot be patented because "it's been around ever since Ben Franklin," says president John J. Notsley. Notsley says the modern adoption and realization of the concept was accomplished by several people. Gene Schullens, an aircraft engineer at Mohawk, used a similar but homemade stove during his youth in Canada. Working from his rough sketch, other design engineers at Mohawk made the prototypes for the Tempwood.

When I described how the Tempwood burned to my father, who grew up on a farm in southern Illinois, he said he used a similar principle when loading a big parlor stove for the night. He would rake ashes around the inside of the lower door, effectively sealing it off. Then, after putting as many big logs on the coals as possible he would prop up the top loading door about 1/16-inch with a piece of wire or coat hanger. Combustion was slow and virtually complete, just as in the Tempwood.

Another simple, yet powerfully effective stove is the Kickapoo. With no baffles or heat exchangers, the Kickapoo nevertheless puts out a lot of heat over a long period of time because it is airtight, massive (3/16-inch steel plate), and has a solid 1½-inch-thick cast-refractory firepot that keeps temperatures high in the combustion chamber. The draft flow is the same as that of the traditional box stove. A recessed flue collar similar to that of the Fisher models helps combustion by creating turbulence.

Wood-burning Furnaces

Many people would like to switch to wood as an alternate source of heating fuel, but do not like the idea of heating only a part of their house with a woodstove. It is true that the temperature differential between rooms without the stove and the room with a stove can be 10 degrees or more, depending on how far away a room is from the stove. In a typical, modern, well-insulated house, that differential can be as little as 5 degrees. For example, our radiant Scandinavian stove is in the kitchen. When the temperature there is 70 degrees, the adjoining living room registers 65 and in rooms farther removed, it is 60. To get the temperature up to 68 in the more remote rooms, I have to stoke the stove so that the kitchen temperature is nearly 80. This is uncomfortable when cooking, dining, or washing dishes unless you are wearing a short-sleeved shirt or blouse. My wife and I prefer to keep the kitchen around 70 and tolerate the cooler temperatures in the rest of the house by wearing warm clothes. We do not like tremendous amounts of radiant heat coming off the stove. This temperature variance, however, makes some people uncomfortable. For them, the only solution is to install a wood-burning central heating system.

A great number of wood-burning furnaces have recently come on the market (see chapter 9) that allow you to heat solely with wood or with wood in combination with exist-

ing oil, gas, coal, or electric hot-air furnaces. Some of these models are very sophisticated, utilizing the latest developments in thermodynamics and heat-transfer technology. Others are simple woodstoves with insulated enclosure and hot-air plenum. Prices range from $259 to over $3000. Some work by simple convection, and others by complicated electronic gadgetry.

All can be charged with large loads of wood, but even loading has been assisted by the designer of the Longwood. Inside the loading door, there is a little roller on which you can set a large, heavy log and roll it all the way back into the firebox. With this furnace, such assistance is nearly a necessity because it will take logs up to 60 inches long and 11 inches in diameter! This certainly simplifies cutting and splitting.

This same furnace has a unique burning system. A gas- or liquid-fuel burner blows flames directly into the airtight, wood-combustion chamber without additional draft, so the wood does not break into flame to any great extent. First, the smoke and other volatile gases are burned out of the wood; then, the remaining slow-burning charcoal is allowed to complete the burn cycle. The manufacturer claims that the nearly complete combustion leaves only a small residue of ash and that there is little potential heat-loss. It is estimated that wood provides about 75 percent of the total heat.

Most of the combination wood/oil or wood/gas furnaces have separate combustion chambers (Dual Fuel's New-Mac, Duo-Matic's CWO, and Hunter's HWO models, to name a few). These separate chambers are considered necessary in order to keep the oil or gas burner free of wood-ash fouling. Hunter Enterprises, a Canadian firm, solves this problem interestingly by installing a horizontal baffle, like the Scandinavian-type stoves, with the oil-burner chamber placed at the back of the baffle and the wood-burning chamber at the front (see diagram in chapter 9).

Some furnaces, such as the Bellway Hi-Temps, have separate secondary-combustion chambers. The Hi-Temp has an afterburner installed in this chamber which heats the exhaust gases to 1000 degrees. Riteway's boiler has a cast-iron combustion flue mounted entirely within the firebox to achieve the same results. Preheated secondary air is fed into the chamber (see diagram in chapter 9).

Since a furnace is usually placed in a basement or in some other out-of-the-way place, beauty is not an overriding concern of furnace designers. Consequently, some of these furnaces are made with massive heat-exchanger sections that would be unsightly on a stove. The furnaces made by Sam Daniels in Montpelier, Vermont, for example, have two large steel drums over the firebox. The Ray-Mask, sold by Liter Knot, has three drums, each with separate cleanout cap. Longwood's furnace has a built-in box which extracts heat from the flue gases as they pass over 35 tubes.

A boiler is also, in effect, a heat exchanger. The heat from the firebox must be transferred to the water and then radiated into the room. Energy Options, maker of the Red Ox boiler, has come up with the ultimate heat exchanger. They have wrapped a "continuous coil" of black iron pipe entirely around the firebox, which measures 30 inches deep, 18 inches tall, and 17 inches wide—a considerable amount of coil. Coupled with this, the design also includes primary- and secondary-air dampers controlled by a solenoid (see diagram in chapter 9). The H.S. Tarm multifuel boiler imported from Denmark by Integrated Thermal Systems also has total enclosure of the two combustion chambers (oil, wood) by water, even on the bottom, for greater heat-transfer.

With all the complicated heat exchangers, secondary combustion chambers, and solenoid heat-sensors, there is still something to be said for a straightforward, simple, radiant stove/furnace such as the Cleveland, the Johnson Energy Converter (by Natural Energy Systems), the Kickapoo BBR, and the Ram Forge furnace and boiler. The Kickapoo Parlor furnace, for example, is made out of 3/16-inch plate steel, has manual draft controls, and a 1½-inch-thick solid cast-refractory firepot to maintain high temperature. Grates are stainless steel. The Ram Forge furnace and boiler weighs in at about the same as the Kickapoo (around 350 pounds) and is made of even thicker steel: ½-inch welded plate. The furnace has 30 fins on the firebox sides for greater radiating surface. The Ram is a Scandinavian-type baffled stove. The Johnson Energy Converter sits next to an existing heating system and uses the same air ducts. Its 10-gauge steel firebox is enclosed by a 16-gauge steel cabinet through which air is forced by a blower directed over the entire firebox. At $259, it is the most economical of all the furnaces. Any radiant stove, however, could be adapted to an existing hot-air system by enclosing the stove with a cabinet and directing the heat into the existing air plenum. This is frequently being done by wood-burners who want to place their stoves in the basement. A cabinet helps keep the stove from heating the entire basement space.

CHAPTER 8

Accessories

A good gauge for measuring the success of any business phenomenon is the amount of "cottage industry" growing up around it. In this case, the woodstove business is truly flourishing. Take for example the mechanical log splitter. A cursory check of advertisements in only three different magazines shows that by October 1977 there were 22 different models on the market and at least four additional do-it-yourself kits. Nine manufacturers have come out with heat exchangers, and there are nine hot water attachments available for your stovepipe, your fireplace, or the firebox of your stove. Many of the old-fashioned cooking utensils such as iron kettles, waffle makers, and stovepipe ovens have also been revived. One enterprising soul is even marketing kindling! New inventions abound: mauls that expand on impact, paper-log rollers, a portable metal sawbuck, and adjustable chimney scrapers. The patent office must be deluged with countless inventions relating to the woodstove industry.

Other merchandisers are also enjoying the fallout. Many people who had never seen the inside of a hardware store are coming in and asking for everything from axes, wedges, and chain saws to furnace cement, soot remover, and stove boards. Building-supply stores are trying to get in on the action by offering quarter-inch brick panel boards, heat shields, and all kinds of stovepipe.

A complete guide to all the woodstove accessories would be impossible, because many items are only made and sold locally or regionally. A comprehensive list of nationally advertised accessories however, is necessary to give wood-burners an overview of what is available.

Ash Pan

Almost all stoves are made with a tray or shelf in front of the door to catch falling embers and ashes when cleaning out the stove, but this tray is not always very big. Woodstructures (Box 27W2, Brinklow, MD 20727) manufacturers a welded steel ash pan to fit several Jøtul and Reginald stoves; a spout allows the embers to be poured back into the stove. The ash pan is finished with high-temperature enamel and costs $19.95. Most woodstove owners should have a metal (not plastic!) dust pan to use when sweeping off the hearth.

Bucksaw

Also called "bow saws," these saws are generally available in most hardware stores and come in lengths from 15 to 36 inches. You may want a small one for pruning and a large one for sawing logs on the sawbuck and for felling small trees. Many models are Scandinavian imports with exceptionally sharp and durable blades. Some wood-burners use these for all their cutting.

Cart

This is one of the simplest but also one of the most useful tools for anyone who cuts his own wood. The basic idea is to put a cart bed on a pair of bicycle wheels (Fig. 1). Commercially available models, such as the Garden Way Research cart (Charlotte, VT 05445), have been designed to carry a 400-pound load easily. Apart from carrying ten times more wood than a wheelbarrow, the Garden Way cart can also be used to haul leaves, straw, vegetables, and any number of things in large quantities without tipping over. You can even guide it with one hand. Try brushing a bug off your face when pushing a wheelbarrow. Three sizes are available, including a do-it-yourself kit. Plans for a smaller cart can be obtained from Fasteners & Fittings, Inc. (656 W. 98th St., Minneapolis, MN 55420).

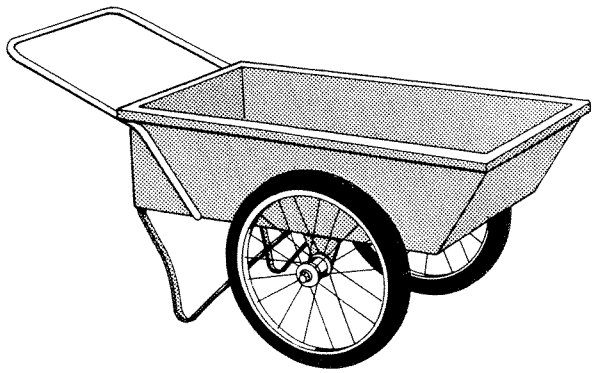


Fig. 1. Bicycle-wheeled cart.

Chain Saws and Accessories

Advice on choosing a chain saw is just about as useless as advice on choosing an automobile, mainly because there are so many models and also because we chain saw users have our favorites. The best procedure is to begin reading about chain saws. Walter Hall has written an excellent book on the subject, *Barnacle Parp's Chain Saw Guide* (Emmaus, Pa.: 1977), and a useful article has appeared in *Wood Burning Quarterly,* "How to Buy a New Chain Saw" (vol. 2, no. 2, p. 9). Visit chain saw dealers in your area and get as much promotional literature as possible. Many manufacturers also publish instructional and safety booklets.

Talk to professional and amateur chain saw users and ask them all about the saws they use. It is a good idea to rent a saw from a tool rental agency to get the feel of such a machine. This will help you decide on how heavy a chain saw you can handle, how long a chain bar you can wield, and how efficiently the saw functions when being started and when cutting all sizes of wood. You will have to decide how much cutting you plan to do, what size trees you will be felling, and what other uses you might want to make of the saw, such as making your own lumber.

As mentioned earlier, finding a reliable dealer close by may be more important than the brand of saw you buy. You need to be able to get the saw repaired quickly when it is broken and have it repaired by a good and responsible mechanic who has a complete inventory of parts. Many hardware stores sell chain saws but neither employ a mechanic nor have any parts in stock. You may be able to buy a saw there at a very reasonable price, but receiving service or buying parts and accessories could be very trying.

Some wood-burners buy cordwood in 4-foot logs and then use an inexpensive electric chain saw to finish cutting them to stovebox-size in their backyards. Cordwood in such lengths is usually considerably cheaper, and the final cutting is a more pleasant task with the quiet, electric saw. You can also spare yourself long periods out in the woods. On the other hand, many of us like to get out into the woods even though the crack and roar of the chain saw disturbs the serenity of the forest.

If you have access to free wood, you will most likely want to buy a good-sized chain saw so that you can cut all the wood you need. If you have a fireplace or old-style, inefficient stove, you will need twice as much wood as with a modern, airtight stove. In the northern regions of the country the difference can be considerable—say, between four cords of wood and eight per year. For such purposes, a chain saw with at least a 16-inch bar is necessary.

After reading, talking, and experimenting you will be able to make an easy decision on the brand of chain saw best suited to your needs. There are many domestic and imported models. Do not rule out the imported models just because they are foreign and may be slightly more expensive. The chain saw was invented and developed in northern Europe. and most imported models are made with the finest quality materials and craftsmanship. American manufacturers have not been left behind, but there are some cheap and shoddy saws on the market. The chain saw is such a potentially dangerous machine that you do not want to own an inferior product. It is difficult enough to operate the machine itself with constant vigilance, without the worry of mechanical failures over which you have no control.

Once you become familiar with your own saw, you will begin to enjoy cutting. Each saw has its own idiosyncracies and "feel." Respect its awesome power, and learn to keep it in tip-top shape. Preventive maintenance is absolutely essential for safety's sake and for the sake of efficient operation. You cannot afford to be negligent with a chain saw.

The wood-burning movement has given new impetus to the chain saw industry so that there are now several large companies that deal solely in replacement parts and accessories, just as in the automobile business. These companies publish extensive catalogs which list parts for all makes and models, and many times these parts will be cheaper than those at your dealer. You can easily replace your own chain, chain bar, and spark plug with only a minimum of mechanical ability. If you are cutting much, you will also want to learn how to sharpen the chain. This is not difficult. There are special files and file guides to make sharpening fairly simple.

A good chain saw should last seven to ten years with proper care, although in that length of time there will probably be enough development in chain saws to make you want to buy another. It is a rapidly expanding field. For example, there is now a Wankel-motor chain saw that is practically vibration-free: the Sachs-Dolman, distributed by Derby Log Splitter (P.O. Box 21, Rumson,

NJ 07760). The idea of a rotary engine for a chain saw seems ideal. Other impressive developments in recent years are the automatic oiler, roller (or "sprocket") nose, chain brake, antikickback device, and many others. The market is booming, competition is keen, and development is swift. It is a good time to buy a chain saw.

Chemical Soot Removers

One of the main problems of the modern airtight stoves is soot and creosote buildup in the stovepipe and chimney. The older, less-efficient stoves burned fast and furiously, sending most of the residues up the chimney with the heat. The modern stoves, however, produce a more controlled burn, and the baffles, heat exchangers, blowers and other efficiency-increasing devices cause a cooler stack temperature, which in turn means more condensation on the inside walls of pipe and flue. Many old-timers claimed ordinary table salt regularly sprinkled on the fire lessened soot buildup. Scientific testing of this, however, has yielded unimpressive results. On the other hand, salt (sodium chloride) mixed with catalysts such as zinc or copper sulphate has proven to be effective, with the degree of effectiveness depending on the type of stove, method of firing, and exposure of chimney. Two brands of soot remover have been around a long time: Red Devil (Fig. 2) and Chimney Sweep. Both are modestly priced (approximately $1.50 per 16-ounce can) and readily available in hardware stores all over the country, Red Devil is usually more commonly found in the West and Chimney Sweep in the East. Some experienced wood-burners are thoroughly convinced of their effectiveness, so it would not hurt to try some. Another brand, Old-Fashioned Flue Cleaner, with a zinc formulation, is available in the West (To Anachron, Box 8860, Portlant, OR 97208).

Chimney Brushes and Other Manual Cleaning Equipment

Many old-timers will brag about never cleaning out their chimneys. Most of their stoves, however, were as efficient in burning out the soot and creosote inside the chimney as they were inefficient in heating the house. There were also a lot of fires and few survivors around to brag about never cleaning out *their* chimneys.

The problem is somewhat like cigarettes and cancer, or driving without seatbelts: the insurance companies have the statistics, but the surviving smokers are still puffing away and the foolhardy are still driving around without seatbelts. Well, chimney fires do happen, and in insurance-policy terminology, they are not "acts of God." In fact, most of them are not accidents; that is, *unavoidable* accidents. Chimney fires are caused by dirty and sometimes defective chimneys.

With some of the modern, efficient, airtight stoves that milk almost every last drop of heat out of a pound of wood, cleaning the chimney may be a biannual chore. All chimneys should be cleaned at least once a year. This is a law in Norway just as yearly automobile inspection is in this country. Chimney sweeps are still few and far between in most regions, so you will probably have to clean your own chimney. If you plan to become a professional chimney sweep, a complete kit can be purchased that includes a Dickens-style top hat, brushes, scrapers, and vacuum sweeper for $1385 from August West Systems (33 Rae Lane, Norwalk, CT 06850). For the rest of us who will have enough trouble cleaning one chimney, heavy-duty wire brushes that fit most any flue are available from the Worcester Brush Co. (Box 658-WD, Worcester, MA 01601), from Kristia Associates (343 Forest Ave., Portland, ME 04104), or from W.F. Landers Co. (Box 211, Springfield, MA 01101). These brushes are not cheap, and you must also buy loops, adapters, couplers, and rods to go with them, not to mention a 15- or 20-pound weight and heavy rope. One firm, C&D Distributors, Inc. (Dept. O, Box 766, Old Saybrook, CT 06475), sells a patented "Jiffy Chimney Cleaner," a heavy metal scraper that adjusts to any chimney from 7 to 12 inches wide. It comes with enough chain to extend down a 30-foot chimney.

Creosote, when dry and hard, can be very hard to remove, even with a wire brush. The Cumberland General Store (Crossville, TN 38555) sells a soot scraper for $2. You may want to make your own or use a screwdriver, chisel, or any other sharp-edged object to get the ornery stuff out of your stovepipes.

Fig. 2. Chemical soot remover.

Cordwood Saw

This is for the farmer/wood-dealer who owns a tractor. Richard Pokrandt (R.D. 3, Box 182, Tamaqua, PA 18252) has manufactured a cordwood saw and a wood splitter which mount individually or in combination on a tractor. The combination is also available with a gasoline engine or electric motor.

Dampers

These old-time draft controllers (Fig. 3) have become the subject of some controversy in the recent woodstove boom. Most manufacturers of modern, airtight stoves say they are not necessary since the draft can be completely controlled at its entry to the firebox. Dampers were obviously helpful with the older, inefficient stoves that could not be shut down. They also seem to help slow the draft in fast-drawing chimneys and in freestanding fireplace-type stoves. One manufacturer, Larry Gay (The Stove Works, P.O. Box 172A, Marlboro, VT 05344), feels that even with an airtight stove, the damper creates turbulence in the stovepipe (especially in long runs) which slows the exhaust gases enough for the stovepipe to radiate more heat than it would without the damper.

Dampers are usually available in all sizes from an old-time hardware or feed-and-seed store, and by mail-order from the Cumberland General Store (Route 3, Crossville TN 38555), Country Catalog (Sebastopol, CA 95472), or Lehman Hardware (Box 41, Kidron, OH 44636).

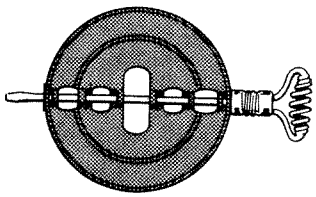


Fig. 3. Stovepipe damper.

Fireplace Shield or Cover

If you are planning to install a woodstove in your fireplace, then have a heavy-gauge sheet-steel cover made to fit your fireplace. Odd Lyngholm (Haagaard's Den, Bethel, ME 04217) makes a shield that snaps in place in seconds and can be removed just as easily without the use of any tools or costly masonry alterations. Some people have placed their woodstove directly in their fireplace without a shield. The stove is then as inefficient as the original fireplace since most of the heat goes right up the chimney. A fireplace shield of some kind is the best way to connect a woodstove effectively.

Flue Adapter

Sometimes called a reducer or expander, the flue adapter is usually needed to accommodate smaller pipe coming out of the stove to a larger opening at the thimble leading into the chimney. It is desirable (although not commonly done) to use the adapter at the flue collar of the stove and then have a complete run of the larger pipe from there. This allows creosote to flow back into the stove and be burned more easily. When the adapter is used at the thimble level, a puddle of creosote always collects there, and unless you have a perfectly sealed joint, it will leak out onto the wall.

Flue adapters are usually available from your stove dealer or from a fireplace-accessory store.

Furnace Cement

A hardware store should handle this item, which is used to seal cracks and joints in stoves as well as to seal the joints in stovepipe connections. It is necessary in order to keep the whole system as airtight as possible.

Gems (Thimble Plugs)

These used to be gorgeous plates that fit over the hole leading to the chimney in the off-heating season. In the olden days stoves were always removed, cleaned, and stored during the summer. These plates could be made out of porcelain, but were usually sheets of tin with a rustic scene embossed on them. The porcelain gems are probably only found in antique shops now, but the tin ones can still be bought from the Cumberland General Store (Crossville, TN 38555) for as little as $1.12.

Gloves

It is essential to wear gloves when working around a hot stove. The doorknobs on some stoves are too hot to handle with bare hands, and when raking hot coals together in a small pile to ignite the next load of wood, you can easily burn your hands or catch your shirt sleeve on fire. If a hot coal falls out onto the hearth, it can be quickly picked up and put back into the fire if you are wearing specially treated, heat-resistant gloves. These gloves are sometimes made especially for welders, although more expensive models are now being advertised as "fireplace gloves" or "woodstove mitts." One advertisement suggests that you can "handle hot coals and grills and rearrange burning logs," but I think this is carrying their use to an unnecessary extreme, and if done in front of small children, could give them dangerous ideas. For example, I always wear gloves when loading the stove. One day our three-year-old daughter

came to me with her little knit mittens and asked if she could touch the stove.

Any log or coal can be moved or shifted in the firebox by using one or two pokers, one in each hand. I use a small one and a large one. It is irresponsible to suggest that you stick your gloved hands into a stove. Welders' gloves are perfectly adequate and should be bought in the turtleneck, gauntlet, or bell-gauntlet style to protect your forearm and shirt cuffs.

Heat Exchangers or Reclaimers

The basic principle of a heat exchanger is to capture some of the heat inside the stovepipe and "exchange" it to the room's atmosphere. There seems to be a general consensus among wood-burners today that these heat exchangers should only be used on the older-style inefficient stoves (such as the Franklin, parlor, box, and potbelly stoves) since as much as 90 percent of their heat is lost up the chimney. With the newer airtight models, heat reclamation from the stovepipe is not necessary because the fire has been so carefully controlled by the airtight draft regulator and in some stoves, by the baffles, that most of the heat has already been absorbed by the bulk of the stove and radiated into the room before it gets into the stovepipe. Taking any more heat out of the stovepipe gases could result in a poor chimney draft and considerable creosote problems.

If you have an old stove, however, there are a number of heat exchangers on the market you may want to try. Some are merely metal fins that slip over the stovepipe, thus increasing the heat-radiating surface. Others are quite sophisticated units with tubes, fan, thermostat, and cleanout plates. This last feature is particularly important, since by their nature, heat exchangers will become easily gunked up; that is, the cooler inside temperature of the tubes will attract condensation and creosote formation.

There are at least 12 manufacturers of heat exchangers, some making several different models. In essence, heat exchangers are makeshift devices to improve the efficiency of an inefficient stove. It would seem more practical to get rid of the bad stove and invest that money in a more efficient model which will not need a heat exchanger or will have one built in. It must be remembered that the heat exchanger only improves the efficiency of a stove if it is burning hot and you need the extra heat. In no way does it help the main problem of the old stoves: burning too fast.

Heat Shields

Radiant stoves should not be placed less than 36 inches from a combustible wall. By shielding the wall with a sheet of metal spaced out about 1 inch from the wall, the stove can be moved as close as 18 inches to that wall without causing any danger of spontaneous combustion. Such metal sheets can be cut to order at sheet-metal shops for a nominal fee and painted, if desired, with high-temperature paint.

The Boston Stove Co. (155 John St., Reading, MA 01867) makes the Thermogard panel of 22-gauge steel packed with insulation, which when properly installed one-half inch from the wall, will allow a radiant stove to be placed 12 inches from the wall and still conform to National Fire Protection Association standards. The metal is also coated with porcelain and is available in several colors.

Condar Co. (Box 264-A, Garrettsville, OH 44231) makes a Heatflector shield for a different purpose. The Heatflector is slightly bent and it pivots and rotates to direct heat to other parts of the room.

Hearth Shield (Veneered Metals Inc., P.O. Box 327, Edison, NJ 08817) is heavy-gauge textured black steel that can be used as a stove board on the floor or as a heat shield on the wall.

Many new products made out of brick, tile, metal, and asbestos are coming onto the market. See a building-supply store or building contractor for samples of these.

Hot Water Systems

One of the modern necessities of life is hot water. Americans heat, use, and waste more hot water than anyone else in the world. Most Americans feel they need a daily bath, and most teenage girls feel they need a daily hair wash. Our automatic dishwashers and multicycle clothes washers add to our prodigious consumption. We even heat and reheat our water for no purpose at all when we go away on vacations. Ever since the Arabian oil embargo, however, many of us have realized that we can no longer take hot water for granted as a cheap and perpetually available luxury. In the rush to discover ways of conserving energy, the water heater was soon discovered to be an enormous energy hog. Some devised electrical timers that turned the heater on for times of peak use. Others turned to solar panels as a source of hot water, and it was not long before hot-water systems for woodstoves came on the market.

These systems are basically of two types: coils of pipe or tubing placed either inside or outside the firebox. The position inside the firebox is the most efficient since the water is heated faster and in greater quantities, but there are some difficulties involved. Copper tubing and welds can be damaged by the extremes of heat inside the firebox, especially if the water happens to be drained out of the pipes. Tubes inside the firebox are also difficult to keep clean.

Many of the old-time wood cookstoves had a stainless steel (or porcelain-coated steel) reservoir alongside the firebox. This provided enough water for washing the dishes, for shaving, and for washing the face and hands. A coil outside the firebox would seem to be the simplest solution for a limited supply of hot water, and at least one major manufacturer of woodstoves is developing such a system: Tempwood (Mohawk Industries Inc., P.O. Box 71-1, Adams, MA 01220) is experimenting with a reservoir or jacket that would fit on the back of its stove. The All Nighter Stove Works (80 Commerce St., Glastonbury, CT 06033) has made a hot-water jacket that fits around its stove's flue collar and extends into the firebox. The Good Time Stove Co. (P.O. Box F, Goshen, MA 01032) makes a 38-pound cast-iron jacket that will fit any stove or fireplace larger than 16 inches high by 12 inches wide. There are also a number of furnaces with hot-water capacity (see chapter 9).

Of the hot-water systems that extract heat from the stovepipe, Blazing Showers (Box 327, Point Arena, CA 95468) has been the most successful. Two characters by the name of Sundance and Louie have taken an old idea and made it work effectively. They offer a section of 6-inch, 7-inch, or 8-inch pipe with coils enclosed and intake/outflow connections ready to hook up to your present hot-water system. They are so refreshingly unselfish in their success that they publish a manual which shows how to build your own hot-water system. Sundance offers an excellent explanation of the system in *Wood Burning Quarterly* (vol. 1, no. 2, p. 47), where he admits that a few of the modern airtight stoves may have problems with condensation and creosote formation using Blazing Showers since the stack temperature is so cool compared to other types of stoves. Thus, as in the case of heat exchangers, hot-water systems that operate in the stovepipe probably should only be used on older-type less-efficient stoves.

Iron

If you are really into saving energy, you may want to buy real honest-to-goodness sadirons (Fig. 4) for ironing your clothes. Lehman Hardware (Box 41, Kidron, OH 44636) offers two models in their "Good Neighbor" heritage catalog (pp. 14–15). Just set two or three irons on top of the stove, and once they are heated up you can iron an entire wash load by using one until it cools, then letting it warm up again while you use another. Be careful with modern synthetic fabrics. Grandma found the right temperature by wetting her finger and judging the amount of hiss when she touched the bottom of the iron.

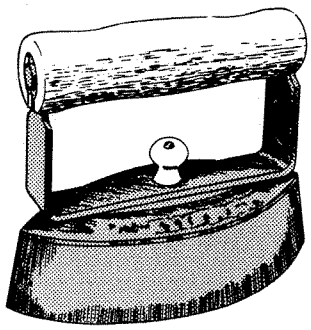


Fig. 4. Sad iron.

Kindling

This may sound silly, and probably is, but Brewton Enterprise, Inc. (P.O. Box 872, Dept. W, Brewton, AL 36426) offers bundles, sacks, boxes, and crates of "old time kindlin'," which is "Virgin fat pine grown only in the Deep South." If this is the old-time "liter knot," then it is the best kindling possible. Old-timers knew that the twisted and gnarled sections of wood (knots) around the base of pine branches made the best kindling. The kindling is attractively packaged in old-fashioned, wooden beer crates or tow sacks.

Kindling Box

In the North Carolina mountains where hardwoods are still plentiful, cabinetmaker Eddie Lutz (c/o The Liter Knot, P.O. Box 1881, Hickory, NC 28601) makes a beautiful oak box for firewood with a small side compartment for kindling. The whole box is on rollers for wheeling to the door for refills.

Log Carrier

Here is another item that could be made easily at home but isn't, judging by the many log carriers on the market:

1. Firewood carrier, canvas with leather handles, $15 (Dorothy Israel, R.D. #1, Boiling Springs, PA 17007);
2. Canvas Wood Carrier, canvas reinforced with steel rivets and straps (Wood Heat, Inc., 1748 Warm Springs Rd., Columbus, GA 31904);
3. New England Log Carrier, canvas, double-stitched with Dacron thread, solid brass grommets, braided Dacron handle (New England Firewood Company, Little City Rd., Higganum, CT 06441);
4. Canvas Log Carrier, $7.50 (Country Catalog, Sebastopol, CA 95472);
5. Log Carrier with end panels, $14.95, canvas with nylon-web reinforcement on edges and seams, nylon-web handle and girth support (Firl Industries, Inc., 123 W. Scott St., Fond du Lac, WI 54935);

6. Fireplace Log Carrier, a loop of stainless-steel aircraft cable with a clear nylon coating, two sliding metal collars to adjust to any size load, $5 (Braaten, Inc., Rt. 171, South Woodstock, CT 06267).

Log Rack

Some people think that a stack of logs sitting in their backyard is unsightly. For them, there are several storage racks made out of metal or wood. Self Sufficiency Products (One Appletree Square, Minneapolis, MN 55420) makes a quarter-cord rack of tubular steel, 4 feet by 4 feet by 12 inches, for $30. American Way (190 Range Rd., Wilton, CT 06897) offers a similar rack, except 16 inches deep, also for $30. There is also an 8-foot model made by Heritage Fireplace Equipment Company (1874 Englewood Ave., Akron, OH 44312). Plans for making your own wooden firewood rack are available in *Organic Gardening* (October 1977, p. 144).

Log Splitters

If you burn a lot of wood and have some very large trees to cut down and split, then you may want to buy a mechanical log splitter. Some of the nearly 30 models available have been tested and reviewed in *Organic Gardening* (October 1977, p. 132). Splitters are either hydraulic-wedge types or screw-types. Many of the screw-types connect to the back wheel of an automobile. You must jack up the rear axle, set it on a suitable axle block, take off the wheel, and connect the splitter. The engine is set at a fast idle and the transmission is set in low-gear. This is tedious and possibly dangerous business, and some of the stringier woods such as elm, locust, and willow cannot always be split successfully with the screw-type units, especially if the logs are over 18 inches wide. Prices range from around $90 for a "guided wedge" manual splitter to over $900 for the 7-horsepower hydraulic-wedge splitters. There are commercial splitters for over $6,000 that pick up 8-foot logs, saw them into stove lengths, split them in half and then in quarters. Some are so powerful they can split a large log across the grain.

One of the most humorous accounts of log splitting devices appeared in *Wood Burning Quarterly* (vol. 1, no. 2, p. 49), by David Kimball. Kimball found some old-timers who had experimented with a black-powder wedge. This device could, depending on how much powder it was charged with, blow "a 40-pound log-section 50 feet through the air into his mother's garden." Later in the article a number of log splitters are reviewed. As Kimball says, "Log splitting will always involve a fair amount of hard labor, regardless of the type of splitter being used." We prefer to "daisy" our big logs with a maul, and leave the powder wedges, hydraulic wedges, and screw splitters to those who cut more than two cords of wood per year.

Here is a list of as many log splitters on the market as could be found in magazines and catalogs (information is supplied by the manufacturer, subject to change without notice):

1. Jiffy Woodsplitter (C&D Distributors, Inc., Box 766, Old Saybrock, CT 06475); manually operated, $89.95.
2. Mighty Mac (Amerind-MacKissic, Inc., Box 111, Parkerford, PA 19457); 5-hp, $665; 7-hp, $890.
3. Hydra-Splitter (Didier Manufacturing Co., Box 163, Franksville, WI 53126); 4-hp, $530–$840; Model 26TM (tractor) $500; numerous models.
4. Lickity Splitter (Piqua Engineering, Inc., Box 605, Piqua, OH 45356); three models from $595 to $1295.
5. Futura Log-Splitter (Futura Master Corp., 5069 Hy. 45 South, West Bend, WI 53095); three models: 3½-hp, tractor-hitch, and 25-ton splitter, $399 and up.
6. Lindig Splitters (1875 W. County Rd., St. Paul, MN); 3-hp, 5-hp, and tractor-mount, $550 to $975.
7. Stickler (Taos Equipment Manufacturing, Box 1565, Taos, NM 87571); wheel-mounted and tractor pto, $199.
8. Bark Buster (F.W. and Associates, Inc., 1855 Airport Rd., Mansfield, OH 44903); self-powered 3-hp.
9. Quick Split (Trans America Power Equipment, Inc., 8308 Washington St., Chagrin Falls, OH 44022); self-powered 5-hp, $379; 8-hp, $479.
10. Derby Splitter (Box 21, Rumson, NJ 07760); self-powered portable 8-hp, $445; tractor pto also available.
11. The Unicorn (Thackery Co., Columbus, OH 43216); wheel-mounted bolt-on, $399.
12. The Nor-Tech screw-wedge (Nortech Corp., Midland Park, NJ 07432); self-powered 8-hp, $775.
13. Knotty Wood Splitter Co., (Route 66, Hebron, CT 06248); tractor-mount, $595.
14. Richard Pokrandt Manufacturing (RD 3, Box 182, Tamaqua, PA 18252); tractor-mount combination cordwood saw, also available with engine or electric motor.
15. Thrust Log Splitter (Thrust Manufacturing, Inc., 6901 S. Yosemite, Englewood, CO 80110); nonhydraulic horizontal wedge, 15,000 pounds of force.
16. Log Splitter (Fabsons Engineering, Box 635, Leominster, MA 01453); detailed drawings with materials list, $4.
17. Log Splitter (J.G. Sonnel, RR 1, Alexandria, Ontario, Canada KOC 1AO); photo, drawing, instructions, $4.
18. Commercial 26M (Household Wood-Splitters, P.O. Box 143, Jeffersonville, VT 05464); 8-hp, $895.

19. La Font Splitter MMS-350T (La Font Corp., 1319 Town St., Dept. WD, Prentice, WI 54556); 8-hp; also, 25-hp "Super Splitter SS-500" with 5-way wedge.
20. Screw-type log splitter (Good Products, Kutztown 3, PA 19530); auger separately, $49.95; complete, $99.95.
21. Spiral Splitter (613 E. Till Rd., Fort Wayne, IN 46825); screw-type for auto or half-ton truck with four- or five-lug-bolt pattern, $119.95.
22. The Cornell Splitter (Cornell Manufacturing, Inc., RD No. 2, Box 511, Laceyville, PA 18623); hydraulic-wedge type.
23. Log splitter plans (Woodland Splitters, P.O. Box 976, Oakbrook, IL 60521); $5.
24. Log splitter plans (Bloomingville Grant Society, Box 56B, South Bloomingville, OH 43152); $3.

Maul and Other Manual Splitting Equipment

Traditional splitting mauls are available at most hardware stores, but there have been some new developments recently in the manual maul. The Woody splitting maul has a triangular wedge head, weights 12 pounds, and costs $21.95 (Energy Associates, P.O. Box 524, Dept. C12-7, Old Saybrook, CT 06475). The Monster Maul weighs 20 pounds and costs $15.70 (Sotz Corp., Columbia Station, OH 44028). The Chopper 1 is a patented maul with splitting levers in the head which rotate on contact and transfer the downward force to a direct outward force. Chopper Industries (P.O. Box 87, Easton, PA 18042) claims it cannot get stuck in the log. The price is $32.95. Felling and splitting wedges come in two or three sizes and are made of either metal or plastic (plastic for felling only).

Ovens and Other Cooking Utensils

Most woodstoves can accommodate either a stove-top oven or a stovepipe oven. It was a tradition in the South on laundry day to bake cornmeal bread, buttermilk biscuits, or cakes in the stovepipe oven (Fig. 5) attached to the laundry stove. Vermont old-timers remember the aroma of baking bread in the stove-top oven. Both of these items are again available from various sources. Garden Way Research (Dept. 74449, Charlotte, VT 05445), for example, sells a heavy steel stove-top oven with a temperature regulator and rack for $39.50 (dimensions are 12 inches high by 15 inches wide by 11 inches deep). C & D Distributors (Box 766, Old Saybrook, CT 06475) has a similar, but collapsible, stove-top oven with thermometer for $39.95. Stovepipe ovens include:

1. Progress Drum Oven (Country Catalog, Sebastopol, CA 95477), $29.95.
2. The Sour Dough Oven (Country Catalog), $75.98;
3. Granny's Oven (Magic Heat Corp., Burton, MI 48529);
4. The Sootless Sue Drum Oven (Cumberland General Store, Rt. 3, Crossville, TN 38555) which features a crank in the back of the oven to turn blades that scrape soot and creosote from between the walls, $39.95.

A related device is the stovepipe warming shelf for $16, also from Country Catalog.

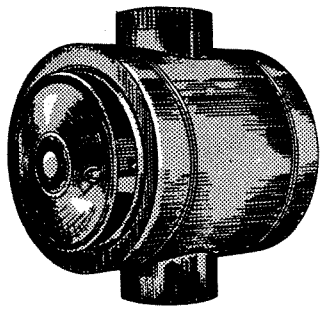


Fig. 5. Stovepipe (drum) oven.

Another essential utensil for the woodstove is the teakettle. A cast-iron kettle is made by Heritage Metalcraft, Inc. (Rt. 202, South Windham, ME 04082) for $37.50. Lehman's Hardware (Box 41, Kidron, OH 44636) offers several sizes of stainless-steel kettles from $24 to $33, one with a copper bottom. If your water supply is high in mineral content, you may not want to use an aluminum kettle because of chemical interaction between water and metal.

In many of the catalogs and magazines mentioned, you will run across dutch ovens, pots, skillets, waffle makers, cookie irons, krumkake irons, and many other cast-iron products which have been traditionally used in cooking with woodstoves.

Paper-log Roller

If you have an old-fashioned stove that burns very hot or a wood/coal stove, you may want to burn paper-log rolls. They are generally sooty and can make a lot of extra ashes, but they do provide extra heat. Country Catalog lists Easy Log, which is spring-loaded to make for a tighter log and easier rolling, at $13.95. Christen Inc. (59 Branch St., St. Louis, MO 63147) makes very attractive paper-log rollers which have won design awards. From an ecological point of view, however, it would be better to recycle paper since it gives off little heat for its size and can be a smoke nuisance.

Poker and Other Fireplace Equipment

Many of the modern stoves are designed in such a way that they need special fire-tending and ash-removal equipment. Loading and ash removal in the Tempwood, for example, can only be done through the top of the stove. Consequently, the manufacturer offers a strange-looking ash shovel along with the stove. Tending the Scandinavian-type stoves requires a kind of rake to drag the coals from the back of the firebox to the front to ignite the new load of logs. The Danish stovemaker Morsø includes a combination poker-rake with its stoves.

Whatever your needs, there is a great variety of fireplace accessories available—and a great variety of junk. Be cautious when you buy a poker, shovel, and broom in one package. Some of the shovels are made so cheaply that the blade will soon break off from the handle. It is also unwise to buy a fireplace broom with plastic bristles because burning plastic gives off toxic gases, and it is not infrequent that you will have to sweep a red-hot coal or two off the hearth. Many of the hardware catalogs offer excellent fireplace tools at quite reasonable prices. You should buy a shovel of iron cast in one piece (Fig. 6) to avoid the blade's breaking off. The blade or scoop should be deep enough to pick up a good amount of ashes without spilling them. Most shovels that come with a fireplace set are so shallow as to be nearly worthless. When you are shoveling ashes and (of necessity) some hot coals out of the stove, you do not want to take unnecessary scoops because the coals are smoking and the ashes puffing up. To clean out the firebox in as few scoops as possible, you need a deep-scooped shovel.

It is sometimes necessary to have two pokers, one for each hand. One poker can be used to push a heavy log back out of the way while some red coals are raked under it with the other poker. Some people even use tongs for such work. Bellows look nice on the hearth, but are hardly necessary for a woodstove because the draft vents in most modern, airtight stoves focus the incoming air in such a way that it functions as if it had come from a bellows. One company makes what looks like an Amazon poison dart blowgun. It is called the Huff Stove-Poke, a poker and bellows in one (Huff Stove-Poke, Box WB, 248 Artino St., Oberlin, OH 44074), at $14.95.

Sawbuck

This is another item you should build for yourself out of scrap two-by-fours, four-by-fours, or whatever. But for those who are not so inclined, Energy Associates (P.O. Box 524, Dept. C12-7, Old Saybrook, CT 06475) makes a portable, all-metal, adjustable sawbuck called Gator-Buck for $39.95. Jefferson Boat Works, Inc., (1655 N. Main St., Jefferson, MA 01522) offers a six-legged Triplebuck Safety Horse that supposedly eliminates chain saw pinch. It is made out of solid oak fastened with galvanized carriage bolts and sells for $37.50. They also make a four-legged cordwood horse for $14.95.

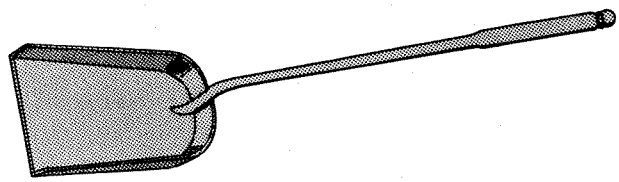


Fig. 6. Cast-iron shovel for stove.

Scuttle

For removing ashes safely, you need a coal scuttle (Fig. 7). The wide opening and spout give plenty of room for dumping shovelfuls of ashes into the scuttle. Cheap, tin scuttles are available at most hardware stores while fancier cast-iron or brass models can be found in the mail-order catalogs of Lehman Hardware, The Cumberland General Store, and Country Catalog. They range from $7 for a galvanized sheet-metal scuttle (or "hod") to $64.20 for a solid cast-iron model.

Stove Boards

Most old-fashioned hardware stores have thin metal stove boards in various sizes. Slightly more expensive are the sheet-metal stove boards backed with asbestos millboard. Riteway Manufacturing Co. (P.O. Box 6, Harrisonburg, VA 22801) makes a mat of 1/8-inch asbestos millboard sandwiched between a 20-gauge cold-rolled steel top and a 24-gauge galvanized steel bottom. The heavy top presumably prevents the edges from turning upward under the weight of a stove. The Hearth Shield was discussed under Heat Shields. There are many other stove boards made out of veneer brick, tile, porcelain-coated sheet metal, and slate. Regular brick laid on its side would easily suffice and would not be much more expensive than some of the stove boards on the market.

Stove Paint

Black surfaces absorb and radiate much more heat than brighter metal finishes. Thus, it is a good practice to paint or polish your stove and stovepipe regularly with a dull-black, heat-resistant stove paint or polish. Every spring after the heating season, the stove should be carried out of the house (if light enough), scraped thoroughly on the inside with a wire brush, and painted inside and out with stove paint in order to keep it from rusting and also to keep it from giving off sooty odors if you bring it back inside and reinstall it. In the olden days, the stove was stored in a

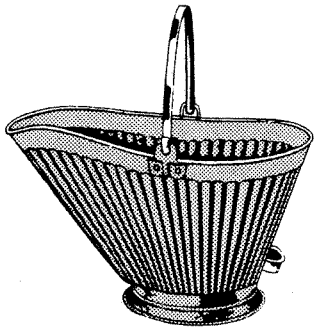


Fig. 7. Coal scuttle.

shed where it could remain dry throughout the humid and muggy summer. A thimble plug, or "gem," was placed in the entrance to the flue and the hearth thoroughly cleaned. It is still a good idea, although some of the modern stoves are so heavy it would take an army of piano movers to budge them. Remember to leave the doors and draft vents open so condensation cannot form inside the stove.

The Dampney Company manufactures Thurmalox 270 heat-resistant stove paint which is said to withstand temperatures up to 1200 degrees Fahrenheit. It is available in black, dark blue, dark green and dark brown. The Right Stove Polish Co., Inc. (55W Howland St., P.O. Box 597W, Marlborough, MA 01752) has been making Williams Stove Polish for over 80 years. A 3.5-ounce tube sells for $1.25. The same company also makes Williams Rising Sun Stove Polish in 4-ounce cans for $1.50. Water-based Old Fashioned Stove Black is available from To Anachron (Box 8860, Portland, OR 97208). Red Devil Antique Black Stove and Iron Polish is widely available in hardware stores in the West or from the Country Catalog (Sebastopol, CA 95472) for $1.49 per 8-ounce can. Cumberland General Store (Rt. 3, Crossville, TN 38555) lists two brands of stove polish in its catalog: Black Beauty (8 ounces for $1.95) and Presto Stove Polish (6 ounces for $1.30).

Thermometers

To help minimize the buildup of creosote in the stovepipe, it is advisable to install a stack thermometer. After considerable experimentation, stove manufacturers have decided that you should fire your stove so that the stack temperature remains in the 300–400° F range (combustion is more complete and soot and creosote deposits on the inside of the stovepipe and flue are kept to a minimum). The Vermont Woodstove Co., (P.O. Box 1016, Bennington, VT 05201), manufacturer of the Downdrafter, employs thermometers in its stoves and will sell you one for your stove. Condar Co. (Box 264A, Garretsville, OH 44231) sells a Chimgard thermometer for $20.95 which attaches to the outside of the stovepipe by a magnet. This is a most useful device, but you should be aware that once creosote starts building up inside the pipe it tends to act as an insulator. Consequently, you may be firing the stove just as hotly but the thermometer could register lower and lower readings. Do not overfire your stove. Tap your stovepipe with a heavy object. If it gives off a dull thud, chances are you should take it apart and clean it. Up to 15 percent of the stove's usable heat will normally be radiated by the stovepipe. This heat should not be lost up the chimney. Thick layers of creosote also reduce the drafting power of your chimney.

Thermostat

Many wood-burners and manufacturers of modern, airtight stoves do not feel a thermostat is necessary or desirable on a stove. Those who have long used the thermostatically controlled circulating heaters, however, would not be without them. If you are interested in experimenting with a thermostat, Autostat (Howes Cave, NY 12092) offers an automatic thermostat that is supposed to fit Fisher, Jøtul, Lange, Morsø, Tempwood, Reginald, and many other nonthermostatically controlled stoves.

CHAPTER 9

Woodstove Catalog

In the pages that follow, you will find detailed descriptions of a great number of the wood-burning stoves and furnaces available, along with the names and addresses of their manufacturers, distributors, importers, or dealers.

Most of the stoves in each category are listed by brand name in tables which provide specifications for each stove. However, not all specifications are available for each stove; blank spaces in the tables therefore indicate only a lack of information on a particular specification and not an absence of that specification on the stove itself. Similarly, not all stoves in each category are listed in the tables. Specifications for these stoves will be found under the supplier's name.

Each source of supply is numbered, and the number also appears in the first table column after the brand name of the stove. These sources may recur from category to category, and their numbers may accordingly be different because of changes in alphabetical order. You may find a source of supply closer to you because of retail distribution patterns, so you may want to write the manufacturer, importer, or U.S. distributor for the name of a retailer in your area.

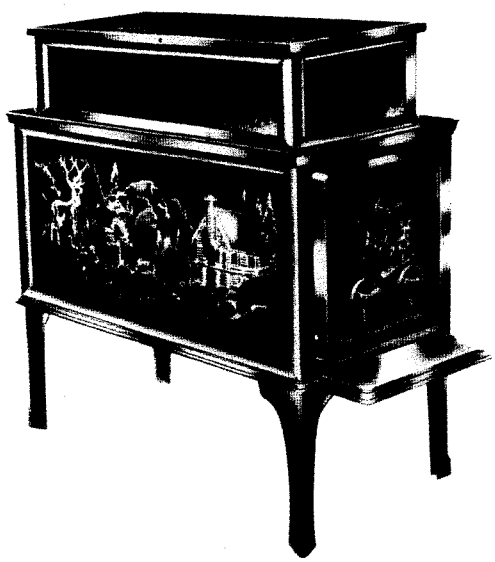


Fig. 1. Woodsman Model 24.

Additional comments are provided for most stoves in order to assist you in matching a stove to your needs. Prices quoted are list, and the latest available as of this writing; by careful shopping you may be able to do better, since competition makes discounts available for many of the stoves mentioned.

Scandinavian-type Box Stoves

1. **Atlanta Stove Works, Inc.** (manufacturer), P.O. Box 5254, Atlanta, GA 30307. The Woodsman (Fig. 1, Table 1) is an American version of the Jøtul 118. It is also manufactured by the Birmingham Stove and Range Co., a sister company of the Atlanta Stove Works, under the name "Nordic." It has three manual draft controls on the front door and a damper-control lever in the back, which is quite unusual for a Scandinavian-type stove. The damper allows the smoke and gases to exit directly instead of around the horizontal baffle, which extends two-thirds of the way to the front of the stove. There are also free-hanging cast-iron liners along the sides. The stove has only 25 parts.
2. **Birmingham Stove & Range Co.** (manufacturer), P.O. Box 2647, Birmingham, AL 35202. The Nordic (Table 1) is also marketed by sister company Atlanta Stove Works, Inc., as the Woodsman Model 24.
3. **Capitol Stove Works of North Carolina** (manufacturer); The Liter Knot (dealer), P.O. Box 1881, Hickory, NC 28601. The Capitol (Fig. 2 and Table 1) has an adjustable steel-plate baffle which forces gases downward toward the fire. Here they meet

Table 1. Scandinavian-type Box Stoves

Brand	Mfr. or source	Size in inches (HWL)	Weight (lbs.)	Firebox size (in.)	Firebrick lined	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Btu per hour	Guaran-tee	Cooking surface	Price
Atlantic No. 224	13	24x21x35	180		no	yes	22		no	yes	yes	5″/top		cast iron			yes	$279
Better 'n Ben's	7	18x18x24	164		no	yes	24	9x13	no	yes		6″		11-gauge steel			yes	$189–$347
Capitol	3	29x19x39		29x21x13	yes	yes	29	17x10	no	yes	yes	6″/back	black	steel plate			yes	$399
Cawley/LeMay 400	4	35x18x36	300	2971 in³	no	yes	19	9½x10½	no	yes	yes	5″/back	stove polish	cast iron		25 yrs.	yes	$475
Cawley/LeMay 600	4	35x18x44	385	4190 in³	no	yes	27	9½x10½	no	yes	yes	5″/back	stove polish	cast iron		25 yrs.	yes	$560
Home Warmer 1	12	34x18x30	300		no	yes	29	10x10	yes	yes	yes	6″/back		steel plate	60,000	lifetime	limited	$449
Home Warmer 2	12	29x16x24			no	yes	23	10x10	yes	yes	yes	6″/back		steel plate	39,000	lifetime	limited	
Independence	21	31x16x36	285	4 ft³	no	yes	28	11½ square	no	yes	yes	7″/top		7-gauge steel	55,000	lifetime	yes	$345
Independence Jr.	21	27x12x30	190	2 ft³	no	yes	22	8½x8½	no	yes	yes	6″/side or back		7-gauge steel	35,000	lifetime	yes	$260
Jøtul 118	9	30x14x29	231		no	yes	24		no	yes	yes	5″/back or side	black or green enamel	cast iron			yes	$440
Jøtul 602	9	25x13x19	117		no	yes	16		no	yes	yes	5″/back or top	black or green enamel	cast iron			yes	$295
Jøtul 606	9	40x12x19	175		no	yes	12		no	yes	yes	5″/back or side	black or green enamel	cast iron			yes	$425
Lange 6203BR	17	41x13x20	213		no	yes	16		no	yes	yes	5″/top	enamel in 5 colors	cast iron			yes	
Lange 6302A	17	34x16x34	272		no	yes	26		no	yes	yes	5″/top	enamel in 5 colors	cast iron			yes	
Lange 6302K	17	50x16x34	370		no	yes	26		no	yes	yes	5″/back	enamel in 5 colors	cast iron			yes (oven)	
Lange 6303	17	37x16x25	220		no	yes	20		no	yes	yes	5″/back	enamel in 5 colors	cast iron			yes	
Lange 6303A	17	23x16x25	145		no	yes	20		no	yes	yes	5″/top or back	enamel in 5 colors	cast iron			yes	
Le Stove	10		427		yes	yes	27		no	yes	yes	back		steel plate		5 yrs.	yes	
Maxi-Heat 2	24					yes	24					back or side		cast iron	44,500		yes	$450
Morsø 1B	20	34x14x30	254		no	yes	22		no	yes	yes	4.7″/top	black or gray enamel	cast iron			yes	$450
Morsø 1BO	20	51x14x30	353		no	yes	22		no	yes	yes	4.7″/top	black or gray enamel	cast iron			yes	$670
Morsø 2B	20	28x13x27	130		no	yes	20		no	yes	yes	4.7″/top	black or gray enamel	cast iron			yes	$325
Morsø 2BO	20	40x13x27	178		no	yes	20		no	yes	yes	4.7″/top	black or gray enamel	cast iron			yes	$450
Morsø 6B	20	24x14x24	168		no	yes	18		no	yes	yes	4.7″/top	black or gray enamel	cast iron			yes	$395
Nashua N18	8	29x20x39	350	3.5 ft³	yes	yes	18	8¾x10¾		yes		6″/back	flat black	boilerplate steel		lifetime	yes	$495
Nashua N24	8	32x25x45	500	5.5 ft³	yes	yes	24	12¾x11¾		yes		6″/back	flat black	boilerplate steel		lifetime	yes	$695
Nashua N30	8	40x31x62	850	15 ft³	yes	yes	30	13¾ square		yes		6″/back	flat black	boilerplate steel		lifetime	yes	$895
Nordic	2	same as Woodsman 24																

Table 1. Scandinavian-type Box Stoves (Continued)

Brand	Mfr. or source	Size in inches (HWL)	Weight (lbs.)	Firebox size (in.)	Firebrick lined	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Btu per hour	Guaran-tee	Cooking surface	Price
Norflame	11	29x14x34		26x12x16	no	yes	26	9¾x11¼	no	yes		4.7"/back, top, side	flat black	cast iron			yes	$450
Quaker Buck	14	34x21x35	455	30x13	yes	yes	30		no	yes	yes	6"/top		steel and cast iron			yes	$489 std. $529 dlx.
Quaker Doe	14	34x21x32	410	27x11	yes	yes	27		no	yes	yes	6"/top		steel and cast iron			yes	$439 std. $479 dlx.
Quaker Fawn	14	34x15x21	350	17x11	yes	yes	15		no	yes	yes	6"/top		steel and cast iron			yes	$389 std. $429 dlx.
Ram	15	30x14x38	250	3.5 ft³	no	yes	28½	10x10	no	yes	yes	5"/back	tile	steel plate	75,000	25 yrs.	limited	
Reginald 101	6	25x12x20	120			yes	16					5"/top or back	matte black	cast iron		2 years	yes	$235 (kit)
Sevca	18	36x17x36	260		no	yes	30			yes	yes	6"/top		steel plate	50,000 to 70,000		no	$280
Solis 6	19	27x18x38	250		no	yes	24	8		yes	yes	5"/top		cast iron			yes	
Sunshine	22	28x14x34	225			yes	24	8x10		yes	yes	6"/back		steel plate			yes	
Trolla 102	11	24x11x17	76		no	yes	12			yes	yes	4"/top or back	green or black	cast iron			yes	
Trolla 104	11	26x13x22	233		no	yes	16			yes	yes	5"/top or back	green or black	cast iron			yes	
Trolla 105	11	25x13x24	178		no	yes	16			yes	yes	5"/top or back	green or black	cast iron			yes	
Trolla 107	11	28x13x31	253		no	yes	24			yes	yes	5"/top or back	green or black	cast iron			yes	
Ulefos	16	23x10x19			refractory bottom	yes	15				yes	3-3/8"/back, top, side		cast iron			yes	$265 to over $1000
Ulefos 172	16	68x13x31	374		refractory bottom	yes	20				yes	5"/back, top, side		cast iron			yes	
Ulefos 864	16	26x13x20	143		refractory bottom	yes	12				yes	5"/back, top, side		cast iron			yes	
Ulefos 865	16	31x14x33	253		refractory bottom	yes	23½				yes	5"/back, top, side		cast iron			yes	
Ulefos 866	16	24x11x19	115		refractory bottom	yes	12				yes	5"/back, top, side		cast iron			yes	
Upland 17	23	27x12x22	125		no	yes				yes	yes	5"/back	flat black	cast iron				$259
Viking 22	5	25x13x19	140			yes	12		no	yes		5"/top or back		cast iron			yes	$230
Viking 33	5	30x14x29	254			yes	24		no	yes		5"/back or side		cast iron			yes	$330
Woodsman 24	1	32x14x32	235	27x11½x20½	no	yes	27	9x10	no	yes	yes	6"/back	matte black	cast iron			yes	$323

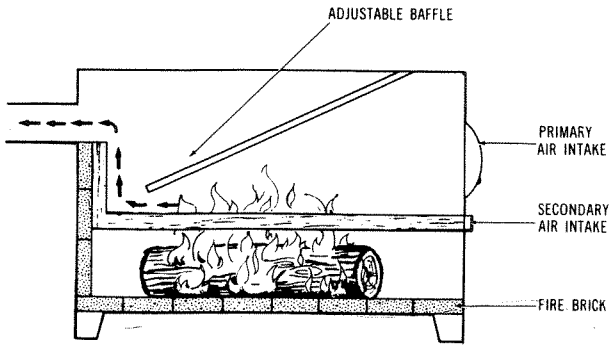


Fig. 2. The Capitol.

preheated secondary air from a tube that extends the length of the firebox. Cast-iron door is hand-fitted "to assure no leaks." One large spin-type draft-control knob.

4. **Cawley/LeMay Stove Co., Inc.** (manufacturer), Box 431, R.D. 1, Barto, PA 19504. The draft-control wheel on the front of the loading door supplies primary and secondary air. Door is hand-fitted, with enameled knobs. The horizontal baffle has an "ignition grid" in front which "acts as a thermal reservoir stabilizing the temperature of the remaining volatile gases and creating a turbulence to thoroughly mix these gases with oxygen, thus aiding secondary combustion," according to the manufacturer. These stoves (Table 1) have unusually large fireboxes, and by reversing interior side baffles, the firebox can be made smaller for periods when much heat is not needed. Each model features a door window to view the progress of the fire. The ash shelf under the loading door is as wide as the stove. The flue is made out of cast iron and rotates to accept stovepipe at any given point within a circle. The sides of each model are deeply embossed with wildlife scenes created by Martha H. Cawley. The cast iron is formulated specifically "for the structural integrity and good thermal qualities required in woodstoves." All joints are tongue-and-groove. There is an optional cast-iron extension shelf on which to set hot pans. In fact, the designers have intended the stoves to be used extensively for cooking by providing two cookplates and a raised edge to keep pots and pans securely on top of the stove.
5. **Colonial Stove Co.** (importer), 275 Circuit St., Hanover, MA 02339. The Vikings (Fig. 3 and Table 1) are similar to the Jøtul Models 602 and 118, respectively. The sides are ribbed for added radiant area, and there is a horizontal baffle.
6. **Garden Way Catalog** (importer), Dept. 303Y3, 1300 Ethan Allen Ave., Winooski, VT 05404. The Reginald has two side cast-iron baffles and one horizontal baffle. Snap-on wire screen is optional. See Fig. 4 and Table 1.
7. **Hayes-TE Equipment Corp.** (manufacturer), Unionville, CT 06085; C & D Distributors, Inc. (distributor), P.O. Box 766, Old Saybrook, CT 06475. Better 'n Ben's (Fig. 5 and Table 1) comes with fireplace cover panel, heat deflector (to protect mantel), adjustable screw-leveler legs, and damper control handle. Options include spark mat, baking oven, broiler grill, ash-removal bucket, see-through screen door for fireplace effect, and poker. Firebox has 45-degree-angle baffle in front of damper.
8. **Heathdelle Sales Associates, Inc.** (distributor), Rt. 3, Meredith, NH 03253. The Nashua models (Fig. 6 and Table 1), manufactured by Metal Building Products, Inc., are massive stoves suitable for a small

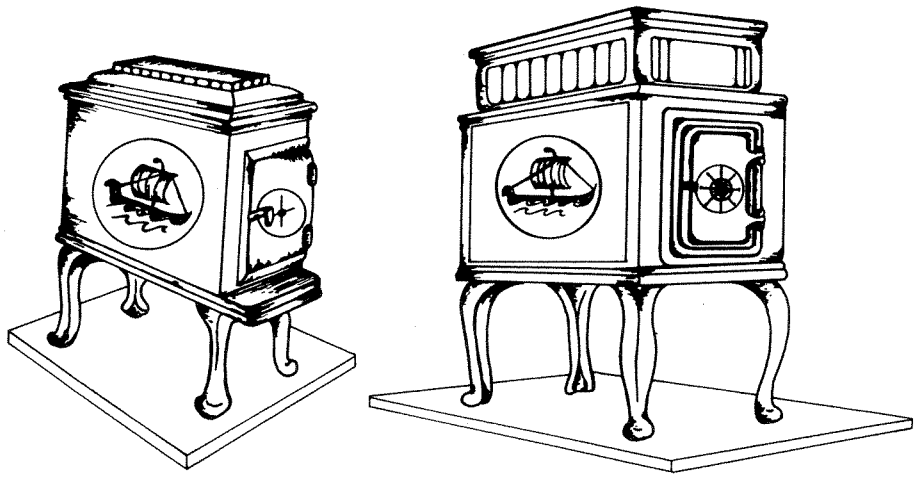


Fig. 3. Viking 22 (left) and Viking 33 (right).

Fig. 4. Reginald 101 box stove.

have horizontal baffle as in the Scandinavian box stoves. Options are safety spark-screen for viewing fire in fireplace mode and duct adapters for central heating capability.

9. **Kristia Associates** (importer), 343 Forest Avenue, Portland, ME 04104. Jøtul stoves (Fig. 7 and Table 1) have set the standard for the entire wood-burning industry for quality construction, efficiency, and beauty. They come with horizontal and side baffles. Sides are embossed with North Woods scenes by recognized Norwegian artists.
10. **The Liter Knot** (distributor), P.O. Box 1881, Hickory, NC 28601. Le Stove (Fig. 8 and Table 1) will hold 50 pounds of wood. Levelers are affixed to legs. This model is patterned after the Jøtul 118.
11. **Lyons Supply Co., Inc.** (importer), One Perimeter Rd., Manchester, NH 03108. There are other sizes of the Norflame (Table 1) imported from West Germany, but the specifications are not immediately available. It has iron side-baffles, each in two sections, and one top baffle (horizontal) as in Scandinavian stoves.

    Trolla stoves (Table 1) each have a *Peer Gynt* scene embossed on the side by Norwegian sculptor Oscar Lyman. Trolla also makes Models 108 and 103, and a Model 800 freestanding fireplace/stove.
12. **New Hampshire Wood Stoves., Inc.** (manufacturer), P.O. Box 310, Fairgrounds Rd., Plymouth, NH 03264. The Home Warmers (Fig. 9 and Table 1) feature a preheated primary and secondary air supply. First horizontal baffle above fire functions as in the Scandinavian stoves; the remainder are actually a form of heat exchanger.
13. **Portland Stove Foundry Inc.** (manufacturer), 57 Kennebec St., Portland, ME 04104. The Portland

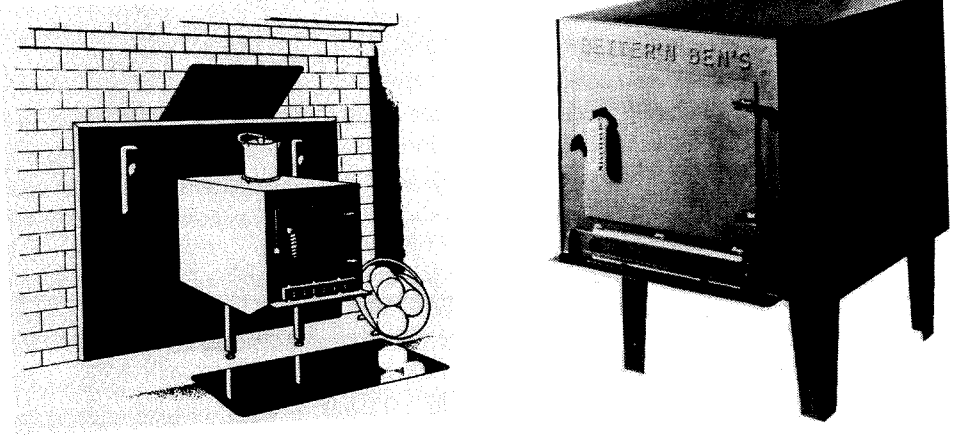


Fig. 5. Better 'n Ben's fireplace stove (left) and freestanding stove (right).

home (N-18), large home (N-24), or business (N-30). They all come with blower, which forces hot air through a patented manifold inside the firebox (back and sides). Hot air comes out each side. Blower capacity and manifold size are mathematically matched for most efficient results. All models

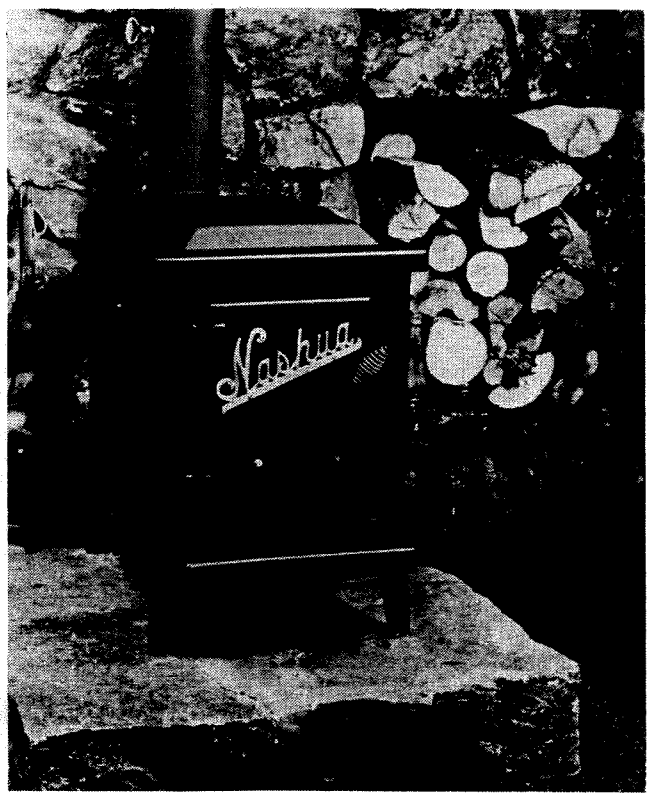


Fig. 6. Nashua box stove.

Stove Foundry has been building stoves for over 100 years, but only recently, during the new woodstove craze, have they begun to make efficient airtight models such as the Atlantic 224 with Scandinavian-type baffle (Fig. 10 and Table 1). These stoves are hand-filed, precision-fitted, and asbestos-gasketed to seal "bank-vault tight." The door has a preheating chamber and distributes the air for primary and secondary combustion. Inside the stove are "uniquely recessed panels" which, according to the manufacturer, eliminate the need for liners or firebrick. The embossed cathedral outside panels are not only attractive but add surface area for more radiation. These stoves are very much in demand, no doubt due to the bargain price for a quality stove. Not many efficient, well-made stoves are priced under $300.

14. **Quaker Stove Co.** (manufacturer), P.O. Box 41, Line Lexington, PA 18032. Deluxe Quaker models have brass detail and a glass window for viewing the fire. Door and faceplate have asbestos gaskets for a tight seal, and there is a preheat chamber on the back of the door which distributes primary and secondary air. C & L Rennels designed the stoves (Fig. 11 and Table 1).
15. **Ram Forge** (manufacturer), Brooks, ME 94921. The Ram (Table 1) comes with a rake and a shovel with 36-inch handle. The body of the stove is finished with 32 handpainted tiles.

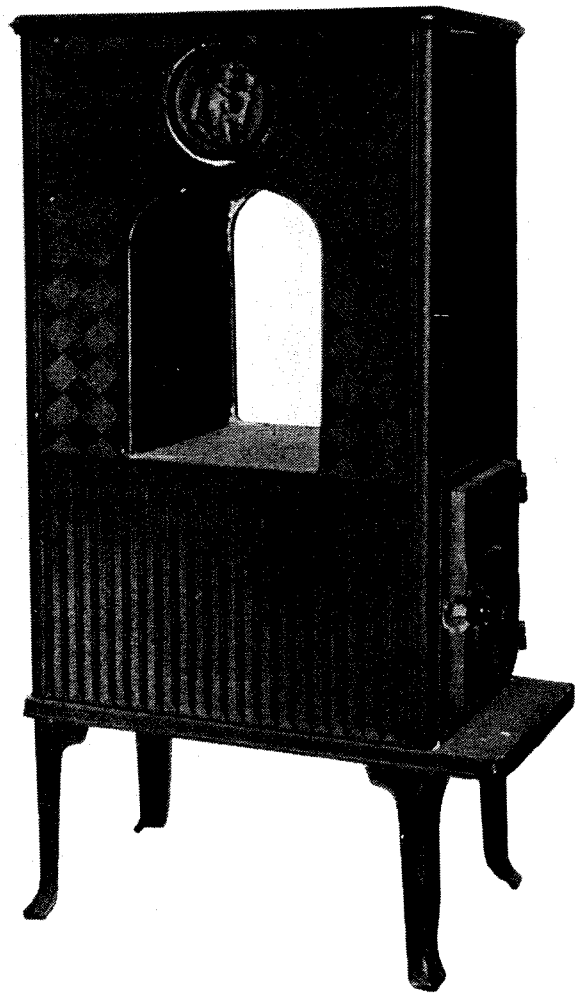


Fig. 7. Jøtul 606 box stove.

16. **Scandia Wood Stoves** (importer), P.O. Box 235, Lahaska, PA 18931. Each Ulefos model has cast-iron side baffles as well as a horizontal baffle (Fig. 12 and Table 1). Sides are embossed with a scene of two fishermen casting a net. A special decorating cover can be supplied at additional cost. Ulefos No. 172 is perhaps the only double-arch model made. It stands 5 feet 8 inches tall.
17. **Scandinavian Stoves, Inc.** (importer), Box 72, Route 12-A, Alstead, NH 03602. L. Lange & Co. of Svendborg, Denmark, have been building stoves for 125 years. These are of the same high quality and beauty as other Scandinavian models, but the rounded sides of Lange models (Fig. 13 and Table 1) give increased radiating surface and strength. Lange also offers a wider variety of colors than other companies. The 6303A is a small model with-

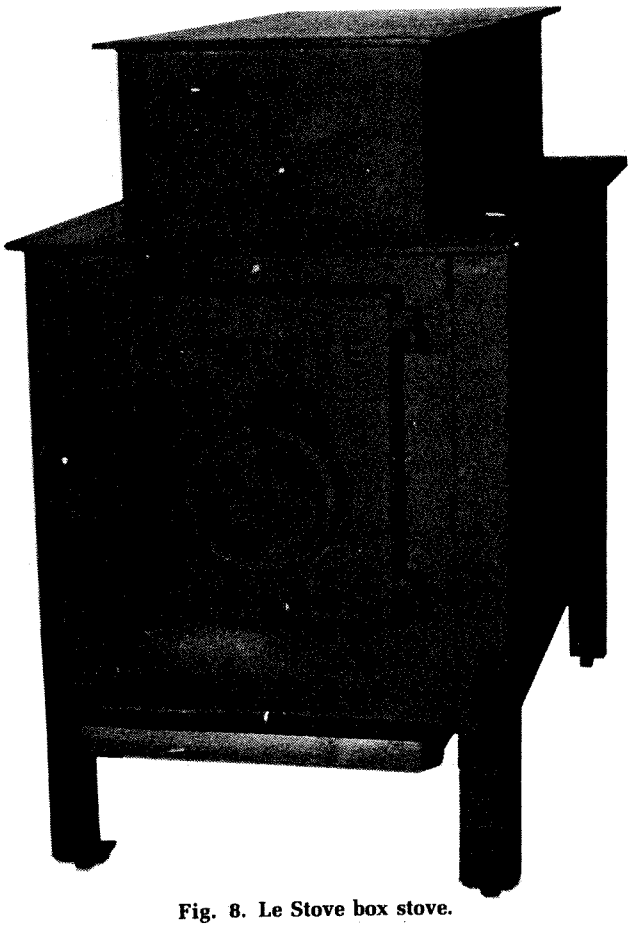


Fig. 8. Le Stove box stove.

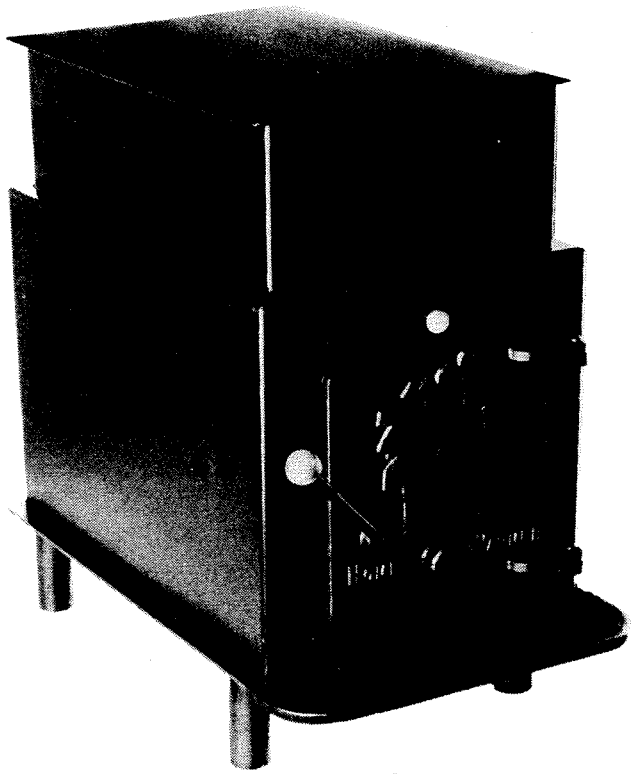


Fig. 9. Home Warmer box stove.

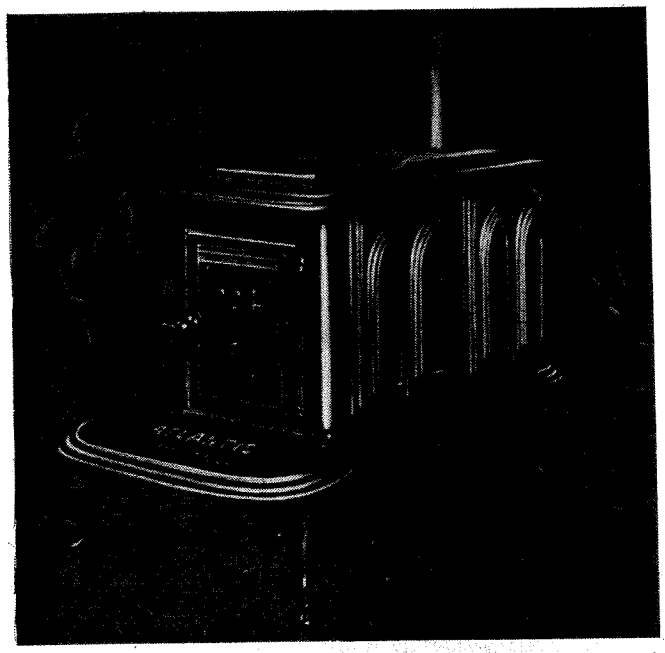


Fig. 10. Atlantic No. 224 box stove.

out the usual baffle, although its counterpart with the heat-exchanger arch, the 6303, does have a horizontal baffle in the top part of the arch itself for an increased flame-path and more radiation. The larger 6302A box stove and its counterpart with the arch, the 6302K, have the baffle connected to the front of the stove so that the flames travel accross the entire stack of wood and exit into the upper chamber at the back of the stove in the reverse of traditional Scandinavian design. The 6203BR is a cast-iron version of the European tile stove with an embossed leaf-and-flower pattern all around the sides. It is relatively short, taking only 16-inch logs, but the firebox is tall and baffled so that it is rated the same in heating power as the arch-model 6303. The built-in oven in 6302K is one of the most useful features found on any stove, and it in no way detracts from the beauty of the stove. The Lange stoves are priced competitively with other Scandinavian imports.

18. **Sevca** (manufacturer), Box 396, Bellows Falls, VT 05101. The Sevca (Fig. 14 and Table 1) was designed and built by members of the Southeastern Vermont Community Action group, a private, non-profit corporation receiving money from the Community Services Administration to assist low-income people. The Sevca, in tests conducted at Williams College, achieved higher efficiency than any other stove. A smaller stove "for parlor situations" is available. A domestic hot-water coil can be installed in the stove's upper chamber. This stove has the same flow-pattern and baffle arrangement as the

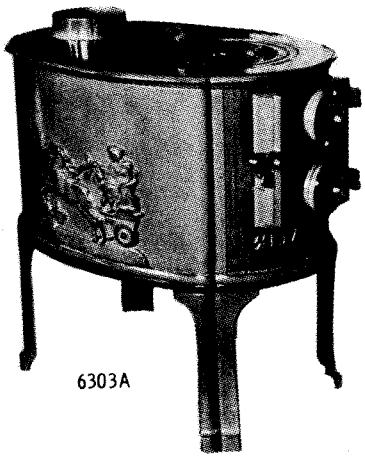
Fig. 11. Quaker Stove's "Buck" box stove.

Lange 6302K, and is constructed of recycled propane tanks.

19. **Solis Energy Works** (manufacturer), Box 262A, RD 1, New Hope, PA 18938. The Solis (Fig. 15 and Table 1) is patterned after the Shaker box stoves, except that its heat exchanger and baffle design make it burn as a Scandinavian-type stove. The sides, back, front, and top are all cast in one piece for airtightness. Each draft knob has its own preheating chamber. The horizontal baffle is a long trough which allows heat to touch all sides of it. Each stove is hand-fitted, has a mica window, and hardwood doorknob.
20. **Southport Stoves,** Division of Howell Corporation (importer), 248 Tolland St., East Hartford, CT 06108. The Morsø cast-iron stoves (Fig. 16 and Table 1) have been made since 1853 by N.A. Christensen Co. of Denmark. Many of their early designs are now in art museums. The iron is cast in molds showing a squirrel on the sides of each stove. The plates are then finished with vitreous enamel. Doors are hand-filed for an airtight fit so that no asbestos gasket is needed. Along with Jøtul and Lange, they represent the best of Scandinavian design, quality, and craftsmanship. All Morsø stoves come with poker, two pieces of 18-gauge enameled stovepipe, one 90-degree elbow, and a wall thimble. Eighteen-gauge, incidentally, is very thick stovepipe. The 1BO and 2BO models with arches are among the most efficient stoves available. Six-inch legs are available as an option for fireplace installation. Standard are 14-inch legs which, along with one inch of ashes or sand in the bottom of the stove, give ample clearance for the stove to be set on most any non-combustible surface (hearth).

Fig. 12. Ulefos No. 172 (left) and No. 864 (right).

21. **The Stoveworks** (manufacturer), Box 172, Marlboro, VT 05344. Both Independence models (Fig. 17 and Table 1) can be fitted with soapstone slabs to convert the stoves to a convection heater. Optional also is a hot-water coil mounted inside the firebox. Scandinavian-type baffles are standard.
22. **Sunshine Stove Works** (manufacturer), RD1, Box 38, Norridgewock, ME 04957. See Table 1.
23. **Upland Stove Co., Inc.** (manufacturer), P.O. Box 87, Greene, NY 13778. The Upland (Fig. 18 and Table 1) is a near-replica of the Jøtul 602.
24. **Warmglow Products, Inc.** (distributor), Liberty Foundry Co., 7600 Vulcan St., St. Louis, MO 63111. The Maxi-Heat 2 (Table 1) is patterned after the Jøtul 118.



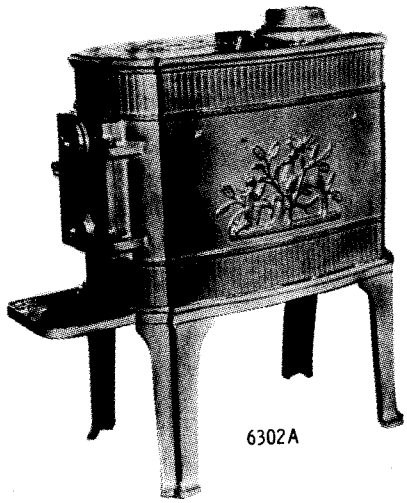
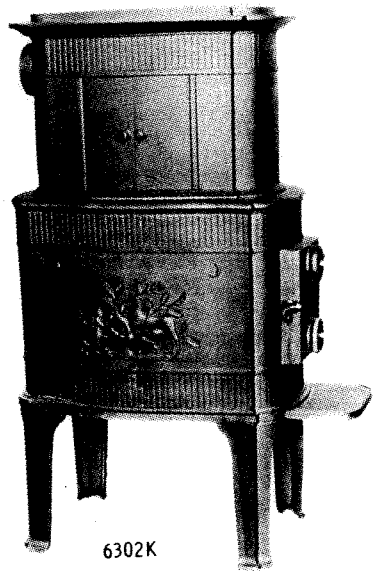
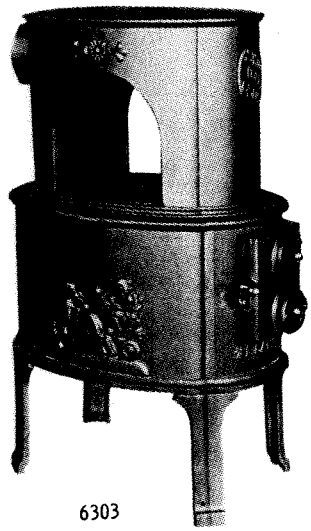
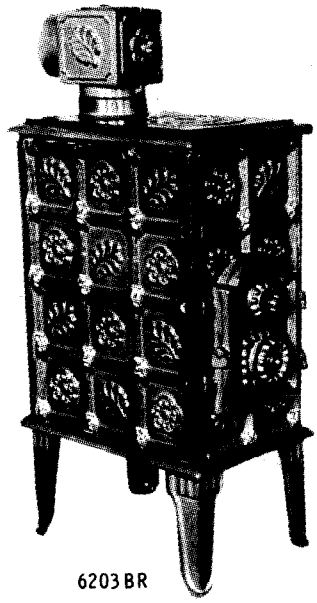


Fig. 13. Lange of Denmark box stoves.







Potbellies and Other Traditional Stoves

1. **Abundant Life Farm** (manufacturer), P.O. Box 63, Lochmere, NH 03252. The low height of the flue collar will allow easy installation of the Comforter (Fig. 19 and Table 2) in most fireplaces. Malleable iron is used at special stress points, and it is heat-treated to prevent cracking or warping. The door has a gasket and a "secure-lock latch." A 45-degree baffle with venturi creates a long flame-path and secondary combustion chamber. The air supply is preheated and directed by channeled heat fins.
2. **Atlanta Stove Works, Inc.** (manufacturer), P.O. Box 5254, Atlanta, GA 30307. The top of each Atlanta box stove swings open for loading large logs. See Table 2 for specifications.
3. **Birmingham Stove & Range Co.** (manufacturer), P.O. Box 2647, Birmingham, AL 35202. The Birmingham Model 27 box stove (Table 2) is also marketed by sister-company Atlanta Stove Works as their Model 27.

   Cumberland General Store (Route 3, Box 479, Crossville, TN 38555) is distributor for Birmingham's Baron 21 cannon-type potbelly wood/coal stove which has an optional steel drum mounted on top of a cast-iron potbelly stove for burning wood. The Baron measures 45½ inches high without the drum and 63½ inches with it, has a firepot 17¾ inches in diameter, and weighs 285 pounds. It is priced at $334 with drum, and $322 without.
4. **Calcinator Corp.** (manufacturer), 28th and Water Streets, Bay City, MI 48706. Box stove made of sheet steel.
5. **Colonial Stove Co.** (importer), 275 Circuit St., Hanover, MA 02339. Supplies Taiwan-made parlor, Franklin, and box stoves (two models), all of cast iron, and accessories. Also handles Scandinavian-type box stoves and a freestanding fireplace/stove.

Table 2. Traditional Box Stoves and Parlor Stoves

Brand	Mfr.	Size in inches (HWL)	Weight (lbs.)	Firebox size (in.)	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Flue size & location	Body material	Cooking surface	Price
Atlanta 27	2	26x12x14	115	20x9x13	no	no	24	9x9	no	yes	6" / top back	cast iron	yes	
Atlanta 32	2	27x13x15	125	22x11x14	no	no	27	10x10	no	yes	6" oval / top back	cast iron	yes	$138–$175
Birmingham 27	3	same as Atlanta 27												
Colebrookdale	21	31x14x30	175								5"	cast iron	yes	$317
Enterprise 25	9	21x15x33	125			no					top	cast iron	yes	$160
King 624	11	23x30 (HL)	102		no	no	23				6"	cast iron	yes	$123
King 628	11	24x33 (HL)	123		no	no	26				6"	cast iron	yes	$144
King 632	11	25x37 (HL)	132		no	no	30				6"	cast iron	yes	$156
Parlor Stoves														
Comforter	1	26x25x20	250		no	yes	20	8x12	no	yes, plus secondary	6"/back	cast and malleable iron	yes	$498
Home Atlantic	19	35x26x23	175–225		no	yes	"whole logs"		no		6"/back	cast iron	yes	$495
Radiant 22	19	30x28x19			no	no			no		6"/back	cast iron	yes	$349

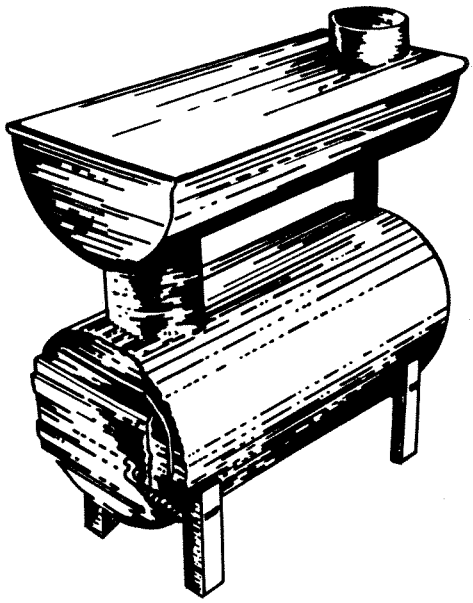


Fig. 14. Sevca stove.

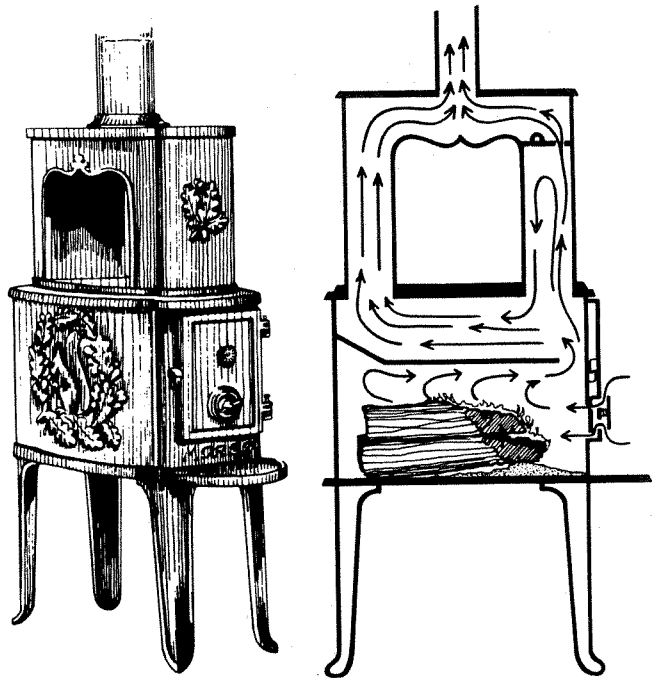


Fig. 16. Morsø Model 1BO box stove (left) showing smoke flow-pattern and baffle system (right).

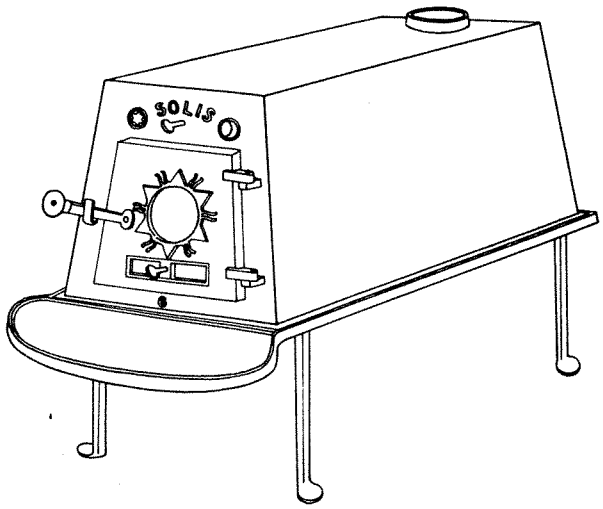


Fig. 15. Solis 6 box stove from Solis Energy Works.

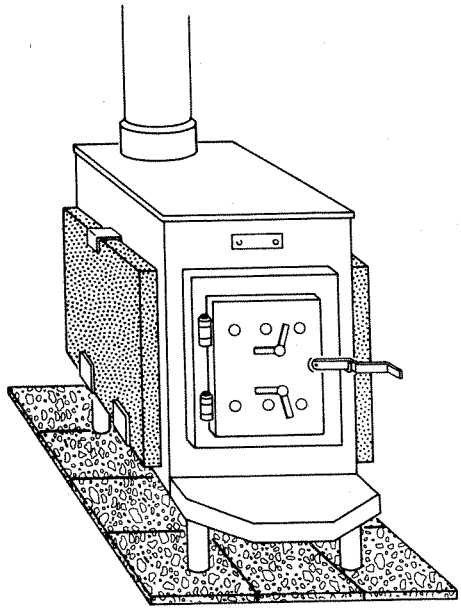


Fig. 17. Independence box stove with soapstone slabs.

6. **Columbia Stove Co.,** Division of Empire Firebrick Co., Inc. (manufacturer), 219 Murray St., Fort Wayne, IN 46803. Makes a box stove, Model CSW-2.
7. **Country Catalog** (distributor), Sebastopol, CA 95472. Supplies Sun potbellies.
8. **Edison Stove Works** (manufacturer), 469 Raritan Center, Edison, NJ 08817. Makes two models of potbelly stoves, priced at $60 and $80.
9. **Enterprise Foundry Co., Ltd.** (manufacturer), Sackville, New Brunswick, Canada. See Table 2 for specifications.
10. **Hearthcraft, Inc.** (manufacturer), P.O. Box 20584, 10035 N.E. Sandy Blvd., Portland, OR 97220. Makes a box stove, a potbelly, and a parlor stove.
11. **King Stove & Range Co.** (manufacturer), Box 730, Sheffield, AL 35660, or King Products Division, Martin Industries, Box 128, Florence, AL 35630. See Table 2 for products.
12. **Logger Stove Corp.** (manufacturer), 16736–38 Oakmont Ave., Gaithersburg, MD 20760. Makes Franklin-style fireplace.

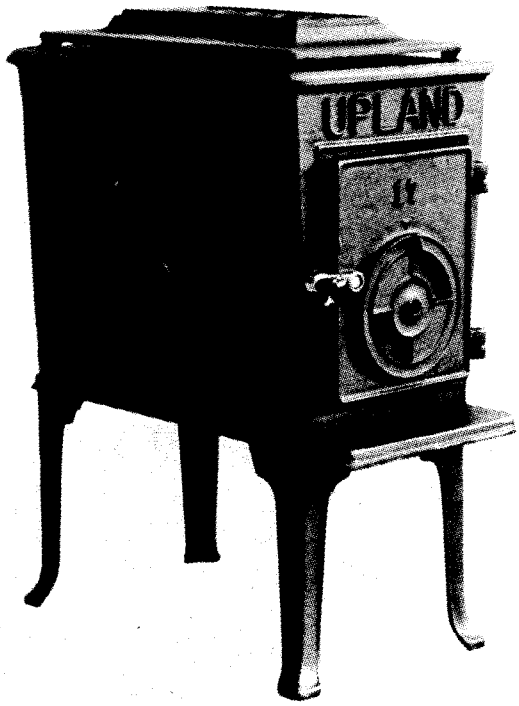


Fig. 18. Upland No. 17 box stove.

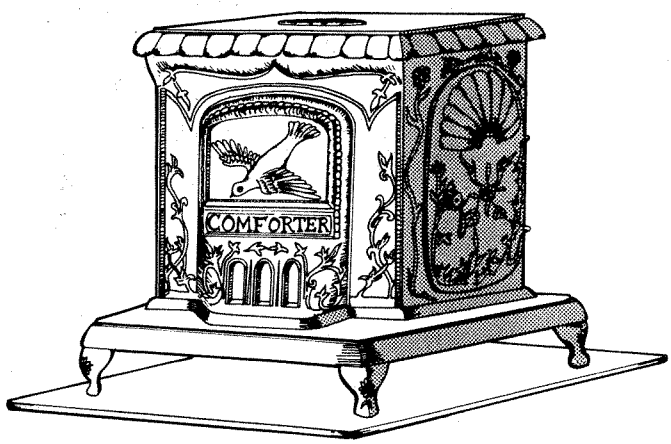


Fig. 19. The Comforter parlor stove.

13. **M & M Manufacturing Sales** (manufacturer), 929 S.W. 29th St., Oklahoma City, OK 73109. Makes a Franklin fireplace guaranteed for five years and supplied with fire screen, reducer, barbecue grill, and bean pot. Price: $169.99.
14. **Malm Fireplaces, Inc.** (manufacturer), 368 Yolanda Ave., Santa Rosa, CA 95404. Franklin-type fireplace.
15. **Midwest Sales Co.** (distributor), P.O. Box 607, Herrin, IL 62948. Supplier of traditional-style cast-iron Franklins, box stoves, parlors, and potbellies.
16. **Monarch Range Co.,** Division of Malleable Iron Range Co. (manufacturer), Beaver Dam, WI 53916. Makes two models of Franklin-type fireplaces.
17. **Montgomery Ward & Co.** (distributor), 6200 St. John Ave., Kansas City, MO 64123. Traditional-style parlor, potbelly, and box stoves, imported from Japan and Taiwan, available through their catalog or from their retail stores.
18. **Old Stove Co.** (manufacturer), Box 7617, Dallas, TX 75209. Makes cast-iron potbelly, box, and other traditional stoves.
19. **Portland Stove Foundry, Inc.** (manufacturer), 57 Kennebec St., Portland, ME 04104. The Home Atlantic (Fig. 20 and Table 2) is possibly the only nearly airtight traditional parlor stove on the market. Now, with the introduction of a patented smoke chamber with "built-in draft," it achieves an efficiency comparable to or better than most of the modern stoves. If nostalgia simply overtakes you, then this is the stove to buy. With the Smoke Guard it is supposed to maintain a burn up to 12 hours on one load. Another attractive feature is the ability to load it from the top, front, or side. Less splitting is thus required.

Fig. 20. Home Atlantic parlor stove.

Fig. 21. Colebrookdale Furnace, by UMCO.

The Radiant (Table 2) is perhaps more attractive, but less efficient than the Home Atlantic.

20. **Sears, Roebuck and Co.** (distributor through catalog or local retail stores). Supplies traditional-style steel or iron box stoves.
21. **UMCO/Union Manufacturing Co., Inc.** (manufacturer), Sixth & Washington Streets, Boyertown, PA 19512. Makes seven sizes of potbellies, the Victory and UMCO models, and the Colebrookdale Furnace. UMCO is one of the leading cast-iron foundries in the country. They cast the stove plate for Specialty Manufacturing Company's "Puritan" stove, for Quaker Stove Co., Cawley/LeMay Stove Co., Vermont Castings Inc., and Upland Stove Co., among others. The Colebrookdale Furnace (Fig. 21 and Table 2) is a cast-iron replica of a stove made at the Colebrookdale Furnace, Ironside Creek, Pennsylvania. It was originally a "ten-plate" stove, and could have been the first manufactured in the colonies to have an oven. The side plate on the present model is merely embossed with an oven door.
22. **United States Stove Co.** (manufacturer), South Pittsburg, TN 37830. Makes a Franklin and a steel box stove.
23. **Washington Stove Works** (manufacturer), Box 687, Everett, WA 98206. Maker of traditional-style potbelly, parlor, box, camping, barrel, and Franklin stoves.
24. **Whole Earth Access Co.** (importer/distributor), 2466 Shattuck Ave., Berkeley, CA 94704. Supplier of traditional-style Franklins, parlors, and potbellies (cast-iron).
25. **Wood Heat** (importer), Route 212–Pleasant Valley, Quakertown, PA 18951. Supply an old-fashioned–type cast-iron box stove, a laundry stove, a potbelly, and a parlor stove, all made in Taiwan.

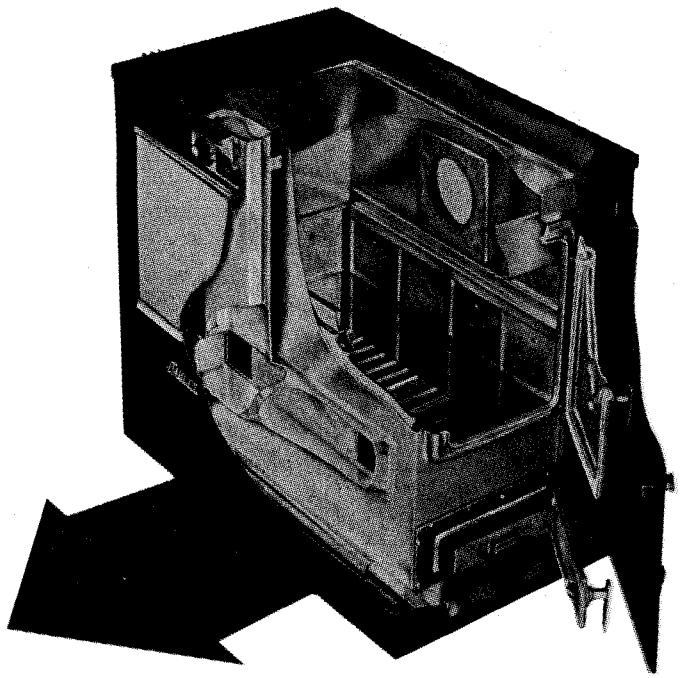


Fig. 22. Cutaway view of Ashley circulating heater, showing interior construction.

Automatic Circulating Heaters

1. **Ashley Products Divison** (manufacturer), Martin Industries, P.O. Box 730, Sheffield, AL 35660. See Fig. 22 and Table 3. Cabinet has gold accent trim and gold mesh grill. Automatic blower is optional, as is patented "draft equalizer." Model C-60 holds 100 pounds of wood, the C-62, 50 pounds at one filling. Downdraft system preheats primary air and distributes it through two intake ports at the level of the grates. Secondary-air intake is automatic and near flue collar. Large ash drawer is accessible through the double-wall cabinet door.

Ashley also makes two coal-burning models, the Cameron 1500B and 6150B, with nearly similar dimensions to the wood heaters. They will also burn wood but are designed for coal, and list for $315 and $460, respectively. The four Ashley units mentioned

Table 3. Automatic Circulating Heaters

Brand	Mfr. or source	Size in inches (HWL)	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Btu per hour	Cooking surface	Price
Ashley Compact C-62	1	36x28x21	223	19″x13″x20″	no	yes	18	13-3/8x9-3/4	yes			6″/back	baked enamel	steel and cast iron		yes	$390
Ashley Imperial C-60	1	36x35x21	242	27″x14″x23″	no	yes	24	13-3/8x9-3/4	yes			6″/back	baked enamel	steel and cast iron		yes	$445
Autocrat FF76	3	34x32x22	245	25″x14″x20″	no	yes	25	25x10	yes	no	no	6″/back	enamel	steel and cast iron		no	$312 to $390
Brown BWK724-A	5	32x35x22	225				18–24	11-3/4x11	yes			6″		steel and cast iron			$250
Coalmaster C6-78	13	36x22x30	225	11″x20″x25″	yes	yes	24	10x12	yes	yes		6″/back	silicone	steel and cast iron		yes	$280
Combustioneer 65	15	37x32x22	335		yes	yes			yes			back	walnut finish	steel and cast iron	45,000 to 65,000		$269 to $349
Homesteader 240	2	33x32x19	240	12″x20″x25″	no	yes	24		yes	no		6″/back	baked enamel	steel and cast iron		yes	
Homesteader 240DG	2	33x32x19	260	12″x20″x25″	yes	yes	24		yes	no		6″/back	baked enamel	steel and cast iron		yes	
King 7801-B	7	32x33x31	215	18″x25″x14″	yes	yes	25		yes	no		6″/back	porcelain enamel	steel and cast iron		yes	
Monarch CR-24D	9	35x32x20	260	19″x20″x10″	no	yes	20	21-1/4x9-3/4	yes			6″/back		steel and cast iron			$320
Riteway 37	10	40x24x33	375	7½ ft³	yes	yes	24	12x12	yes	no	yes	6″/back	3 colors	steel and cast iron	73,000	no	$425 cabinet $141
Riteway 2000	10	33x21x33	215	4 ft³	no	yes	24	12x12	yes	no	yes	6″/back	3 colors	steel	50,000	no	$295 cabinet $120
Sears 42H84065N	11	32x19x33	237	24″x10″x24″	no	yes	24		yes	no		6″/back	enamel	steel and cast iron		no	$225
Shenandoah R-76	12	36x24x35	280–305	23″x26″x15″	yes	yes	25		yes	yes		6″/back	porcelain	steel and cast iron		no	$338
Shenandoah R-76L	12	33x21x29	215–244	23″x26″x15″	yes	yes	25		yes	yes		6″/back	no cabinet	steel and cast iron		no	$255
Shenandoah R-77	12	33x18x32	210–240	23″x26″x15″	yes	yes	25		yes	yes		6″/top	no cabinet	steel and cast iron		no	$252
Surdiac Gotha 511	16	34x39x17	315		no	yes			yes			5″/back	enamel	stainless steel and cast iron	43,670	yes	$950
Surdiac MCK 508	16	28x28x18			no	yes			yes			5″/back	enamel	stainless steel and cast iron		yes	$685
Surdiac MCK 512	16	28x31x17	290		no	yes			yes			5″/back	enamel	stainless steel and cast iron	43,670	yes	$786
Surdiac MCK 516	16	28x36x17	377		no	yes			yes			5″/back	enamel	stainless steel and cast iron	57,565	yes	$860
Valley Comfort C26	6	35x28x22	170	4½ ft³	stainless steel	yes	18	10x11	yes	no	yes	6″/back					
Valley Comfort C31	6	35x34x22	195	6 ft³	stainless steel	yes	24	10x11	yes	no	yes	6″/back					
Warm Morning 701	8	33x36x18	290		yes	yes	26	10x14	yes	no	yes	6″/back	porcelain enamel	steel and cast iron		no	$512
Wondercoal 2607	14	33x19x32	260		yes	yes	24	10x12	yes			6″/back	wood-grain metal	steel and cast iron			
Wonderwood 2600	14	33x19x32	210		yes	yes	24	10x12	yes			6″/back	wood-grain metal	steel and cast iron			$282
Woodmaster W6-78	13	36x22x30	225	11″x20″x25″	yes	yes	24	10x12	yes	yes		6″/back	silicone	steel and cast iron		yes	$280

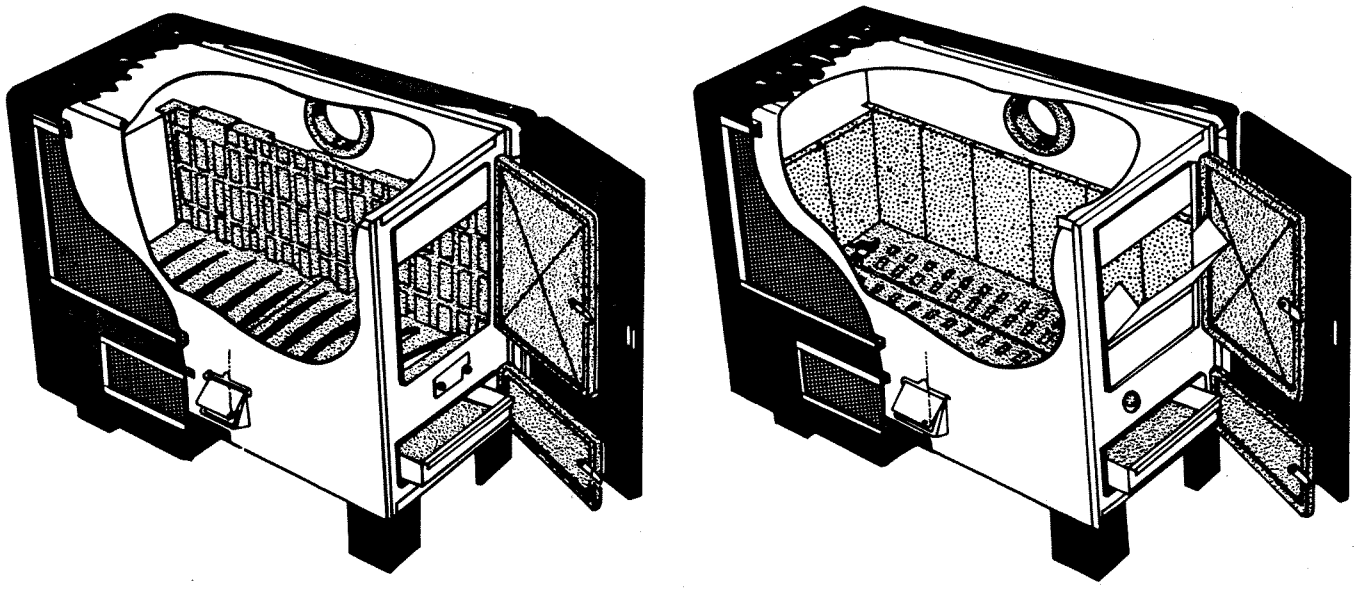


Fig. 23. Cutaway views of Homesteader circulating heaters, Model 240 (left) and Model 240DG (right).

here are available at discount. See also the section on radiant sheet metal stoves for two further models made by Ashley.

2. **Atlanta Stove Works, Inc.** (manufacturer), P.O. Box 5254, Atlanta, GA 30307. Coal-burning Homesteader model (240DG) has specially designed duplex grate, which will also burn wood. Both models (Fig. 23 and Table 3) have double bottom, 4-inch legs, and an aluminized steel slide-out ash pan. Loading door for 240DG has a coal chute which swings down for easy loading. Manual or automatic blower optional.
3. **Autocrat Corp.** (manufacturer), Illinois & Benton, New Athens, IL 62264. The Autocrat FF76 (Fig. 24 and Table 3) has 25-inch wide front loading door and a full-width ash pan and smoke curtain. The cabinet top is insulated to project heat to the front. Heater bottom is also insulated with dead-air space. Model comes with two sections of blued steel fluepipe with built-in damper and heat shields attached. Blower is optional.

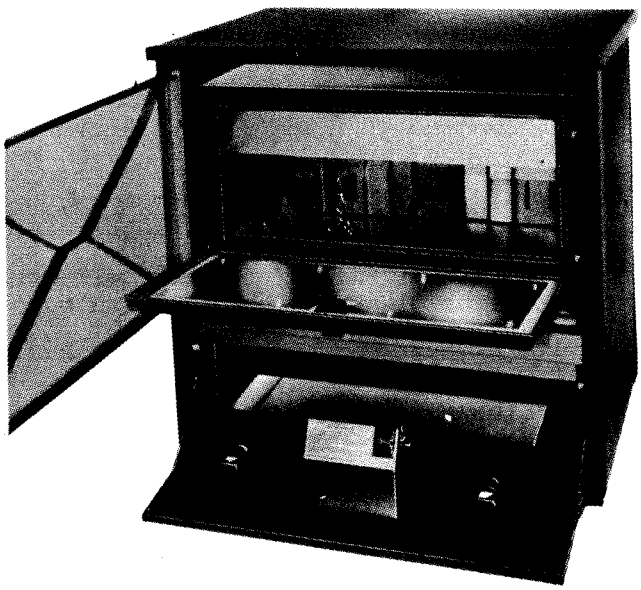


Fig. 24. Autocrat Model FF76 automatic circulating heater.

4. **Bellway Manufacturing Co.** (manufacturer), Grafton, VT 01546. Bellway makes three models of heaters that take 24-inch logs and cost from $595 to $795. See also the section on furnaces.
5. **Brown Stove Works** (manufacturer), Cleveland, TN 37311. See Table 3.
6. **Hunter Enterprises Orillia, Ltd.** (manufacturer), 1 Colborne St. West, P.O. Box 400, Orillia, Ontario, Canada L3V 6K1. Blower optional on both models. Valley Comfort's flow pattern similar to that of the Riteway heaters. Nonelectric or electric thermostat controls damper. See Fig. 25 and Table 3.
7. **King Stove & Range Co.** (manufacturer), Box 730, Sheffield, AL 35660. The King's loading and ash doors are lined with asbestos gaskets for an airtight seal. Blower and "draft equalizer" optional. See Fig. 26 and Table 3.
8. **Locke Stove Co.** (manufacturer), 114 W. 11th St., Kansas City, MO 64105. An electric blower is offered as an option on the Warm Morning (Fig. 27 and Table 3). The thermostat controls the primary draft, and the cabinet is finished in dark brown. Discounts are available.
9. **Monarch Range Co.,** Division of Malleable Iron Range Co. (manufacturer), Beaver Dam, WI 53916. Monarch's cast-iron flue deflector prevents heat-loss through chimney, and its insulated top diverts heat to

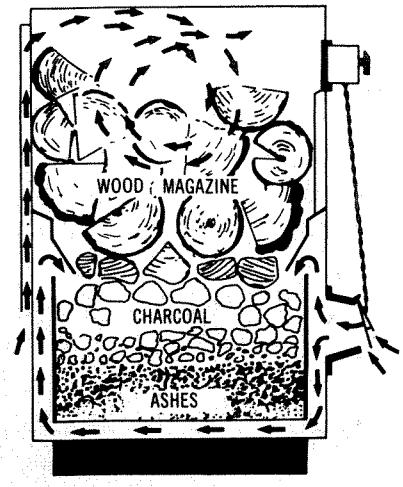


Fig. 25. Valley Comfort automatic circulating heater, showing flow-patterns.

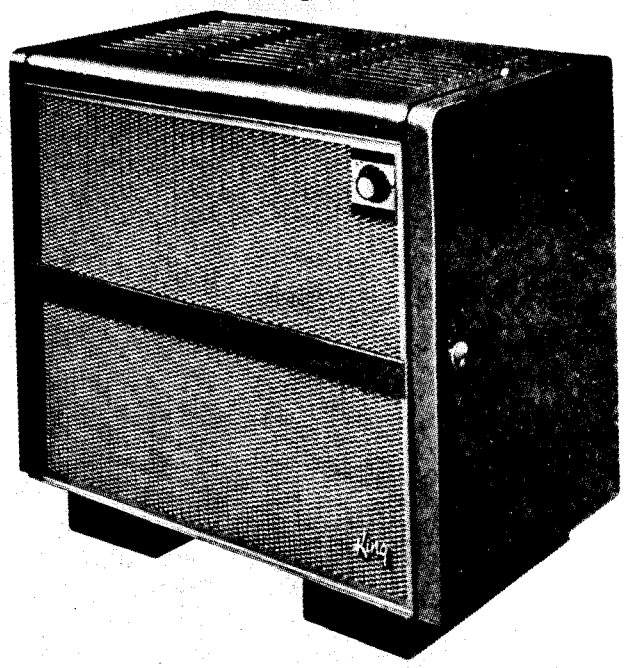


Fig. 26. King Model 7801-B automatic circulating heater.

the floor. The front loading door holds fuel (wood or coal) while loading. Spark and smoke shields are standard. Blower kit optional ($60). See Table 3.

10. **Riteway,** Division of Sarco Corp. (manufacturer), P.O. Box 6, Harrisonburg, VA 22801. Each model comes with magnetic damper, Riteheat Regulator, poker, and ash pan. Model 37 (for wood or coal) comes with a grate shaker. The Riteway heaters (Fig. 28 and Table 3) have been traditionally recognized as among the most efficient stoves on the market. This is due to their unique principles of downdraft and secondary combustion. Primary air enters under the firebox and travels upward around the sides, becoming heated in the process. A special secondary-air chamber on the

Fig. 27. Warm Morning Model 701 automatic circulating heater.

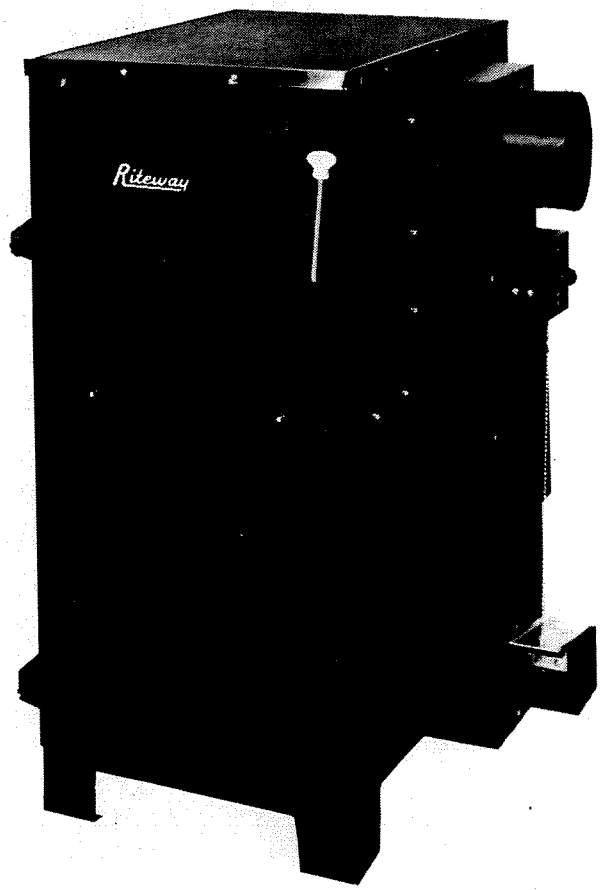


Fig. 28. Riteway Model 37 automatic circulating heater.

back also heats the entering air for secondary combustion of gases and smoke. A considerable amount of turbulence in the firebox aids complete combustion before the gases are forced down through the coals and up into the secondary combustion flue before

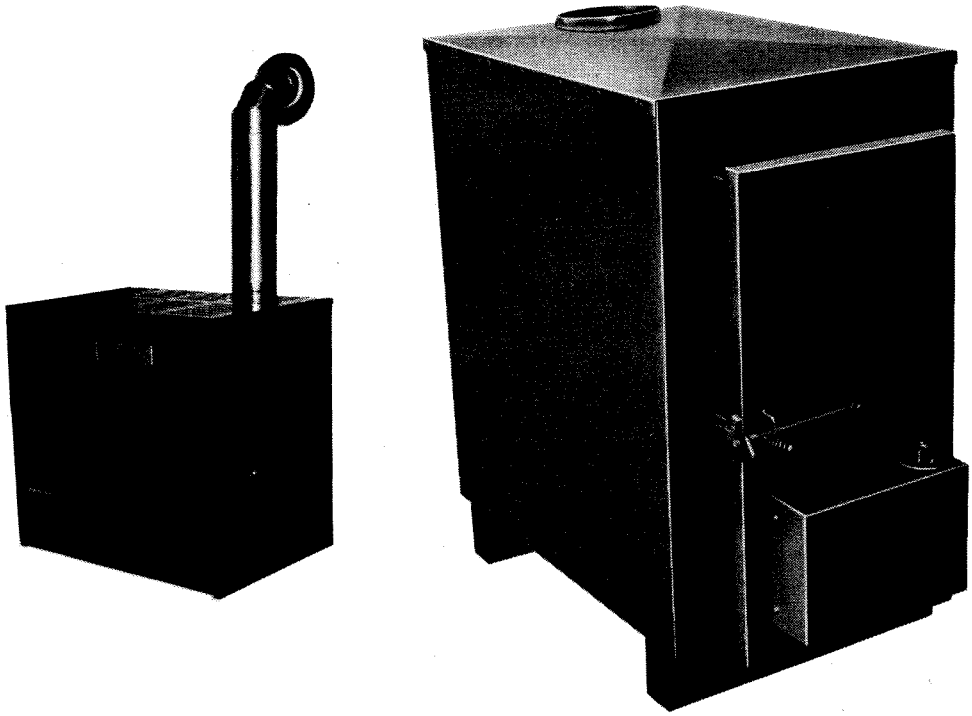


Fig. 29. Shenandoah Models R-76 (left) and R-77 (right).

Fig. 30. Woodmaster automatic circulating heater.

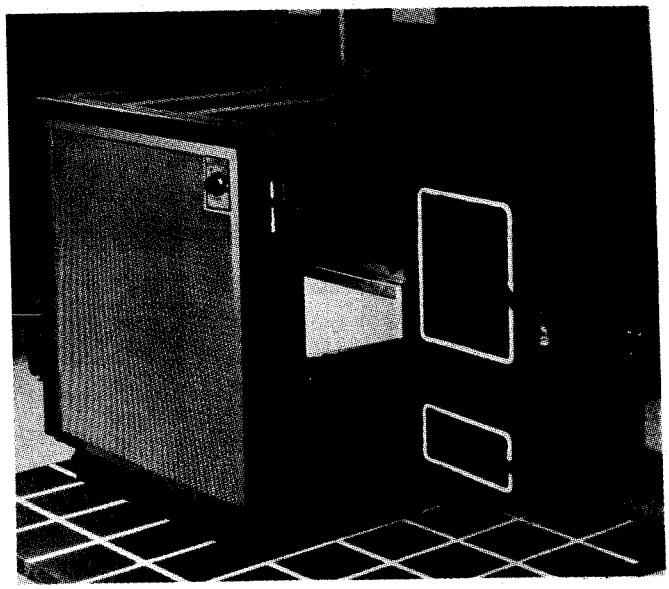


Fig. 31. U.S. Stove's Wonderwood.

leaving the stove. Cabinets are finished in mahogany-and-gold or black-and-gold.

11. **Sears, Roebuck & Co.** (distributor through catalog or local retail stores). Options include blower, stove board, chimney kit, and stovepipe. See Table 3. Cabinet finished in walnut brown with gold mesh. Nonelectric thermostat controls draft.
12. **Shenandoah Manufacturing Co., Inc.** (manufacturer), P.O. Box 839, Harrisonburg, VA 22801. The Shenandoah R-76L is the same as the R-76 less cabinet (Fig. 29 and Table 3). Wood/coal models are designated R-76C, R-76LC, or R-77C. Blower is optional. Nonelectric thermostat controls damper. Model R-76 has black cabinet with gold trim, and an optional coal grate ($44.45).
13. **Suburban** (manufacturer). P.O. Box 399, Dayton, TN 37321. The Coalmaster holds 70 pounds of coal.

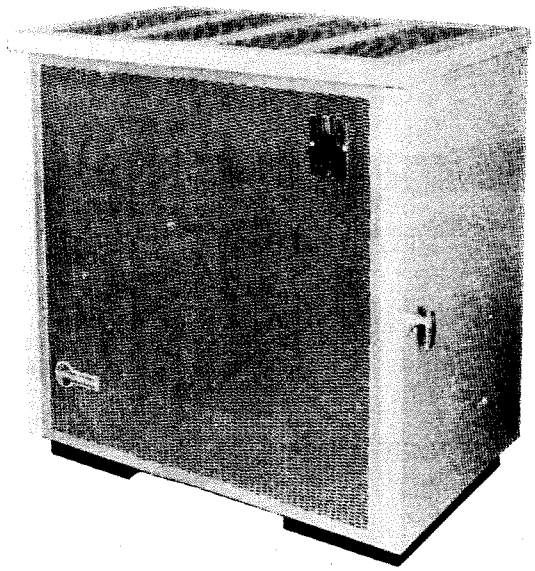


Fig. 32. Combustioneer 65 automatic circulating heater.

Doors are sealed with asbestos gaskets. Hot-water jacket, humidifier, and blower are optional. Cabinets of both Woodmaster and Coalmaster (Fig. 30 and Table 3) finished in mahogany with gold trim. Bimetallic thermostat regulates draft. Another thermostat regulates blower.

14. **United States Stove Co.** (manufacturer), South Pittsburg, TN 37830. Wonderwood comes in a deluxe model, 2601, which is constructed with cast-iron loading door and ash door and improved grates. Doors on all models are gasketed for tight seal. Wondercoal burns 50 pounds in one load. Both have nonelectric thermostats. See Fig. 31 and Table 3.
15. **Will-Burt Co.** (manufacturer), 202 S. Main St., Orrville, OH 44667; Lehman Hardware & Appliances, Inc. (dealer), Box 41, Kidron, OH 44636. See Fig. 32 and Table 3 for Combustioneer wood/coal heater details.
16. **Wood Heat** (dealer), Rt. 212–Pleasant Valley, Quakertown, PA 18951. Primarily a coal-burner, the Surdiac (Fig. 33 and Table 3) has been rated by an official European testing laboratory to be 89.6 percent efficient with burns up to 100 hours on one 25-pound load of anthracite. A heat exchanger covers the back of the stove. The cabinet is enameled in colors inside and out, and there is a Pyrex window in the door. Either wood or coal can be used as fuel.

Combination Wood/Coal Stoves

1. **Bow and Arrow Imports** (importer), 14 Arrow St., Cambridge, MA 02138. The Petit Godin (Fig. 34 and Table 4) is a classic French stove with a hundred-year tradition. The British Coal Board rated its efficiency at 72 percent. The loading door has an asbestos gasket, mica window, and spin-wheel draft control. The rotating ash grate is operated from outside. An all-purpose tool is supplied. Top, loading door, and base can be had in green, sand, brown, or black. Btu ratings are based on anthracite coal.
2. **Country Catalog** (distributor), Sebastopol, CA 95472. The first Tortoise stove (Fig. 35 and Table 4) was made by Charles Portway in 1820. The present model, imported from the British Isles, is based on a model over 70 years old. It is one of six original designs sponsored by the British Solid Fuel Advisory Service.
3. **Kristia Associates** (importer), 343 Forest Ave., Portland, ME 04104. The Jøtul 407 (Table 4) features an embossed pony on front by Norwegian artist, Ønulf Bast. Horizontal baffle for increased efficiency. Manufacturer claims laboratory tests showed this stove achieved an efficiency of 90 percent burning 1.1 pounds of coke per hour. Manual draft control is found in each of three doors.
4. **Lyons Supply Co., Inc.** (importer), One Perimeter Rd., P.O. Box 5035, Manchester, NH 03108. Common in Belgium and France, the Nestor Martin (Table 4) is similar to the Efel, Surdiac, and other imported fireplace-like stoves. It is capable of burning 100

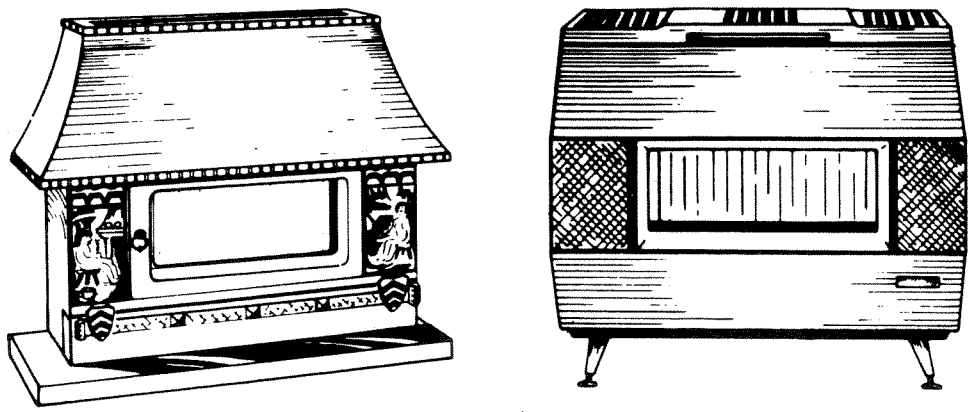


Fig. 33. Surdiac Gotha 511 (left) and MCK512-516 models (right).

Table 4. Combination Wood/Coal Burners

Brand	Mfr. or Source	Size in inches (HWL)	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Btu per hour	Cooking surface	Price
Chappee 8008	6	20x21x12	stove 117 base 24	17″x10″x12″		yes	17		no	yes	no	97mm/back	vitrified enamel	steel and cast iron	14,240	yes	$270 w/o base
Chappee 8033	6	22x19x14	stove 198 base 27	15″x8″x9″	yes	yes	15		no	yes	yes	5″/back	vitrified enamel	cast iron	17,460	yes	$360 w/o base
Jøtul 507	3	32x13x12	183		yes	yes	8		no	yes	yes	5″/back	green enamel	cast iron		yes	$388
Lange 6304RA	8	32x15x17	154		yes	yes				yes	yes	5″/back	enamel in 5 colors	cast iron		yes	
Nestor 479.38	4	31x16x35			no	yes			yes			back	porcelain enamel	cast iron	60,000		
Petit Godin 3720	1	32x16x21	148	470 in³	yes	yes	18		no	yes	yes	4″/back	stove black and enamel	steel and cast iron	17,000		
Petit Godin 3721	1	39x21x27	232	1700 in³	yes	yes	24		no	yes	yes	5″/back	stove black and enamel	steel and cast iron	30,000		
Sears 42H84118N	9	36x15x15	184	10″x10″x18″	yes		18			yes		5″/top	porcelain enamel	steel and cast iron		yes	$165
Styria No. 2	5	39x18x15	289	19″x10″x13″	yes	yes		7x7		yes	yes	back	enamel	steel and iron			$652
Styria No. 3	5	42x18x15	349	22″x10″x13″	yes	yes		7x7		yes	yes	back	black	steel and iron			$735
Styria No. 4	5	48x21x18	533	26″x13″x15″	yes	yes		7x7		yes	yes	back	black	steel and iron			$1220
Tortoise	2	25x15x13	215		yes	yes	15					4½″/back	enamel	steel and cast iron	30,000	yes	$475

Fig. 34. Petit Godin wood/coal stove.

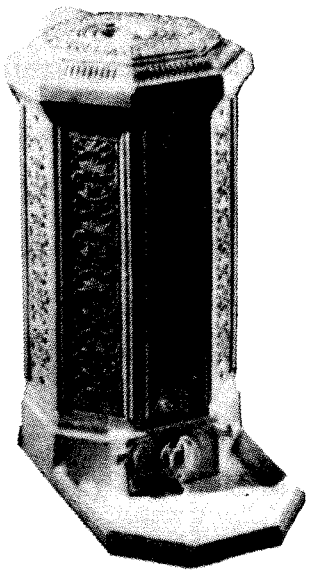


Fig. 35. The Tortoise wood/coal heater.

hours on one load, according to the distributor. The steel cabinet is black, and has a tempered-glass door.

5. **Merry Music Box** (importer), 20 McKown St., Boothbay Harbor, ME 04538. An added feature of the Styria (Table 4) is a humidification chamber. These stoves are imported from Austria, and burn wood, coal, or coke.
6. **Preston Distributing Co.** (importer), Whidden Street, Lowell, MA 01852. The Chappees (Fig. 36 and Table 4) are very well built radiant box stoves from France. Bases for the two models are optional (coal, $39.50; wood, $38.00). Discounts are available.
7. **Roesch, Inc.** (manufacturer), 100 N. 24th St., Belleville, IL 62222. The Forester is a double-walled porcelain-finished stove in six different colors, which burns coal, charcoal, and wood, and is adaptable to gas.
8. **Scandinavian Stoves, Inc.** (importer), Box 72—Rt. 12-A, Alstead, NH 03602. The Lange (Fig. 37 and Table 4) can be used with coal, coke, or charcoal. This Scandinavian coal stove has been tested extensively and has achieved high efficiency. The front door is embossed with a peacock, and the body of the stove comes in red, blue, green, brown, or black enamel. Spin-wheel draft controls are located at two levels.
9. **Sears, Roebuck & Co.** (importer and distributor through catalog or retail stores). Imported from Italy, this Sears wood/coal stove holds 30 pounds of coal. A damper is built into the flue collar. See Table 4.

Freestanding Fireplace/Stoves

1. **A-1 Electric & Plumbing Supply** (manufacturer), 3910 S.E. 82nd Ave., Portland, OR 97266. The American Home Heater (Table 5) has four steel heat-exchanger tubes, a thermostatically controlled draft, and a preheating chamber. It is firebrick-lined, has rolling-log stops, a tempered heat-resistant glass door, and an asbestos door seal.
2. **All Nighter Stove Works, Inc.** (manufacturer), 80 Commerce St., Glastonbury, CT 06033. Giant Moe (Fig. 38) and Jumbo Moe were introduced in early-1978, and specifications were not available at presstime.
3. **Arizona Forest Supply, Inc.** (manufacturer), 610 Butler Ave., P.O. Box 188, Flagstaff, AZ 86002. The AFS (Fig. 39 and Table 5) has a blower which delivers 27,000 cubic feet of air per hour through the five heat exchanger tubes and the plenum chamber at the top of the firebox. Patented baffle design directs unburned gases toward the secondary draft inlet. Man-

Table 5. Freestanding Fireplace/Stoves

Brand	Mfr. or source	Size in inches (HWL)	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Btu per hour	Guaran-tee	Cooking surface	Price
AFS HB465	3	28x26x36	400		yes	yes	18	18½x13	yes	yes	yes	8″/top		steel and cast iron	100,000			$495
Americana 76FH	4	36x42x29	400			yes	25		yes			8″/top	enamel	steel and cast iron				$730
Belgian Efel	27	32x28x15	199	22″x9″x16½″	no	yes	20	21x9 8½x8½	no	yes		8″/back	porcelainized	steel and cast iron	32,951 to 55,183		yes	$495
Colony Classic	7	35x35x25		18″x24″x23″			24	18x24	no			top		steel				
Combi-Fire 4	16	41x23x22	286		yes	yes	14		no	yes		7″/top or back	enamel	cast iron			yes	$603
Combi-Fire 6	16	43x29x22	319		yes	no	14		no	yes		7″/top or back	enamel	cast iron			no	$768
Defiant	32	32x36x22	340		no	yes	24	14¼x10¼	yes	yes (secondary)	yes	8″/top or back	black	cast iron	55,000	1 yr.	yes	$545
Earth Stove 101	26	32x30x23	250	125 lbs. of wood	yes	yes	24	12x20	yes		yes	8″/top		steel			yes	
Ember-Aire	36	34x32x22	330					13x17				7″/top		cast iron			yes	$340
Energy Fireplace	22	33x39x24	350			semi	24					8″		steel and iron				$350
Fargo Heater	18	35x31x24	300		refractory	yes	21	17½x13	yes	yes		7″/top		steel and cast iron			yes	$550
Firemagic	8	32x28x26	356		yes	yes	22		no			8″/top		steel			yes	
Fire-Rite	5	25x28x18	200		yes		26	23¾x15½	no			8″/top or back		boiler plate				
Fire-View 180	9	20x23(HW)	118	16″x18″	yes	yes	16	9x9	optional	yes		6″/top	flameproof coating	steel			yes	$214
Fire-View 230	9	20x23(HW)	131	16″x23″	yes	yes	20	9x9	optional	yes		6″/top	flameproof coating	steel			yes	$244
Fire-View 270	9	25x27(HW)	199	20″x27″	yes	yes	24	10x14	optional	yes		7″/top	flameproof coating	steel			yes	$310
Fire-View 360	9	26x29(HW)	279	22″x36″	yes	yes	30	10x14	optional	yes		7″/top	flameproof coating	steel			yes	$388
Franklin Fireplace	28	28x30x24	190		no	no			no			8″/top	black	steel				$279
Grandma	10	31x23x20	376		yes	yes	20		no			8″/top or back	flat black	steel and cast iron		varies	yes	$400
Grandpa	10	31x25x20	456		yes	yes	24		no			8″/top or back	flat black	steel and cast iron		varies	yes	$450
Greenbriar	11	33x44x23	270	20″x44″x30″	yes	yes	40		optional	optional		8″/top	flat black	steel			no	$320
Hede	17	42x31x20	231		yes	yes	22–24	12x24	no			7″/back	epoxy enamel	steel			yes	$140
Impression 5	15	31x30x31	236		yes	no	20–24	22 wide	optional			8″/top or back	6 colors & tiles	steel		5 yrs.	yes	$325 to $424
Larger Eagle	12	37x36x28	500		refractory		32	13½x33½	no			6″/back	black	boiler plate			yes	
Monarch HR24B	19	31x30x17	190		no		20		no	yes		top	porcelain enamel	steel and cast iron				
Monarch HR24D	19	31x30x17	180		no		20		no	yes		top	porcelain enamel	steel and cast iron				
Norseman 59	6	29x33x20	235		yes	yes	19		yes			8″/top		steel			no	$299
Smaller Eagle	12	37x28x28			refractory		24	13½x25	no			6″/back	black	boiler plate			yes	
Timberline T-LF	29	36x29x29	568		yes	yes	24		no	yes		8″/top		steel and cast iron		5 yrs.	yes	$509
Timberline T-SF	29	35x26x26	460		yes	yes	20		no	yes		8″/top		steel and cast iron		5 yrs.	yes	$469
Triumph	30	29x32x25	360							yes		8″/top		steel plate		1 yr.	yes	$489
Trolla 800	17	41x25x20	300			yes								cast iron				
Twin Spin	24	40x20x32	250		refractory hearth							7″/top	flat black	steel		1 yr.	oven	
Upland 207	31	32x32x18	275		no	yes	26	13½x16½		yes	yes	6″/top	stove black	cast iron			yes	$525
Vigilant	32	30x32x24	245		no	yes	18	17½x18¾	yes	yes	yes	8″/top or back	black	cast iron	47,000	1 yr.	yes	$445
Viking 44	6	41x23x23	309		yes	yes	20		no	yes		7″/back		cast iron			no	$455
Virginian 101	33	27x33x26	433	18″x29″x18″	yes	yes	26	21x9¾	no	yes		top or back	black	steel plate			yes	
Virginian 102	33	27x33x26	450	18″x29″x18″	yes	yes	26	21x9¾	no	yes		top or back	black	steel plate			yes	

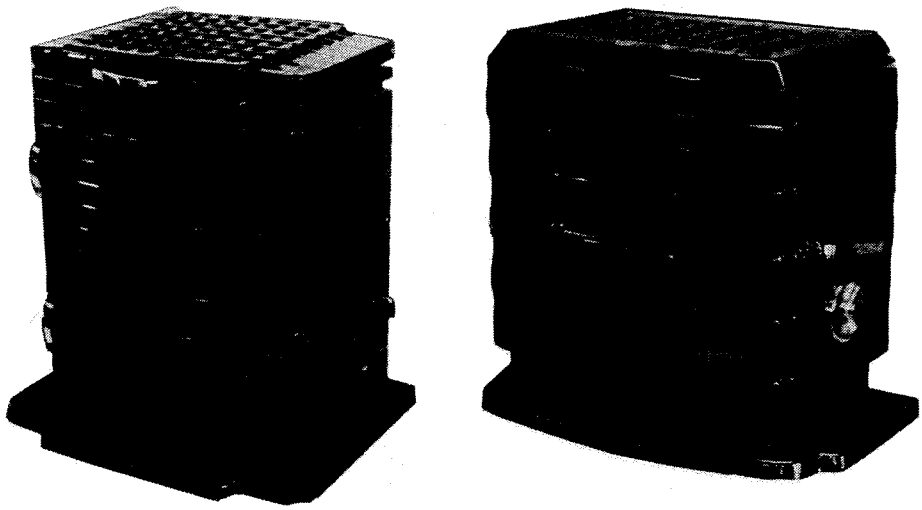


Fig. 36. Chappee 8033 wood/coal stove (left) and 8008 woodstove (right).

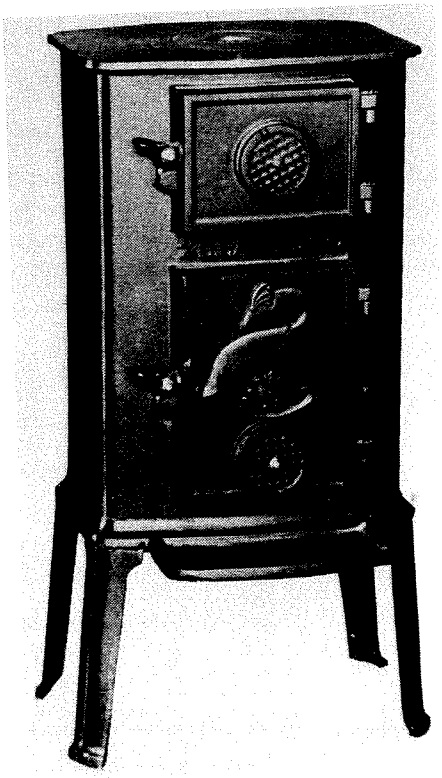


Fig. 37. Lange coal stove 6304RA.

ufacturer claims coal, paper, or "buffalo chips" may be used as fuel, as well as wood. Thermostat controls blower; flue includes a damper.

4. **Autocrat Corp.** (manufacturer), New Athens, IL 62264. The Americana (Table 5), basically a radiant Franklin-type stove, also operates by convection and forced air (with optional blower). It comes with a spark-arresting screen to use when burning as a fireplace, built-in log grate, full-width ash pan, reducer, and enough double-wall pipe to reach an 8-foot ceiling. The first section of pipe has grilles which act as a heat exchanger. The middle section of pipe includes a barometric draft control which offsets varying draft conditions. Loading doors have cam-locking latches, and along with the fireplace screen, can be hung on brackets at back of stove. Forced air circles through a space between the outside and inside of the first section of pipe and then through the grill on top of stove. The Americana can be installed as close as 12 inches from a wall. Discounts are available.

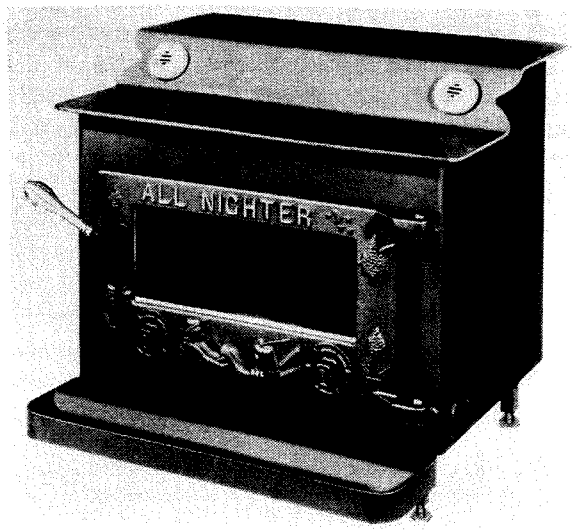


Fig. 38. All Nighter Stove Works' Giant Moe freestanding fireplace.

5. **C & H Manufacturing** (manufacturer), 654 N. Colony Rd., Wallingford, CT 06492. The Fire-rite (Table 5) is available with or without legs, and has heat-tempered glass doors.

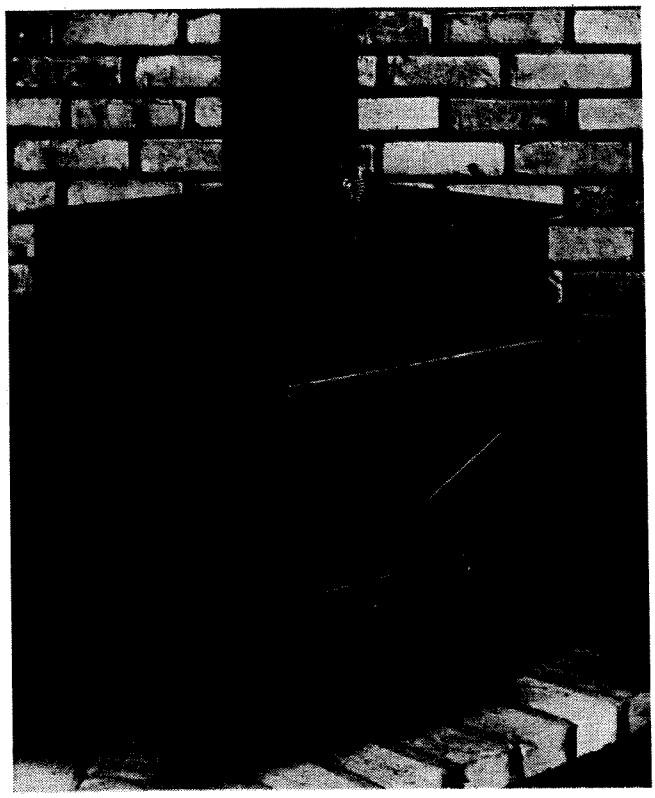


Fig. 39. Freestanding forced-air fireplace from Arizona Forest Supply, Inc. (Model AFS HB465).

inside an existing fireplace. All welds are ground; the doors are of sandwich construction. Primary draft is preheated. Optional with the Norseman are a "surround" for fireplace installation, a grate, a spark guard, and isinglass doors. See Fig. 40 and Table 5.

7. **Contractor Equipment Manufacturers Inc.** (manufacturer), P.O. Box 290, Ashland, OH 44805. The Colony Classic (Fig. 41 and Table 5) has tempered glass doors, heavy steel grate, and ½-inch air space between double walls.
8. **Firemagic,** Whittier Steel & Manufacturing, Inc. (manufacturer), 10725 S. Painter Ave., Santa Fe Springs, CA 90670, or 435-A Kentucky Ave., Rt. 8, Box 435A, Shelbyville, KY 40065. Firemagic's step-stove design allows two levels of cooking. A heat-circulating chamber across the bottom and back of the firebox draws in cool air and creates a convection current up the back. Standard are a safety firescreen and adjustable leveling legs. See Table 5.
9. **Fire-View Distributors** (distributor), P.O. Box 370, Rogue River, OR 97537. The tubular design of the Fire-View (Fig. 42 and Table 5) helps prevent warpage, and a tempered-glass window allows a complete view of the fire. Behind the glass, a collapsible steel door may be closed to bank the fire for the night. Combustion air is supplied through a draft tube at the base of the firebox as in Vermont Casting's "Defiant." Blower and shroud are optional.
10. **Fisher Stove Works** (manufacturer), 135 Commercial St., Springfield, OR 97477. The Fisher stoves are practically a household word across the country. They

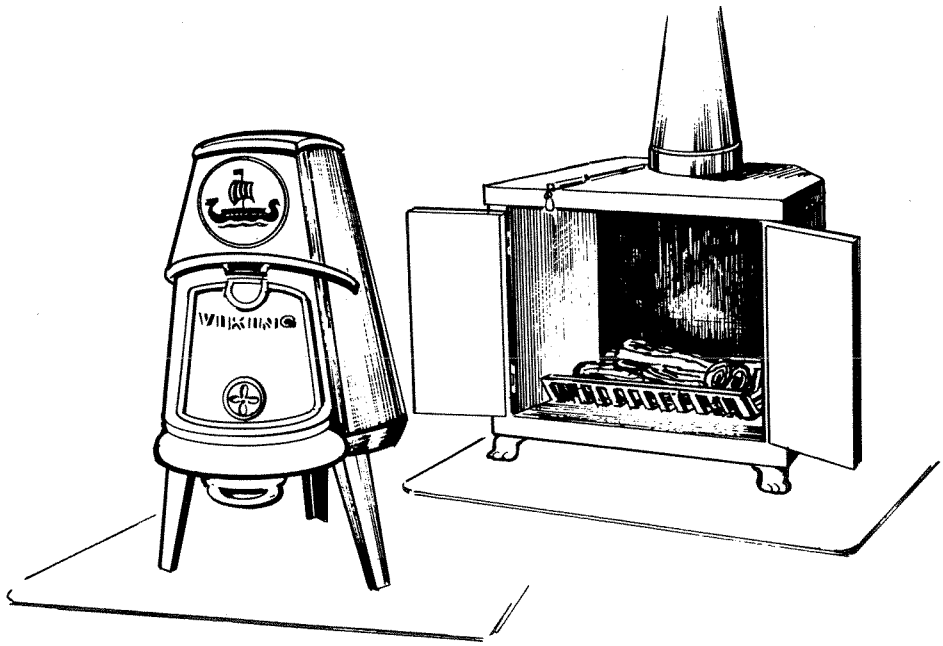


Fig. 40. Viking 44 (left) and Norseman 59 freestanding fireplace/stoves.

6. **Colonial Stove Co.** (importer), 275 Circuit St., Hanover, MA 02339. The Viking 44 is patterned after the Scandinavian "Combi-Fires" by Jøtul, Morsø, and others. The Norseman 59 is similar to a Franklin-type stove, except that it is airtight and can be placed

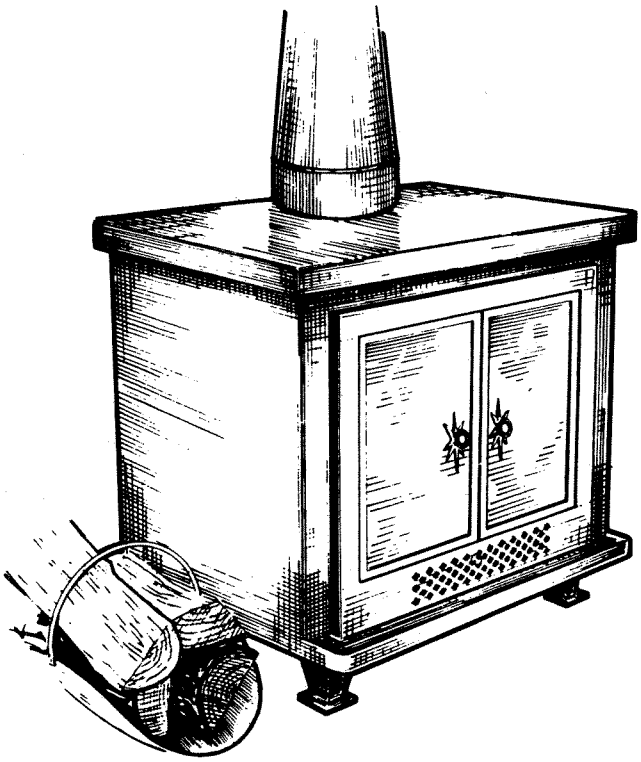


Fig. 41. Colony Classic freestanding fireplace/stove.

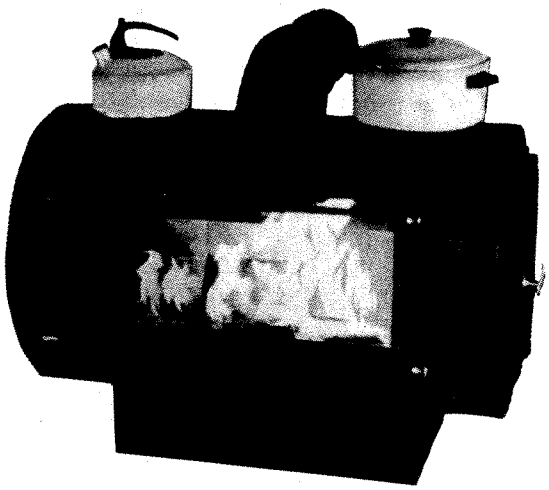


Fig. 42. Fire-View freestanding fireplace/stove.

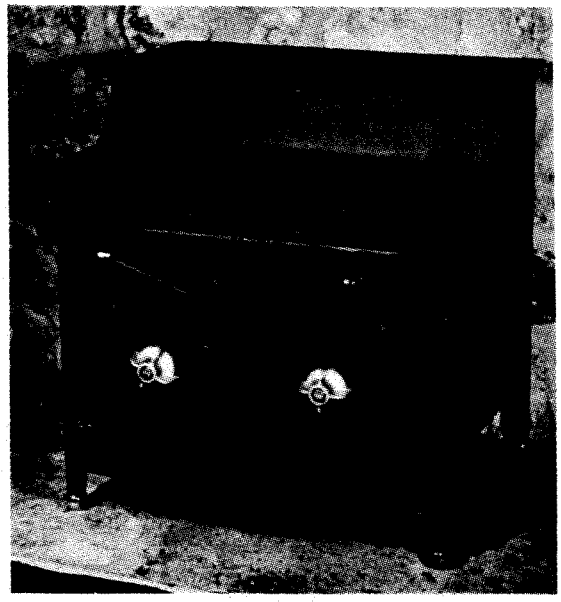


Fig. 43. Grandma fireplace/stove, from Fisher.

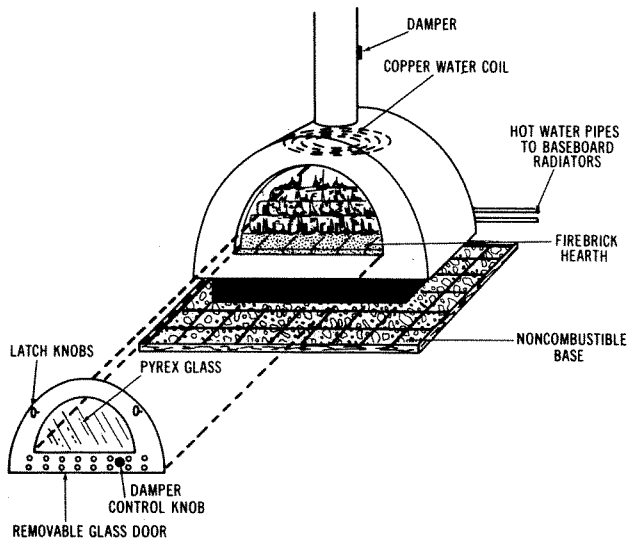


Fig. 44. Greenbriar freestanding fireplace/stove.

are extremely well-built and solid. A measure of their success is the great number of copies on the market. The outstanding features of the Fishers are the recessed flue collar which creates additional turbulence assisting secondary combustion, the airtight cast-iron doors with patented U-channel seal which allows no sparks to escape, and wedge-lock door lever that assures a tight seal. See "Grandma" (Fig. 43) and "Grandpa" (Table 5). Prices quoted are discount and may be higher in some areas.

11. **Greenbriar Products** (manufacturer), 100 W. Jefferson St., Spring Green, WI 53588. Optional features for the Greenbriar (Fig. 44 and Table 5) include door, steel skirt to cover legs, outside-air intake package, steel poker, steel grate, additional stovepipe, heat exchanger, pump for hydronic system, thermostat, and 8-gallon water tank. A spark screen and 6-feet 9-inches of stovepipe are standard.
12. **Hydraform Products Corp.** (manufacturer), P.O. Box 2409, Rochester, NH 03867. Added features include full-length roller loading door, "Turbulator" baffle chamber, and 28 square feet of radiating surface. Larger Eagle can function with "Roman Hypocaust System of central heating," and optionally, with hot water preheater and humidifier available from the

manufacturer. See Table 5 for Larger Eagle and Smaller Eagle specifications.

13. **Hydrotemp** (manufacturer), Narvon, PA. All-steel freestanding fireplace/stove with cast-iron door and front. Has water coils.
14. **J & J Enterprises** (manufacturer), 4065 W. 11th, Eugene, OR 97402. Makes the Frontier (four models), an airtight, baffled, heavy-steel, step-type stove with "custom-fitted doors."
15. **KNT Sales Dept.** (manufacturer), Box 25, Hayesville, OH 44838. The Impression (Fig. 45 and Table 5) has a reflecting heat-shield suspended on the inner back wall, a standing grate for burning coal or logs in the fireplace mode, a "heavy" wire screen door, removable 14½-inch barbecue grill, and full-width ash tray. Glass door kit is optional, as is a thermostatically controlled blower.
16. **Kristia Associates** (importer), 343 Forest Ave., Portland, ME 04104. Combi-Fire 4 closes to make airtight stove. Firescreen included. Forty-five-degree angled baffle increases efficiency. Combi-Fire 6 has no baffles. Both stoves are manufactured by Jøtul (Table 5).
17. **Lyons Supply Co., Inc.** (importer), One Perimeter Rd., Manchester, NH 03108. The Hede (Fig. 46 and Table 5), a Danish stove, is double-walled with fiberglass insulation in between. Doors are glass and gasketed for airtight fit. Firebox also features a baffle and a log retainer. The stove is available in seven colors, and the price quoted is that of Montgomery Ward & Co.

    The Trolla 800 is a Norwegian import.
18. **Malm Fireplaces, Inc.** (manufacturer), 368 Yolanda Ave., Santa Rosa, CA 95404. A blower, 8 feet of stovepipe, and wire-mesh screen door are standard on the Fargo (Table 5). Burns wood or coal. This model also features a Scandinavian-type baffle, a preheating air chamber in the door, and step-stove styling. Discounts are available.
19. **Monarch Range Co.,** Division of Malleable Iron Range Co. (manufacturer), Beaver Dam, WI 53916. The Monarch combustion chamber is all porcelain-enameled "heavy-gauge steel" inside and out. Full-size ash drawer. Model HR24B has base; HR24D, legs. Matching porcelain-enameled pipes, elbow, and damper are optional. Both stoves are available in red, black, orange, or white, and both have double sliding doors. See Table 5.
20. **Chester B. Nolt** (distributor), 24 S. Hershey Ave., Bareville, Leola, PA 17540. The Alaska freestanding fireplace/stove (Fig. 47) is a two-level step stove made out of steel boiler plate. It is firebrick-lined, has cast-iron doors that seal airtight, and a horizontal baffle as in Scandinavian-type stoves. It is chrome-trimmed with a sandblasted finish. A "hot air unit" is available as an option. Lifetime guarantee on all five models. The Alaska is similar in appearance to the Fisher, Timberline, and other step stoves.
21. **Pioneer Energy Centres** (manufacturer), Rt. 1, Box 189-W, Forest, VA 24551. The Pioneer Solar Stove (in two sizes) heats radiantly or as a hydronic boiler with coils. Rated 40,000 Btu per hour as boiler. Features include glass door, internal baffle, secondary-air feed, large cooking surface, and airtight construction. Can be used as solar backup, or for preheating air and water for electric, gas, or oil systems.
22. **Pipe Products Co.** (manufacturer), 1274 Lincoln Rd., Allegan, MI 49010. The Energy Fireplace (Table 5) features a built-in heat exchanger grate made out of

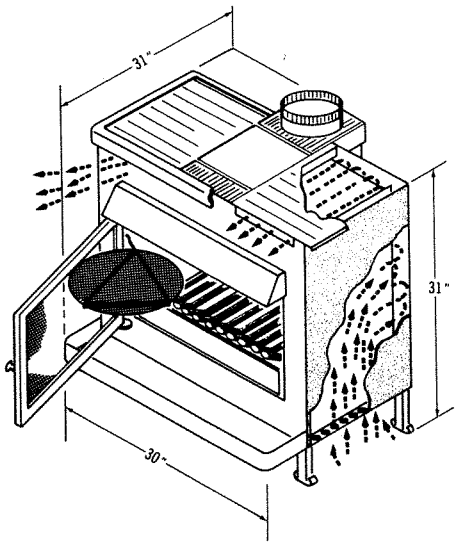


Fig. 45. The Impression 5 freestanding fireplace/stove.

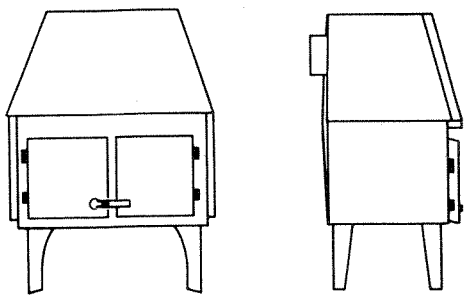


Fig. 46. Hede front view (left) and side view (right).

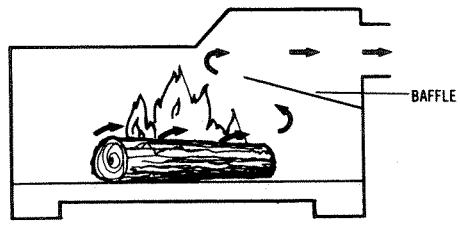


Fig. 47. Flow-pattern and baffle in the Alaskan.

steel tubing and iron pipe, a blower, a built-in firescreen, and bifold doors.

23. **Pro-Heat Products, Inc.** (distributor), 1513 Pierson Dr., Charlotte, NC. The Buck Stove has thermostatic controls and is claimed to be suitable for mobile homes.
24. **Richardson's Fireplaces, Inc.** (manufacturer), 2031 Hillcrest Lane, P.O. Box 187, Burley, ID 83318. The Twin Spin Fun Fire (Table 5) needs no electricity and has a patented, updraft, glassed-in firebox to allow fire to fill room with light. Its oven holds four loaves of bread, 30 potatoes, or a 10-pound roast. Other foods can be cooked on top.

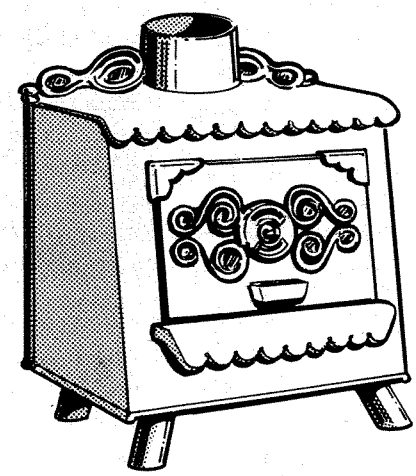


Fig. 48. Earth Stove Model 101.

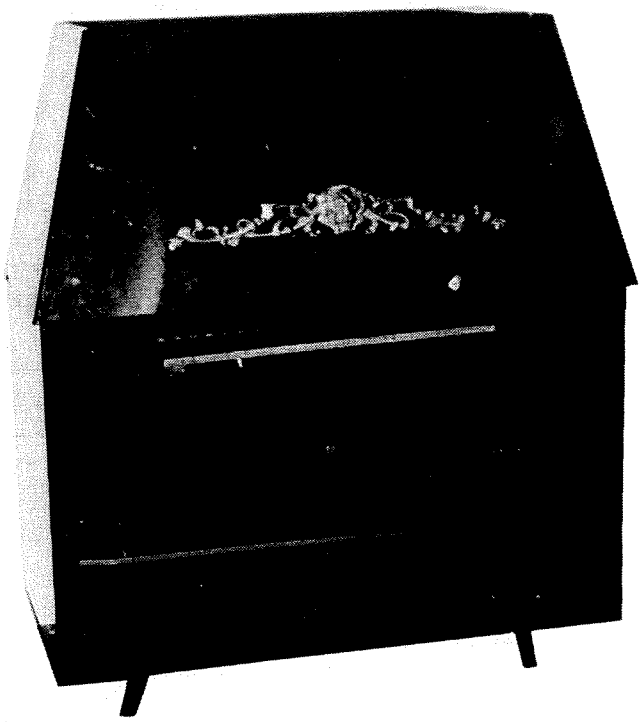


Fig. 49. The Belgian Efel uses wood or coal.

25. **Schrader Wood Stoves** (manufacturer), 4425 Main St., Springfield, OR 97477. Features 10 models with unique secondary combustion chamber and all-steel construction.
26. **Roy F. Smith, Licensor** (distributor), P.O. Box 8, 19440 S.W. Boones Ferry Rd., Tualatin, OR 97062. In the Earth Stove (Fig. 48 and Table 5), both primary and secondary air are preheated, the secondary air through small draft tubes. Both are controlled by thermostatically operated draft. The Earth Stove is ICBO-listed. The door is fitted with an original ceramic motif.
27. **Southport Stoves, Inc.** (importer), 248 Tolland St., East Hartford, CT 06108. The Belgian Efel (Fig. 49 and Table 5) delivers heat by radiation when hood is raised, and by convection when hood is in place. Barbecue grill is standard. Loading door is of double-layered sheet-steel with air space and is sealed with asbestos gasket. Baffle forces heat-flow to front of stove and around sides. Legs are 3 inches high and of porcelainized cast iron. The Efel can be vented into a fireplace. Manual draft controls are concealed behind front panel. Flue collar with built-in damper optional. Choice of six colors.
28. **Thermo-Control Wood Stoves** (manufacturer), Box 640—Howe Caverns Rd., Cobleskill, NY 12043. The Franklin Fireplace (Table 5) comes with firescreen and grate.
29. **Timberline Stoves Ltd.** (manufacturer), 110 E. First St., East Syracuse, NY 13057. Both models come with spark screen and horizontal baffle as in Scandinavian models. Each Timberline (Fig. 50 and Table 5) has two spin-wheel draft controls, one on each front door.

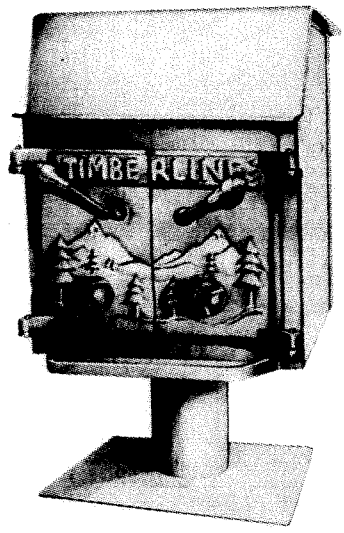


Fig. 50. Timberline freestanding fireplace/stove.

30. **Torrid Manufacturing Co., Inc.** (manufacturer), 1248 Poplar Place South, Seattle, WA 98144. The Triumph (Table 5) burns wood or coal, and has a hot water tank on the side and a towel-drying rack. Draft controls consist of two spin-wheels on the front doors. Discounts are available.
31. **Upland Stove Co., Inc.** (manufacturer), P.O. Box 87, Greene, NY 13778. In outward appearance (Fig. 51 and Table 5), this stove looks similar to the "Defiant" of Vermont Castings, Inc. The Upland 207, however, has adopted the Scandinavian-type horizontal baffle and heat-flow pattern. Upland's baffle may be adjusted by a tool to open in the center for a direct flame-path up the flue when burning in the fireplace mode. The doors are sealed with braided fireproof gaskets. A spark screen is standard, and the 6-inch flue is convenient for those who only have a 6-inch chimney—most fireplace/stoves require a 7- or 8-inch chimney.
32. **Vermont Castings, Inc.** (manufacturer), Box 126 Prince St., Randolph, VT 05060. Spark screen, shovel, and touch-up paint are provided with each Defiant or Vigilant (Figs. 52–53 and Table 5). Optional is a heat shield for the back of the stove in order to place it closer than 36 inches to a combustible surface. These stoves are extremely well-made and ingeniously designed. In them, combustion principles of the Riteway heaters are combined with a horizontal baffle ("smoke shelf"), resulting in an extremely long

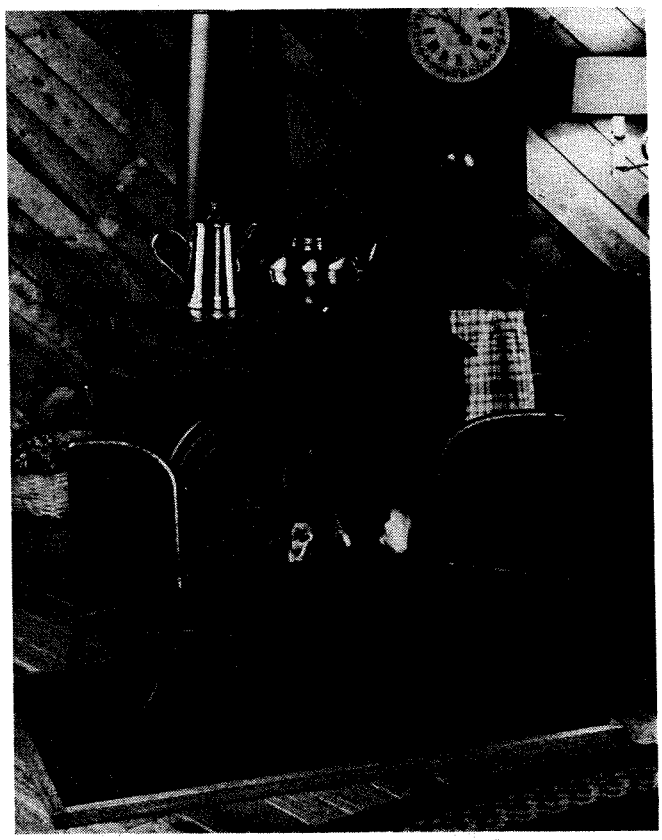


Fig. 52. Vermont Castings' Vigilant.

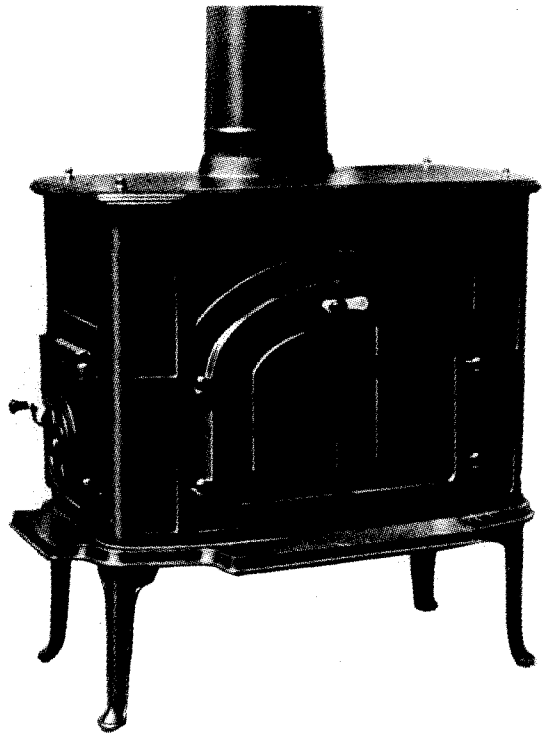


Fig. 51. Upland 207.

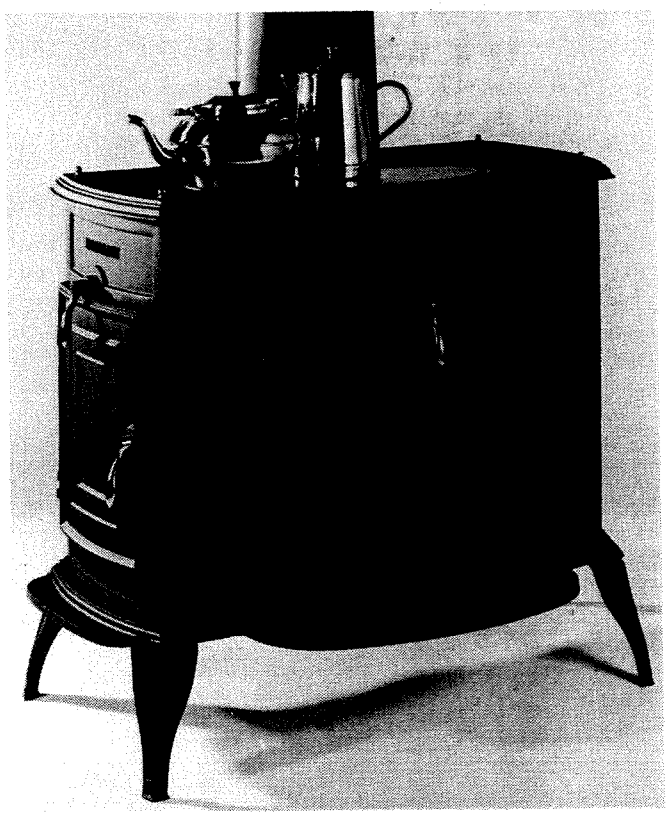


Fig. 53. Defiant freestanding fireplace/stove.

flame-path within the stove. Primary air is supplied around two sides of the firebox at the bottom through numerous holes in a tube. Secondary air is preheated and released at the bottom of the secondary combustion chamber, where gases are forced to exit from the firebox. The stoves can also be operated in the fireplace mode. Then, flames go directly up the flue. These stoves may be the modern wood-energy revolution's crowning achievement.

33. **Virginia Stove Works, Inc.** (manufacturer), 1922 Patterson Ave. S.W., Roanoke, VA 24016. The Virginian 102 "convector" has a series of heat exchangers in the firebox and a heat collector attached to the body. It comes with a blower having 144 cubic feet per minute capacity. Both models also have a short horizontal baffle. Fireplace screen is optional. Each door has a spin-wheel draft control and oak handle. See Fig. 54 and Table 5.
34. **Warmglow Products, Inc.** (distributor), Liberty Foundry Co., 7600 Vulcan St., St. Louis, MO 63111. The Maxi-Heat 1 (Fig. 55) delivers 50,000 Btu per hour, is airtight with door closed, and has its flue location at top or back. It is made of cast iron, has a cooking surface, and sells for $545.00, list. This model is near-replica of the Jøtul Combi-Fire 4.
35. **Wiltons Stove Works** (manufacturer), 33 Danbury Rd., Wilton, CT 06807. Makes two models (one Franklin, one box), all of steel.
36. **Wood Heat** (distributor and importer), Rt. 212—Pleasant Valley, Quakertown, PA 18951. The Ember-Aire (Table 5), of step-stove design, features a spark guard, cast-iron grate, blower, and "Taiwan patent pending."

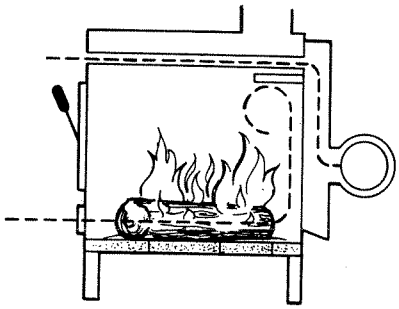


Fig. 54. Virginian 102 convector.

Fig. 55. Maxi Heat 1.

Step Stoves

1. **All Nighter Stove Works, Inc.** (manufacturer), 80 Commerce St., Glastonbury, CT 06033. The All Nighter Moes (Fig. 56 and Table 6) have a "Triple Air System Door," which is an air baffle on the back of the loading door creating a triple air flow. A built-in heat exchanger (called the "Hot Air Distribution System") consists of tubes through which cold air from the floor is convected (or blown) and heated before it exits the top of the stove from two chrome-plated directional air outlets. Optional hot-water system fits into a recessed hot-water jacket at the flue collar. Asbestos "Double Seal Door" makes each stove airtight. Blower, door screen, and hot-coal rake optional. Tiny Moe not available with hot water sys-

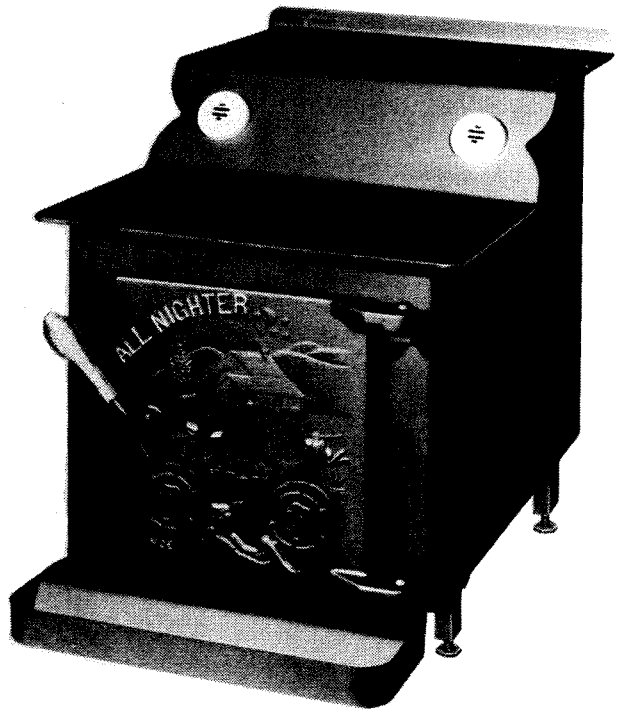


Fig. 56. Big Moe step stove.

Table 6. Step Stoves

Brand	Mfr. or source	Size in inches (HWL)	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Btu per hour	Guaran-tee	Cooking surface	Price
Baby Bear	4	30x14x21	245		yes	yes	18	10x10	no			6″/back or side	flat black	steel and cast iron		varies	yes	$439
Big Moe	1	31x23x41	510		yes	yes	30				yes	6″/back	colors	steel and cast iron		lifetime	yes	
Canadian	6	30x17x33	350		yes	yes	24		no	yes		6″/back		steel and cast iron			yes	$395
Energy Saver Lge.	7	30x20x42	572		yes	yes	32		optional	yes		6″/back		steel			yes	$420
Energy Saver Med.	7	30x20x38	518		yes	yes	28		optional	yes		6″/back		steel			yes	$390
Energy Saver Sml.	7	28x20x33	465		yes	yes	22		optional	yes		6″/back		steel			yes	$370
Hot Box	8		600	18″x36″	yes	yes	24		no	yes		back	flat black	steel		lifetime	yes	
Huntsman 241	2	33x18x34	390		yes	yes	32		no	yes	yes	6″/back		steel and cast iron			yes	$378
Independence HMF1	3	32x18x38	400		yes	yes								steel and aluminum			yes	
Independence HMF2	3	32x18x38	435		yes	yes								steel and aluminum			yes	
Little Moe	1	28x19x31	314		yes	yes	20				yes	6″/back	colors	steel and cast iron		lifetime	yes	
Mama Bear	4	30x16x27	345		yes	yes	24	10x10	no			6″/back or side	flat black	steel and cast iron		varies	yes	$399
Mid Moe	1	31x21x36	408		yes	yes	24				yes	6″/back	colors	steel and cast iron		lifetime	yes	
Papa Bear	4	30x18x32	410		yes	yes	30	10x10	no			6″/back or side	flat black	steel and cast iron		varies	yes	$329
Sierra 150	9	30x16x24	335		yes	yes	24		no	yes		6″/back	flat black	steel and cast iron	38,352	lifetime	yes	$373
Sierra 300	9	32x18x32	400		yes	yes	30		no	yes		6″/back	flat black	steel and cast iron	50,676	lifetime	yes	$429
Timberline T18	11	30x14x21	285		yes	yes	18		no	yes		6″/top, back, side		steel and cast iron		5 yrs.	yes	$349
Timberline T24	11	35x16x27	418		yes	yes	24		no	yes		6″/top, back, side		steel and cast iron		5 yrs.	yes	$409
Timberline T33	11	35x18x33	502		yes	yes	30		no	yes		6″/top, back, side		steel and cast iron		5 yrs.	yes	$449
Tiny Moe	1	26x17x28	241		yes	yes	16				yes	6″/back	colors	steel and cast iron		lifetime	yes	

tem. Manufacturer also makes freestanding fireplace/stoves and a modern box stove.

2. **Atlanta Stove Works, Inc.** (manufacturer), P.O. Box 5254 Atlanta GA 30307. In the Huntsman Model 241 (Fig. 57 and Table 6), smoke and gases go around the firebox top into an upper heat chamber, then into a 12-inch interior flue. Marketed as "The Ponderosa" by sister company, Birmingham Stove and Range Co.

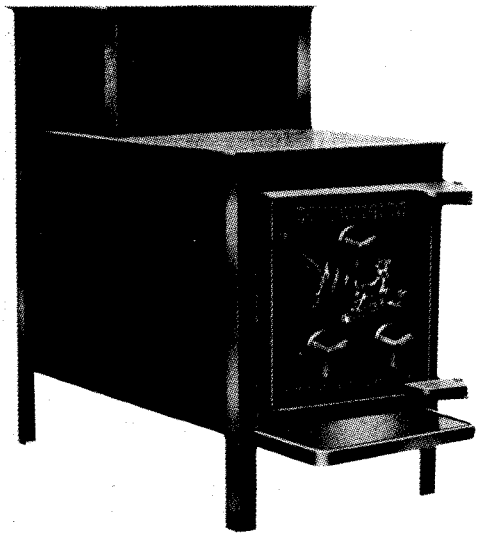


Fig. 57. Huntsman Model 241 step stove.

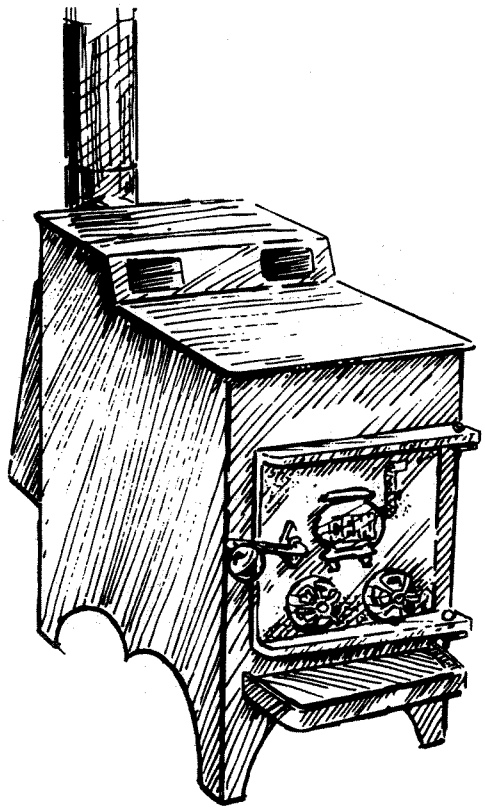


Fig. 58. Independence step stove.

3. **Contractor Equipment Manufacturers Inc.** (manufacturer), P.O. Box 290, Ashland, OH 44805. The Independence (Fig. 58 and Table 6) features a "unique smoke-heat baffle system, and unique 210 ft^3/min dual blower system."
4. **Fisher Stove Works** (manufacturer), 135 Commercial St., Springfield, OR 97477. See comments for the Fisher freestanding fireplace/stoves. See also Fig. 59 and Table 6 for details of the "Bear" stoves.
5. **Hydroheat Division/Ridgeway Steel** (manufacturer), P.O. Box 382, Ridgeway, PA 15853. The Hydrostove (Fig. 60) is a cast-iron-and-steel stove that circulates water throughout its interior. Rated at 50,000 Btu per hour. May be connected to an existing hydronic, hot-air, or solar heating system.
6. **Lakewood Stove Co., Ltd.** (manufacturer), P.O. Box 580, Fenelon Falls, Ontario, Canada; Vermont Wood-

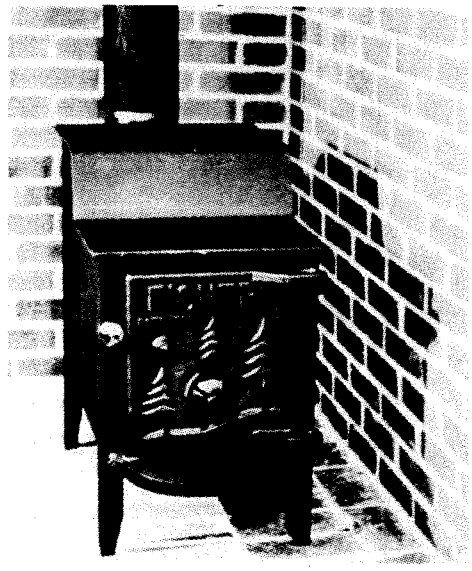


Fig. 59. Baby Bear step stove, by Fisher.

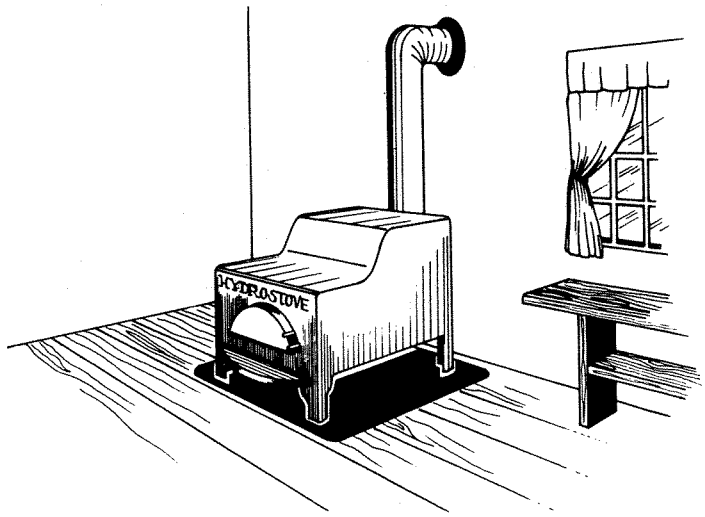
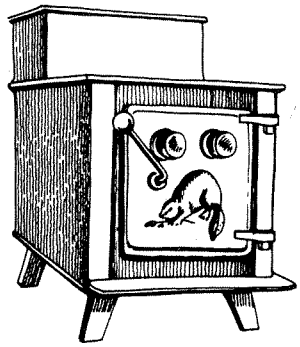


Fig. 60. Hydrostove step stove for hot-water system.



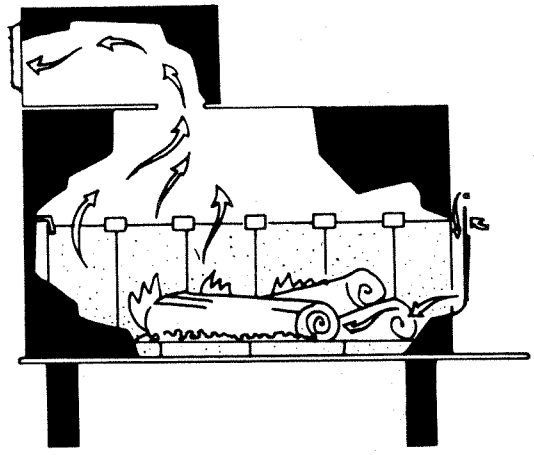


Fig. 61. The Canadian step stove (left) showing flow-pattern (right).

stove Co. (U.S. distributor and manufacturer), Bennington, VT 05201. The Canadian step stove (Fig. 61 and Table 6), unlike many others, has incorporated the principle of the horizontal baffle, just as in Scandinavian models. The steel plate is welded with "Deep-penetrating MIG welds, for completely airtight construction." The cast-iron door is sealed with gaskets, and is chambered for preheating intake air.

7. **Matherly Stove Manufacturing, Inc.** (manufacturer), Rocky Mount, VA 24151. The Energy Saver (Table 6) offers a package option of a Dayton blower, Honeywell thermostat, and a plenum of 24-gauge steel (galvanized) for $225.00.
8. **Metal Fab, Inc.** (manufacturer), P.O. Box 865, Circle M Industrial Park, Salisbury, NC 28144. Humidifier pan included. Burns wood, coal (with special grate), and trash. Has two spin-type draft controls.
9. **Self Sufficiency Products** (manufacturer), One Appletree Square, Minneapolis, MN 55420. The Sierra's flue collar extends into the firebox, as in the Fisher stoves, to increase turbulence and therefore secondary combustion. Door is a fitted U-channel which guards against flying sparks. See Table 6.
10. **Thermo-Matic** (manufacturer), Rt. 145, Lawyersville Rd., Cobleskill, NY 12043. Step stove models TM-2, TM-4, and TM-5 are thermostatically controlled, have secondary air, and a large door. The stoves are airtight, have a downdraft system, and are available with hot-water coils for boiler or furnace.
11. **Timberline Stoves, Ltd.** (manufacturer), 110 E. First St., East Syracuse, NY 13057. All Timberline models have a baffle, as in Scandinavian stoves. Company also makes two fireplace/stoves. See Table 6.

Modern Box Stoves

1. **All Nighter Stove Works, Inc.** (manufacturer), 80 Commerce St., Glastonbury, CT 06033. The Box Moe (Fig. 62 and Table 7) has adjustable legs for fireplace installation. Not available with hot-water system. For further features, see more Moe specifications under Step Stoves.
2. **The Dam Site Stove Co.** (manufacturer), R.D. No. 3, Montpelier, VT 05602. All models have baffles, but the flow pattern is horizontal, not as in Scandinavian models. The horizontal baffle creates an upper chamber for storing wood or smoking meat. The Double Dynamite furnace can hold 7 cubic feet of wood which slowly feeds down to the fire, as in Riteway stoves. See Fig. 63 and Table 7. Discounts are available.
3. **Enterprise Foundry Co., Ltd.** (manufacturer), Sackville, New Brunswick, Canada. The Enterprise BH 25 (Table 7) comes with 4 feet of pipe and a damper.
4. **Garden Way Research** (distributor), Dept. 64479, Charlotte, VT 05445. The Garden Way Model 2 (Table 7) fits easily into existing fireplaces. It has "positive-locking doors" and large ash tray.

Fig. 62. The Box Moe modern box stove.

Table 7. Modern Box Stoves

Brand	Mfr. or source	Size in inches (HWL)	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Btu per hour	Guaran-tee	Cooking surface	Price
Box Moe	1	24x21x38	380	25″x18″x22″	yes	yes	23				yes	6″/back	colors	steel and cast iron		lifetime	yes	$325
Double Dynamite	2	38x34x26	200	17″x25″x19″	no	yes	24	13x16	no		yes	6″/back		steel			yes	
Downdrafter I	9	32x26x44	500	5 ft³	yes	yes	24	11x11	yes		yes	8″/back	colors	steel and cast iron	60,000	1 yr.	limited	$629
Downdrafter II	9	28x22x25	250	3½ ft³	yes	yes	18	11x11	yes		yes	6″/back	colors	steel and cast iron	20,000	1 yr.	limited	$469
Dynamite	2	27x18x34	100	17″x25″x19″	no	yes	24	13x16	no		yes	6″/top		steel			yes	$225
Enterprise BH25	3	20x13x33	55									6″		steel				$71 to $89
Garden Way 2	4	22x18x34	102			nearly	24	9x10	no			6″/top		steel		3 mos.	yes	
Greenwood	2	38x18x34	200	17″x25″x21″	no	yes	24	13x16	no		yes	6″/back		steel			yes	$325
Jones Small	6	27x20x19	286		yes	yes		13x13	no	yes		top/back	flat black	steel			yes	
Jones Standard	6	34x26x25	450		yes	yes		13x13	no	yes		top/back	flat black	steel			yes	
Shaker	5	32x26x39	305	50 lbs.	no	yes				yes		6″/top		cast iron			yes	$450
Shaker Basic	5	24x26x39	265	50 lbs.	no	yes				yes		6″/top		cast iron			yes	$375
Thermo-Control 100	8	27x18x33	200	27″x18″x18″	yes	yes		12½x15	no	yes	yes	6″/top	black	steel			yes	$289
Thermo-Control 200	8	28x18x33	200	27″x18″x18″	yes	yes		12½x15	yes	no	yes	6″/top	black	steel			yes	$289
Thermo-Control 300	8	28x18x33	240	27″x18″x18″	yes	yes		12½x15	yes	no	yes	6″/back	black	steel			yes	$359
Thermo-Control 400	8	28x24x33	315	27″x24″x18″	yes	yes		14x21	yes	no	yes	6″/top	black	steel			yes	$399
Thermo-Control 500	8	32x24x40	410	34″x24″x24″	yes	yes		18x21	yes	no	yes	6″/top	black	steel			yes	$539
Wood Chuck	7	24x12x34										back	satin black	steel				

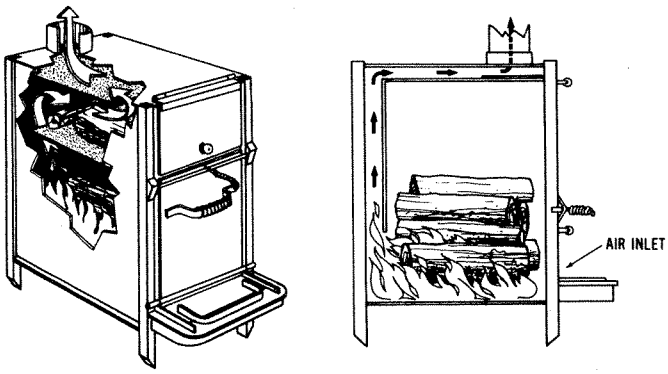


Fig. 63. Greenwood (left) and Double Dynamite (right).

5. **Hinckley Foundry** (manufacturer), 13 Water St., New Market, NH 03875. These are near-replicas of models found in museums. The Shakers are reputed to have designed the first true airtight stoves over 150 years ago. See Fig. 64 and Table 7.
6. **Jones Wood Stoves** (manufacturer), 4550 W. State, Boise, ID 83702. Jones stoves (Fig. 65 and Table 7) come with fireplace adapter, tempered-glass door, and screen for fireplace effect. Options include a built-in oven, water reservoir, and nickel trim.
7. **Lehman Hardware & Appliances, Inc.** (dealer), Box 41, Kidron, OH 44636. The Wood Chuck (Fig. 66 and Table 7) has a large loading door on top.
8. **Thermo-Control Wood Stoves** (manufacturer), Box 640—Howe Caverns Rd., Cobleskill, NY 12043. A gasketed door and preheat chamber for primary and secondary air are features of the Thermo-Control stoves (Fig. 67 and Table 7). Downdraft baffle system results in a heat-flow pattern similar to that of the Riteway and Vermont Castings stoves. Available also with hot-water heating connection, warm-air hood, or domestic hot-water piping. Model 300 is for fireplace hookup. All models have bypass control damper for quick starts.

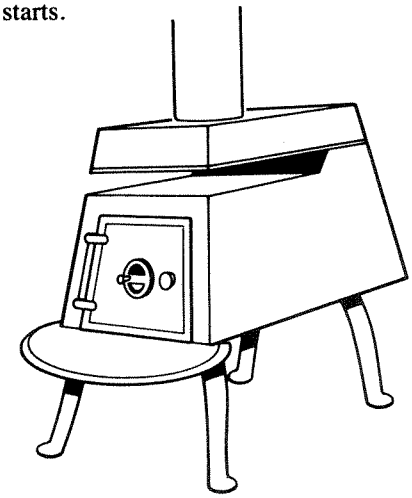


Fig. 64. Shaker modern box stove.

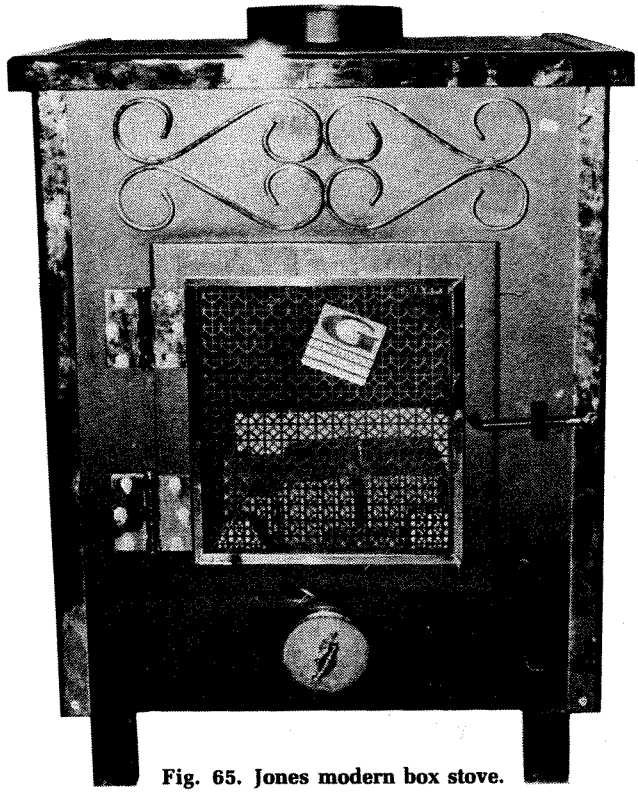


Fig. 65. Jones modern box stove.

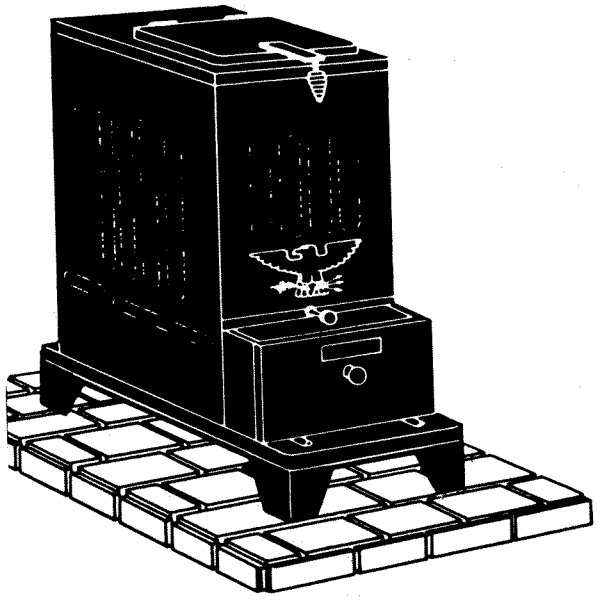


Fig. 66. The Wood Chuck.

9. **Vermont Woodstove Co.** (manufacturer), P.O. Box 1016, Bennington, VT 05201. The Downdrafters (Table 7) are one of the few original designs to come on the market in modern times. It is a true downdraft design (some stoves advertised as such are not) and according to tests, has achieved 60 percent-plus efficiency—second to no other domestic stoves. The reason for this is that combustion is as nearly complete as possible. Smoke and gases are forced down through

Table 8. Radiant Sheet-Metal Stoves

Brand	Mfr. or source	Size in inches (HWL)	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Cooking surface	Price
Carolinian 23HF	1	30x18x28	105	22″x16″21″		yes	18	12x13 10x12	yes	no		top	blue	steel and cast iron	yes	$195
Columbian 25HF	1	34x20x30	125	24″x17″x23″		yes	20	13x15 10x12	yes	no		top	blue	steel and cast iron	yes	$215
King 2600-3	5	44 (H)	152	25″x18″x19″	no		24		no	yes		6″/top		steel and cast iron	yes	$200
King 6600-A1	5	44 (H)	144	25″x18″x19″	yes	yes	24		yes	no		6″/top		steel and cast iron	yes	$172 to $215
Shenandoah R65	7	35x21 (HW)	162	18″x23″	yes	yes	18	12x13	yes	no	yes	6″/top		steel	yes	$204 to $211
Shenandoah R75	7	35x24 (HW)	178	21″x23″	yes	yes	18	12x13	yes	no	yes	6″/top		steel	yes	$216
Superautomatic 2502	2	35 (H)	147	22″x17″x23″	no	yes	20		yes	yes		6″/top	blue	steel and cast iron	yes	$172 to $217

Table 9. Other Stoves

Brand	Mfr. or source	Size in inches (HWL)	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Manual draft control	Secondary draft	Flue size & location	Body finish	Body material	Btu per hour	Guaran-tee	Cooking surface	Price
Cabin BBR-C	16	34x20x20	235		cast refractory	yes	16		no	yes		6″/top	paint	steel and cast iron		1 yr.	yes	$369
Circulator	13	32x22x24	200	3½ ft³	no	yes	22½	13″ dia.	no			6″/back		steel			no	
Culvert Queen	24	31 H 22 dia.	140	5 ft³	no	yes	15	11″ dia.	no	yes		top		steel	55,000	lifetime	yes	$205
Elm	26	26x21x34	250	26″x34″x21″	yes	yes	26	14″ dia.	no	yes	no	6″/back	black paint	steel and cast iron	40,000		yes	$340 to $400
Gibraltar 2	21	24x14x24	240		yes	yes	20		no			6″/top or back		steel			yes	$339
Gibraltar 3	21	28x16x27	272		yes	yes	24		no			6″/top or back		steel			yes	$379
Gibraltar 4	21	32x18x32	320		yes	yes	28		no			6″/top or back		steel			yes	$439
Parlor BBR-A	16	34x20x27	364		cast refractory	yes	24		no	yes		6″/top	paint	steel and cast iron		1 yr.	yes	$700
Standard BBR-B	16	34x20x27	258		cast refractory	yes	24		no	yes		6″/top	paint	steel and cast iron		1 yr.	yes	$379
Supra 402	4	26x21x12	117	1300 in³	yes	yes	12–14		no	yes		5″/back	vitreous enamel	steel and cast iron	20,000		yes	
Tempwood 2	20	28x28x18	200		refractory	yes	18	11″ dia.	no	yes		6″/back	matte black	steel and cast iron	55,000	15 yrs.	yes	$279
Tempwood 5	20	24x24x14	127		refractory	yes	14	11″ dia.	no	yes		5″/back	matte black	steel and cast iron	35,000		yes	$229

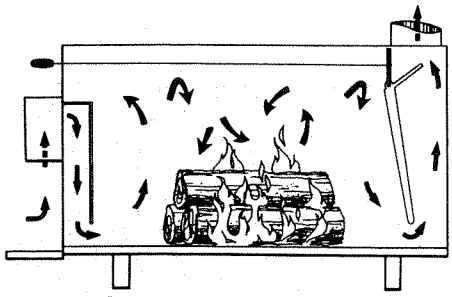


Fig. 67. Thermo-Control's heat-flow pattern.

the coals where they meet secondary air to allow further combustion. A blower controlled by the stack thermometer moves air through the heat exchangers on each side of the firebox for optimum heat-transfer to the room. The standard color is flat black, but color-change kits are available. Optional also is a manifold kit for connection to existing ductwork and hot-water coils for home-heating systems. Critical parts of the firebox are made out of stainless steel, as are the grates. The Downdrafter also fits into existing fireplaces; directions supplied. Hot water coils cost $55.00 to $98.00 Hot-air manifold system: $26.00/pair.

Radiant Sheet-Metal Stoves

1. **Ashley Products Division** (manufacturer), Martin Industries, P.O. Box 730, Sheffield, AL 35660. Ashley offers an optional universal circulating blower, which attaches at the back and blows air around the sides of the stove toward the front. The Columbian 25HF holds 5.5 cubic feet of wood, the Carolinian 23HF holds 4.3 cubic feet. See Fig. 68 and Table 8. Discounts are available.

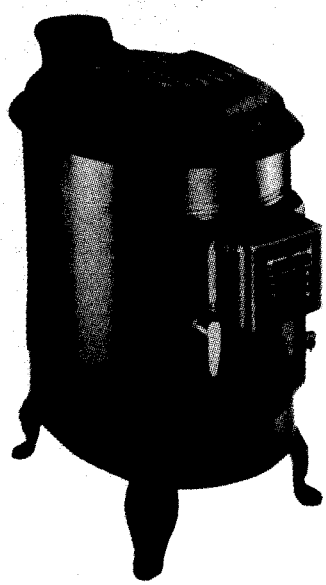


Fig. 68. Ashley Columbian 25HF radiant sheet-metal stove.

2. **Atlanta Stove Works, Inc.** (manufacturer), P.O. Box 5254, Atlanta, GA 30307. Identical to Birmingham Stove and Range Company's Majik Automatic Model 122A. See Fig. 69 for photo.
3. **Birmingham Stove & Range Co.** (manufacturer), P.O. Box 2647, Birmingham, AL 35202. The Majik Automatic Model 122A (Fig. 69) is identical to Atlanta Stove Works' Superautomatic Model 2502. For specifications, refer to that model in Table 8.
4. **Cyclops Corp.** (manufacturer), Empire-Detroit Steel Division, Dover, OH 44622. The Reeves Dover Series 25 (Fig. 70) measures 30-3/8 inches high, 17 inches wide, and 25 inches long assembled, and has a shipping weight of 20 pounds. It has a sloping ash pouch with 6-inch, pressed-steel, hinged ash door with register-screw draft and spark arrester, and a heavy-gauge steel lining. The price is $37.95.
5. **King Stove & Range Co.** (manufacturer), Box 730, Sheffield, AL 35660. See Table 8.

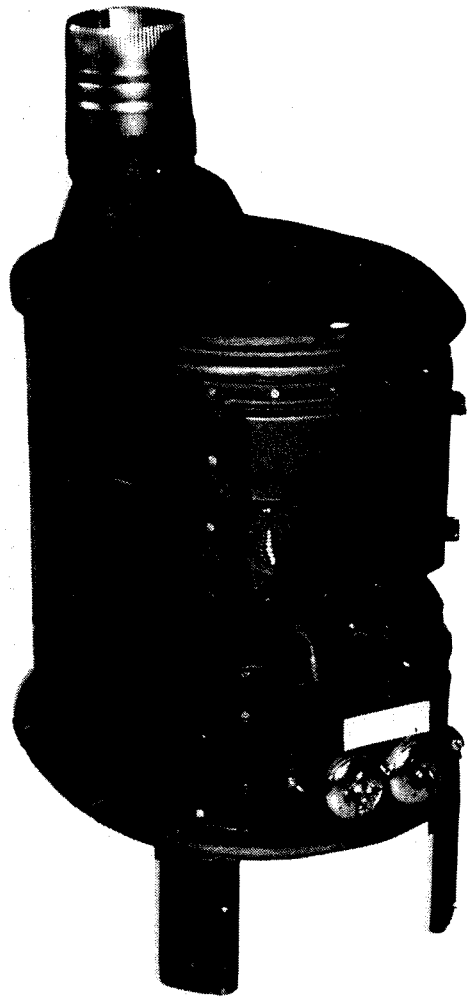


Fig. 69. Majik Automatic Model 122A radiant sheet-metal stove.

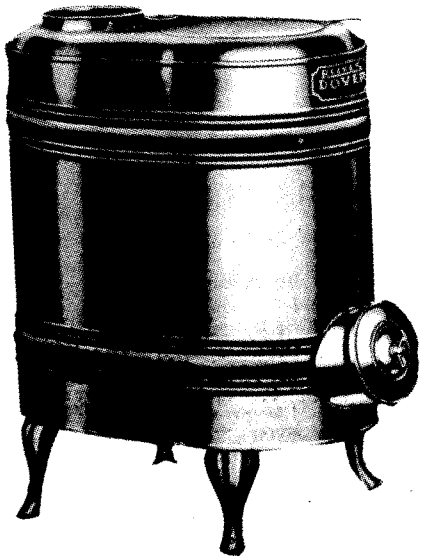


Fig. 70. Reeves Dover Series 25.

6. **Louisville Tin & Stove Co.** (manufacturer), P.O. Box 1079, Louisville, KY 40201.
7. **Shenandoah Manufacturing Co., Inc.** (manufacturer), P.O. Box 839, Harrisonburg, VA 22801. Model R65 burns wood or coal ($210.93 with coal grate). Model R75 designed for wood only. See Fig. 71 and Table 8.

Other Stoves

1. **Aeroheater Co.** (manufacturer), P.O. Box 1461, Springfield, VA 22151.
2. **Athens Stove Works** (manufacturer), P.O. Box 10, Athens, TN 37303.
3. **Automatic Draft and Stove Co.** (manufacturer), Lynchburg, VA 24500. Makes various stove types, and also a sawdust burner.
4. **Bow & Arrow Stove Co.** (importer), 14 Arrow St., Cambridge, MA 02138. Fyrtønden barrel-shaped stoves are made out of 4-mm plate steel in Denmark and range from $540.00 to $715.00. The tallest, Model A, is 34 inches high and 23 inches in diameter. Flue location is at the top or back. Ring stove lids are optional on Models C and D, for cooking. These stoves can also be operated in the fireplace mode with front door open. Four models are available.

   The well-made French heater Supra 402 (Fig. 72 and Table 9) is a true convector except, unlike American convectors, it has no thermostat or blower. Also, a smoke baffle creates turbulence for better secondary combustion. Ashes can be removed at any time—even while the stove is burning. The Supra can also burn processed coal briquets but not unprocessed hard or soft coal. Front has "strong heatproof window."

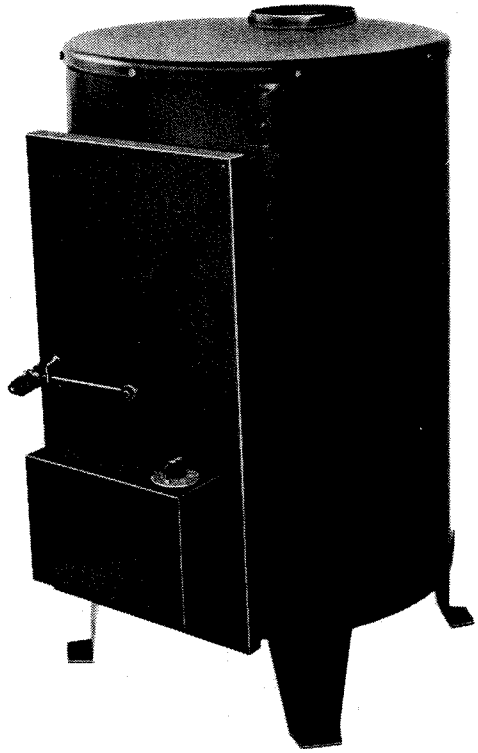


Fig. 71. Shenandoah Model R-65 for wood or coal.

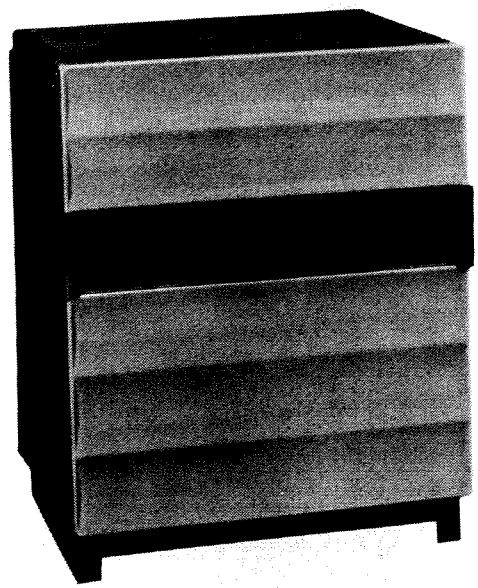


Fig. 72. Supra nonautomatic circulating heater.

Doors are sealed with gaskets. Sliding, cast-iron ash grate can be operated from outside. There is a heat shield (steel) in the rear, and a spin-disc draft control on the ash door.

5. **Coleman Products Co.** (manufacturer), Rt. #3, Box 174, Lawrence, KS 66044; barrel stoves and stove kits.

6. **Country Craftsmen Forge and Foundry** (manufacturer), P.O. Box 3333W, Santa Rosa, CA 95402; barrel stoves and stove kits.
7. **Dawson Manufacturing Co.** (manufacturer), Shaker Rd., Enfield, CT 06082.
8. **Edwards Manufacturing Co.** (manufacturer), 529–49 Eggleston Ave., Cincinnati, OH 45202.
9. **Fatsco** (manufacturer), 251 N. Fair Ave., Benton Harbor, MI 49022; barrel stoves and stove kits.
10. **Fisher's** (manufacturer), Rt. 1, Box 63A, Conifer, CO 80433; barrel stoves and stove kits.
11. **Fisk Stove** (manufacturer), Tobey Farm/Box 935, Dennis, MA 02638; barrel stoves and stove kits.
12. **Foresight Enterprises, Inc.** (manufacturer), 343 Luinsor St., Ludlow, MA 01056. Makes the N-ER-GY Saver stove, with cooktop.
13. **The Free Flow Stove Works** (manufacturer), Mine Rd., South Strafford, VT 05070. The Circulator (Table 9) represents one of the most original stove designs on the market. Tubes form the firebox and therefore constitute a large area to absorb heat and radiate it. A special baffle design causes the smoke and other volatiles to make three passes within the stove before leaving. A bypass is also possible for quick starts and smokeless reloading. The Circulator is the smallest model, followed by the Wonder and the Furnace (specifications not available for the latter two models).
14. **Hoskin Diversified Industries** (importer), Schoolhouse Farm, Etna, NH 03750. Imports the Heidelberger.
15. **Jackes-Evans Manufacturing Co.** (manufacturer), 4427 Geraldine Ave., St. Louis, MO 63115. Makes an airtight heater.
16. **Kickapoo Stove Works. Ltd.** (manufacturer), Box 127–46, La Farge, WI 54639. Parlor model has interior surfaces lined with angled steel ribs. Footrests added. Exterior surface of hull has been finely ground to a seamless finish. Each model has a high-temperature grate, an ash pan, and separate door for ash removal. Recessed flue. See Fig. 73 and Table 9.
17. **Locke Stove Co.** (manufacturer), 114 W. 11th St., Kansas City, MO 64105; barrel stoves and stove kits.
18. **Modern Kit Sales** (manufacturer), Box 12501, North Kansas City, MO 64116.
19. **Modern Machine and Welding** (manufacturer), 2307 Highway 2 West, Grand Rapids, MN 55744.
20. **Mohawk Industries Inc.** (manufacturer), 173 Howland Ave., Adams, MA 01220. The Tempwood (Fig. 74 and Table 9) is a true downdraft box stove. Air enters at the top of the stove, aids in combustion, then is forced back over the flames by more incoming air

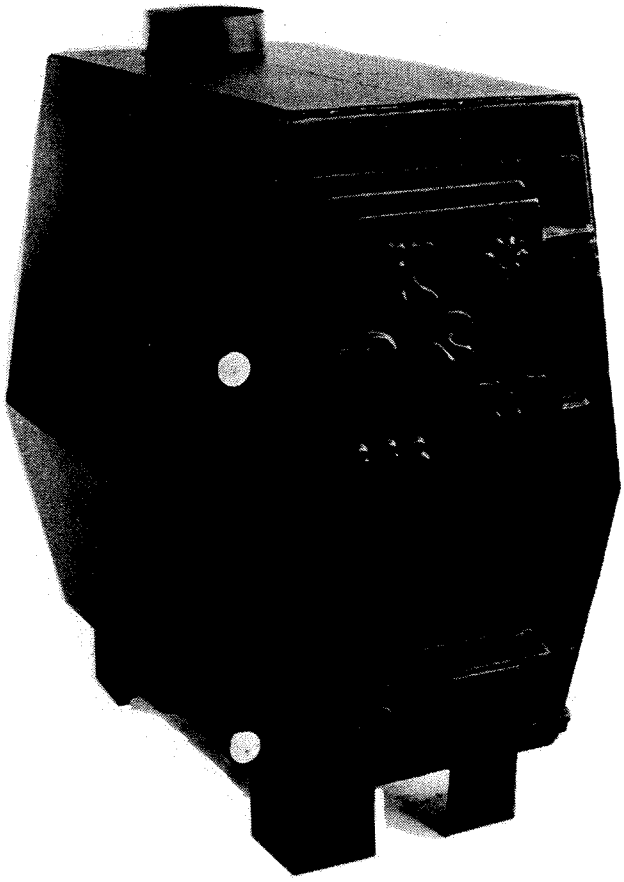


Fig. 73. Kickapoo Standard Model BBR-B wood-burner.

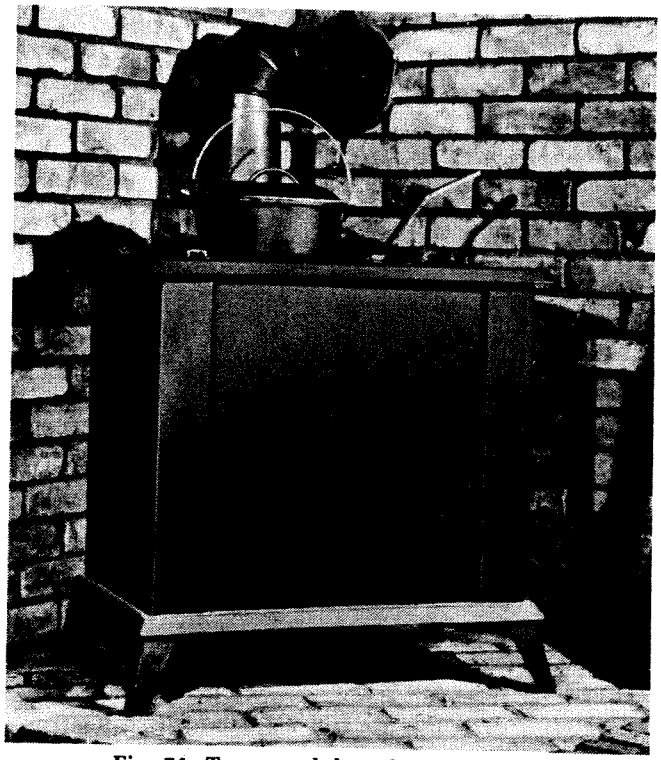


Fig. 74. Tempwood downdraft box stove.

before it exits at the back. The two primary air-intake ports are tubes sticking down into the firebox, focusing two jets of hot air onto the wood. Combustion is about as nearly complete as possible. The principle is amazingly simple and yet ingenious. The exterior surface is sandblasted for a smooth appearance. Both models come with a coal shovel bent for ash removal.

21. **Self Sufficiency Products** (manufacturer), One Appletree Square, Minneapolis, MN 55420. An added feature of the Gibraltar (Table 9) is a large Racon window for viewing the fire. These fireplace-like stoves are similar to many freestanding fireplace/stoves on the market, except that they are *not* to be burned with the front door open (they do not have a grate and the 6-inch flue is not adequate for burning in the fireplace mode).
22. **Sotz Corp.** (manufacturer), Columbia Station, OH 44028; barrel stoves and stove kits.
23. **Southern Co-Operative Foundry Co.** (manufacturer), P.O. Box 69, Rome, GA 30161.
24. **The Stoveworks** (manufacturer), Box 172, Marlboro, VT 05344. The Culvert Queen (Fig. 75 and Table 9) is built on the same combustion principle as the Mohawk Tempwood stoves—a bonafide downdraft principle. The corrugated body makes the surface area approximately 10 percent greater than a simple cylinder of similar dimensions. It also adds to the strength of the body.

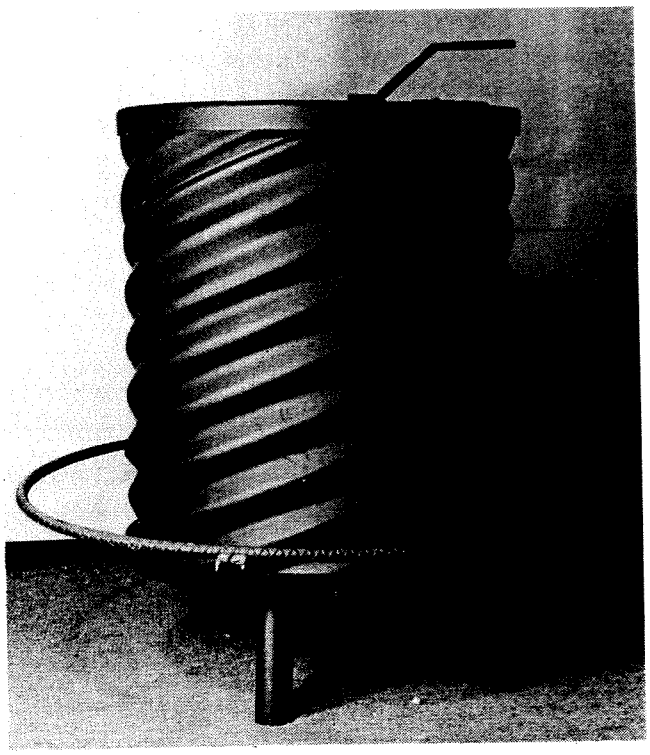


Fig. 75. The Culvert Queen cylindrical radiant stove.

25. **Templet Industries, Inc.** (manufacturer), 201 E. Bethpage Rd., Plainview, NY 11803. Makes Templet woodstoves.
26. **Vermont Iron Stove Works** (manufacturer), The Bobbin Mill, Warren, VT 05674. The Elm (Fig. 76 and Table 9) is a very sturdy stove and uniquely designed. The Europeans' common complaint that Americans cannot build a beautiful stove is disproved here, for the Elm is truly original. Three other designs are scheduled for later production: the Maple, the Birch, and the Oak.
27. **Walt Winters** (manufacturer), Triton Advertising Agency, Box 27232, Philadelphia, PA 19118; barrel stoves and stove kits.
28. **Weir Stove Co.** (manufacturer), Taunton, MA 02780.
29. **Whitten Enterprises, Inc.** (manufacturer), Box 798, Bennington, VT 05201.
30. **Winnwood Industries** (manufacturer), 4200 N.E. Birmingham Rd., Kansas City, MO 64117; barrel stoves and stove kits.
31. **Yankee Woodstoves** (manufacturer), P.O. Box 7, Bible Hill Rd., Bennington, NH 03442; barrel stoves and stove kits.

Wood-Burning Furnaces

1. **Bellway Manufacturing** (manufacturer), Grafton, VT 05146. The Hi-Temp furnaces (Table 10) will heat by themselves or in combination with existing hot-air systems. Manufacturer claims they will burn dry or

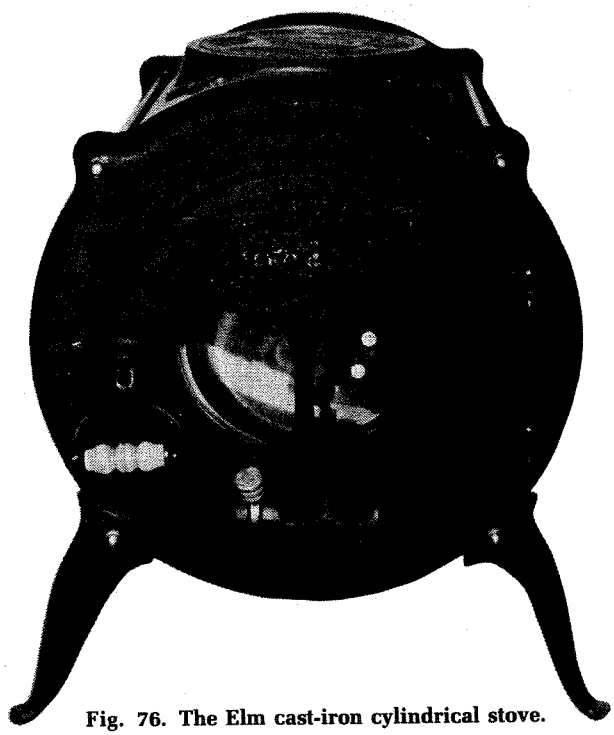


Fig. 76. The Elm cast-iron cylindrical stove.

Table 10. Wood-Burning Furnaces

Brand	Mfr. or source	Size in inches (HWL)	Warm air plenum (in.)	Cold air plenum (in.)	Multifuel	Can use as add-on	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Flue size	Body finish	Body material	Btu per hour	Price
Add-A-Furnace AF124	20	31x18x26			no	yes				yes	24		no	6″	matte black	steel		
Add-A-Furnace AF224	20	36x20x30			no	yes				yes	26		yes	6″	brown enamel	steel	50,000	
Add-A-Furnace AF324	20	44x20x32			no	yes				yes	26		yes	6″		steel and cast iron	75,000	
Carlson SF-1	2	54x23x28					700	16½″x15″x28″		yes	20	14x15	yes	8″		steel	170,000	
Cleveland	3	48x24x24			yes				yes	yes		10x12	yes		baked enamel	cast iron	100,000	$319 to $439
Daniels R30W	5				no			21″x21″x30″	stainless steel		30	15x17	yes	8″			100,000	
Daniels R36W	5				no			25″x21″x36″	stainless steel		36	15x17	yes	8″			128,000	
Daniels R42W	5				no			25″x21″x42″	stainless steel		42	15x17	yes	8″			157,000	
Daniels R48W	5				no			25″x21″x48″	stainless steel		48	15x17	yes	9″			225,000	
Daniels R160W	5				no			25″x21″x60″	stainless steel		60	15x17	yes	9″			300,000	
Daniels R260W	5				no			29″x25″x60″	stainless steel		60	15x17	yes	10″			400,000	
Duo-Matic CWO	7	51x44x50			yes		975				17	14x12	yes	8″		steel		
Hi-Temp F50	1	48x30x44			yes	yes			yes	yes	24	14x17	yes	6″		steel	25,000 to 35,000 +	$2000 to $3000
Hi-Temp F75	1	55x36x54			yes	yes			yes	yes	36	15x20	yes	7″		steel	25,000 to 35,000 +	$2000 to $3000
Hi-Temp F125	1	60x46x72			yes	yes			yes	yes	48	18x23	yes	8″		steel	25,000 to 35,000 +	$2000 to $3000
Home BBR-D	14	35x26x40				yes	381				24			6″		steel and cast iron		$499 to $599
Hunter HWO 100	12	53x47x56	26x54	17x54	yes		790				26		yes	8″			110,000	
Hunter HWO 125	12	53x47x56	26x54	17x54	yes		790				26		yes	8″			138,000	
Hunter HWO 135	12	53x47x56	26x54	17x54	yes		790				26		yes	8″			150,000	
Hunter HWO 150	12	53x47x56	26x54	17x54	yes		790				26		yes	8″			164,000	
Johnson Conv.	21	36x18x24				yes				yes			yes	6″		steel		$259
Longwood	16	40x24x66		16x16	yes		550 to 750			yes	60	11⅛x11¾	yes	6″		steel, cast iron, aluminum	115,000 to 150,000	$1065
Lynndale 810	17	51x32x68				yes	1000		yes		30		yes	7″			125,000	
Lynndale 910	17	51x36x73				yes	1000		yes		30		yes	8″			200,000	
Newmac CL140B	6	50x54x48	51½x21¼	51½x16¾	yes		1035		stainless steel		24	17x17	yes	8″			142,000	
Northeaster 101B	4	48x36x29			no	yes		24″x24″x21″		yes	16		yes	7″		steel	100,000	
Parlor BBR-A	14	34x20x27					364		refractory	yes	24			6″		steel and cast iron		$700
Ram Boiler	25	48x27x42			no		350				28½	10x10	yes	5″		steel	75,000	
Ram Furnace	25	48x27x42			no	yes	350				28½	10x10	yes	5″		steel	75,000	
Red Ox 111	8	49x30x35			no		700	30″x18″x17″		yes	30	15x16	yes	8″	red enamel	iron and steel	600,000	
Riteway LB20	26	68x33x50			yes		1500	15 ft³			20	16x16	yes	7″			125,000	$2400

Table 10. Wood-Burning Furnaces (Continued)

Brand	Mfr. or source	Size in inches (HWL)	Warm air plenum (in.)	Cold air plenum (in.)	Multifuel	Can use as add-on	Weight (lbs.)	Firebox size	Firebrick lining	Airtight	Log length (in.)	Loading door (in.)	Thermo-stat	Flue size	Body finish	Body material	Btu per hour	Price
Riteway LB30	26	68x36x56			yes		2000	17.5 ft³			24	16x16	yes	8″			160,000	$3088
Riteway LB50	26	68x36x68			yes		2600	26.2 ft³			36	16x16	yes	8″			200,000	$3221
Riteway LB70	26	68x40x84			yes		3200	43.4 ft³			48	16x16	yes	10″			350,000	$3840
Riteway LF20	26	53x34x68	16x30		yes		1000	13.5 ft³			24	13x14	yes	7″			125,000	$1442
Riteway LF30	26	65x36x73	16x32		yes		1600	20 ft³			24	14x16	yes	8″			160,000	$1950
Riteway LF50	26	65x36x85	24x32		yes		2400	30 ft³			36	14x16	yes	8″			215,000	$2110
Riteway LF70	26	65x40x103	28x36		yes		3050	45 ft³			48	16x16	yes	10″			350,000	$2760
Tarm OT35	13	51x39x30			yes		1089				21	10x12			red-orange enamel	steel plate	112,000	
Tasso A3	13	40x18(HW) 24–33(L)			yes	yes	787 to 1023			yes	20–30		yes	6″	enamel	steel and cast iron	126,000 to 180,000	
Thermo-Control 500A	31	47x31x44			no	yes	480	34″x24″x24″	yes	yes	24	18x21	yes	8″	paint	steel		
Thermo-Control 500W	31	32x24x40			no	yes	455	34″x24″x24″	yes	yes	24	18x21	yes	8″	paint	steel		
Valley Comfort F51	12	50x32x65	35x25	16x25	no		860				36	12x15		8″			90,000	
Valley Comfort F71	12	50x32x77	47x25	16x25	no		950				48	12x15		8″			130,000	
Valley Comfort RB3D	12	46x30x45	25x36		no		485				36	12x15		8″			90,000	
Valley Comfort RB4D	12	46x30x57	25x48		no		580				48	12x15		8″			120,000	
Woodmaster	30	32x32x19						20″x11″x25″	yes	yes	24	10x12	yes	8″		steel and cast iron		
Yukon	33	50x56x30			yes		600		yes	yes	24	10″ wide	yes	8″		steel and cast iron	85,000 to 112,000	

green wood, trash, garbage, old paper, and catalogues effectively because fuel is stored in top section and feeds down to the high-temperature burner in lower section (1800 degrees). Secondary combustion chamber has afterburner (1000 degrees). All units are made-to-order and come with casings for convection or forced air. Water heater available in Model F125. These furnaces have been widely used in Vermont for 20 years.

2. **Carlson Mechanical Contractors, Inc.** (manufacturer), Box 242, Prentice, WI 54556. The Carlson boiler (Table 10) has domestic hot-water capabilities. Boiler constructed of welded steel plate and tubing. Connects to existing hot-water heating system. Automatic controls included, or uses pump and controls of existing boiler.
3. **Cleveland Stove and Specialty** (manufacturer), 15779 Broadway Ave., Maple Heights, OH 44137. Makes a combination wood/coal furnace (Table 10), available as a radiant model with louvered sides, a gravity model with plenum, or a furnace attachment with solid sides, plenum, and blower.
4. **Waldo G. Cumings** (manufacturer), Fall Rd., East Lebanon, ME 04027. The Northeaster (Table 10) is a furnace and boiler that can be used as an auxiliary heating system when connected to existing hot-air duct system or hot-water system. Designed for 1200 square-foot home.
5. **Sam Daniels** (manufacturer), Box 868, Montpelier, VT 05602. Daniels furnaces are designed to burn large chunks of wood. The firebox material is stainless steel. All models have thermostat controls. The large heat exchangers (heat drums) are standard. See Fig. 77 and Table 10.
6. **Dualfuel Products, Inc.** (manufacturer), Box 514, Simcoe, Ontario, Canada N3Y 4L5; Dualfuel Products, Inc. (U.S. distributor), 2775 Pittsburgh Ave., Cleveland, OH 44115. The Newmac wood/oil furnace has separate combustion chambers and switches from wood to oil automatically. There are two heat exchangers. Wood fire can be maintained during power failures. Firebox liner is made of stainless steel. Oil burner made by Carlin. Three other models available, but wood-burning section is the same. See Table 10.
7. **Duo-Matic Division** (manufacturer), 2413 Bond St., Park Forest South, IL 60466, and Duo-Matic of Canada (manufacturer), Waterford, Ontario, Canada NOE 1YO. Duo-Matic's furnace (Fig. 78 and Table 10) has two combustion chambers, one for oil or gas and the other for wood or coal, with two thermostatic controls for automatic switchover from wood or coal to oil or gas. Oil or gas burner will not become fouled with ashes or soot from wood/coal chamber. Regular-size air filters. Solid-fuel chamber has cast-iron grates. Heat exchanger is standard, as is a "heat-limit control" device which prevents excessive temperatures by automatically closing the damper.

   Company also manufactures the DWO combination furnace which cannot burn coal, and a furnace for wood-burning only, which comes with or without its own blower section. The latter is available for immediate shipment, the company says. Presumably, the other models are only available on order.
8. **Energy Options, Inc.** (manufacturer), P.O. Box 303, Green Bay, WI 54305. The firebox of the Red Ox (Table 10) is a "continuous coil" of black iron pipe which, the manufacturer claims, exceeds ASME specifications in strength. The coil also utilizes certified weldments. In combination with the "Heat Sink Tank" (optional) the furnace/boiler also provides domestic hot water. Primary air is delivered to the firebox through solenoid-controlled dampers with a measured supply of heated secondary air. Two smaller models available. Five-year guarantee.
9. **Enwell Corp.** (manufacturer), 750 Careswell St., Marshfield, MA 02050. The Spaulding Concept furnace and boiler burns fuels such as large chunks of

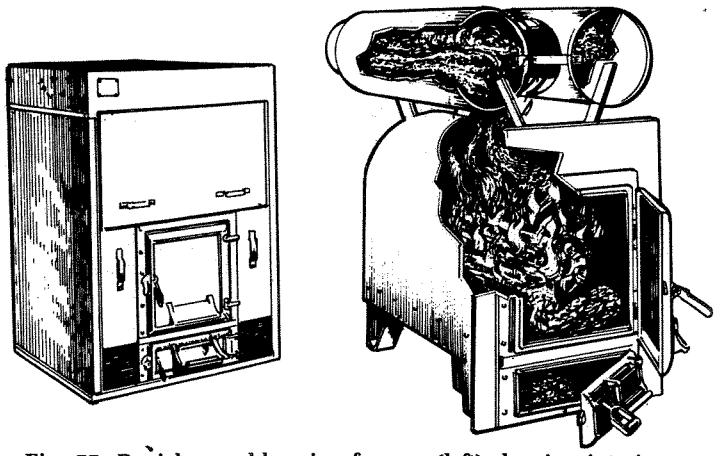


Fig. 77. Daniels wood-burning furnace (left) showing interior view (right).

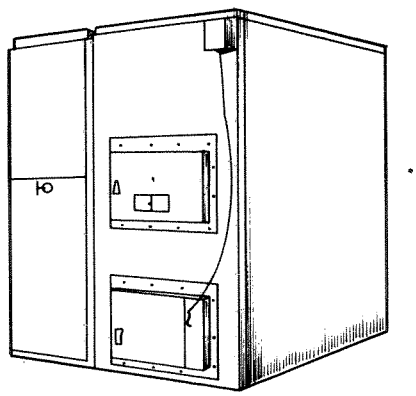


Fig. 78. Duo-Matic Model CWO multifuel furnace.

wood, logs up to 30 inches, chips, trash, rubber, and used engine oil, according to the manufacturer. Up to 100,000 Btu per hour.

10. **F & W Econoheat, Inc.** (manufacturer), Star Route—Box 53A, Bozeman, MT 59715. A wood-burning fireplace/furnace, the BHV or Boyd Heating and Ventilation system can be used as a complete central forced-air heating system or can be added to an existing system. Delivers more than 100,000 Btu per hour. Unit has iron firebox (with replaceable cast-iron plates), glass doors, temperature-control box, combustion-air blower, and backdraft damper. Uses outside air for combustion and flue. Comes with heating/cooling thermostat. Price: $2395.00.
11. **Hiestand Distributors** (distributor), 1830W State St., East Petersburg, PA 17520. The Mascot wood-burning "hot-water furnace" is firebrick-lined, takes 26-inch logs, is ASME-approved, and delivers 75,000 Btu per hour. It is made of cast iron and steel.
12. **Hunter Enterprises Orillia, Ltd.** (manufacturer), P.O. Box 400, Orillia, Ontario, Canada L3V 6K1. The manufacturer of the Hunter combination wood/oil furnace (Fig. 79 and Table 10) claims 82-percent efficiency burning oil and "over 80-percent" burning wood. The oil-burning section incorporates a pressure-atomizing-type oil burner which evenly sprays the oil into the alumina/silica-fibre-felt-lined refractory. Wood-burning section is thermostatically controlled. The separate combustion chambers for wood and oil are designed to minimize the possibility of wood-ash fouling the oil-burning section. Hot gases are fed separately into a common secondary heat-exchanger with a horizontal baffle. The thermostatic controls permit the automatic startup and normal operating cycles of the oil-burning section to take over and maintain a preset temperature in the event the heat output of the wood-burning section decreases.

    The Valley Comfort Models RB-3D and RB-4D are designed to operate with either natural draft or forced-air circulation, and will function without the use of electricity (Fig. 80 and Table 10). The heat exchanger

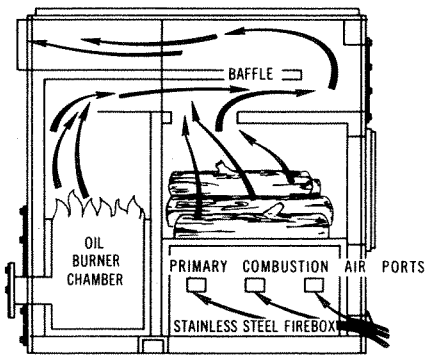


Fig. 79. Hunter combination wood/oil furnace flow-patterns.

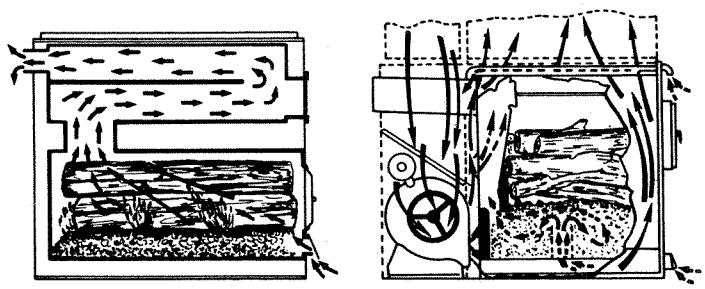


Fig. 80. Valley Comfort wood-burning furnace flow-patterns.

of the F-51 and F-71 models is "heavy gauge steel plate," and is lined with firebrick.

13. **Integrated Thermal Systems** (distributor), 379 State St., Portsmouth, NH 03801. The H.S. Tarm OT-35 boiler (Table 10) is made of steel plate and provides water for heating as well as domestic supply. Wood is used in combination with oil, gas, or electricity. Combustion chambers are separate. Three center tappings are for optional installation of electric heating elements. Automatic draft-regulator controls fire. Base-burning principle is employed (secondary air is mixed with smoke and other volatiles, which are drawn over the fire before leaving firebox). Boiler can be supplied with a tank-type or tankless system for domestic hot water. The tank is steel that has been coated with high-fired porcelain enamel, and an anode further reduces the possibility of corrosion. Tankless coil is large-diameter copper tubing. All plate exposed to flue gases is about 5/16-inch thick. Steel jacket is fully insulated and finished in red-orange stove enamel. Both fire chambers are surrounded by water on all sides, including bottom, for greater heat-transfer. All threaded tappings accept U.S. controls and equipment. Limited 5-year warranty.

    The Tasso A3 boiler (Table 10) is available in four sizes and can be used alone or in combination with an oil- or gas-fired boiler. Optional burner plate allows easy conversion to oil or gas firing. Unit can be supplied with a top-mounted tank heater for domestic hot water.
14. **Kickapoo Stove Works, Ltd.** (manufacturer), Box 127–46, La Farge, WI 54639. The Parlor Furnace has the interior surfaces of the plate-steel hull lined with angled steel ribs to increase radiation. Outer surface is finely ground to a seamless finish to enhance visual appeal. Both models (Fig. 81 and Table 10) have cast-iron doors and frames to resist warpage, and are designed with a special airtight seal. They also have manual draft control and a recessed flue to "retard escape of heat." Grates are high-temperature stainless steel. Solid cast-refractory firepot is 1½ inches thick, weighs 105 pounds, and is edged with steel. The Home Furnace Model BBR-D has a series of heat

exchangers and a thermostatically controlled blower. It can be used with an existing gas, oil, electric, or solar-power forced-air furnace.

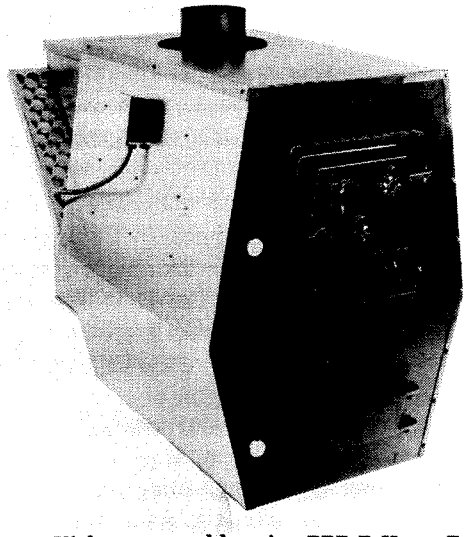


Fig. 81. Kickapoo wood-burning BBR-D Home Furnace.

15. **The Liter Knot** (dealer), Springs Rd. at County Home Rd., Hickory, NC 28601. The Ray-Mask wood-burning furnace (Fig. 82) is firebrick-lined and has three heat exchangers. The smoke goes up at rear of furnace and into heat exchangers on both sides; it then travels to front of each lateral heat exchanger, up to center heat exchanger, and then to the flue. Exchangers have cleanout caps for easy access. Standard equipment includes Dayton blower assembly, damper motor assembly, fan-and-limit switch, and thermostat control. Optional features are "draft-o-stat," air-conditioning coils with remote condensing unit, and electric-heat package for standby heat.

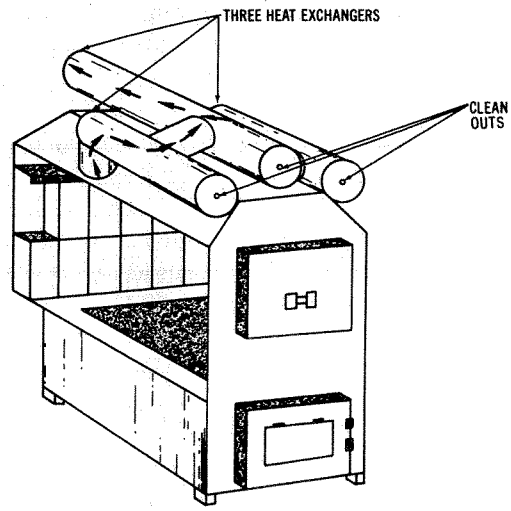


Fig. 82. Ray-Mask wood-burning furnace.

16. **Longwood Furance Corp.** (manufacturer), Rt. 2, Box 223, Gallatin, MO 64640. A built-in flue-heat reclaimer on the Longwood (Fig. 83 and Table 10) extracts heat from hot gases as they pass over 35 heat tubes. A thermostatically controlled blower forces fresh air through the heat tubes and, according to the manufacturer, reclaims as much as 30,000 Btu. Oil or gas (LP or natural) power burners are available as standard equipment and are interchangeable. Air-conditioning units up to 4 tons can be accommodated. The Longwood's combustion chamber is designed to slow the burning process, providing more complete combustion at lower flue temperatures. Manufacturer claims its "unique, no-draft" system converts wood to charcoal, and in the process generates and burns combustible gases to attain an efficiency of up to 75 percent while controlling overheating. Solid fuel and liquid or gaseous fuel are combined in the same combustion chamber. The oil or gas burner fires directly onto the wood without applying a draft of additional air, thus converting the wood into charcoal. The wood remains as slow-burning charcoal between burning cycles, providing even heat with minimal heat-loss. The nearly complete combustion leaves only a small amount of ash. A roller inside the feed door allows ease of loading large logs. Wood provides about 75 percent of the heat during the firing cycle, and the furnace is capable of providing heat during power failures.
17. **Lynndale Central Heating Systems** (manufacturer), 1309 N. Hills Blvd.—Suite 207, Crossroads Business Park, North Little Rock, AR 72116; Lynndale Manufacturing Co., Inc., P.O. Box 1154, Harrison, AR 72601. The Lynndale cabinet is made of 24-gauge

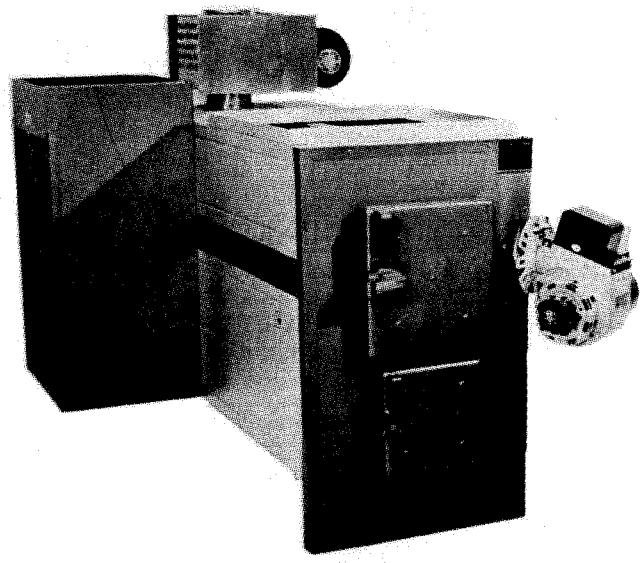


Fig. 83. Longwood wood/oil or wood/gas furnace.

sheet metal. Units can work in combination with existing oil, gas, or electric heating systems. Domestic hot-water system optional, as are air-conditioning units. Unique secondary combustion chamber. See Table 10.

18. **Marathon Heater Co, Inc.** (manufacturer), Rt. 2, Box 165, Marathon, NY 13803. Makes a wood-burning combination furnace, the Logwood, which can deliver 200,000 Btu per hour.
19. **Minnesota Energy Savers, Inc.** (manufacturer), 305 Main, La Crescent, MN 55947. Their Lumberjack add-on wood-burning furnace (Fig. 84) weighs 550 pounds and has cast-iron grates and doors. Firebox is firebrick-lined and takes 28-inch logs. Blower has 465 ft^3/min capacity. Stove hooks up to existing hot-air furnace.
20. **Monarch Division,** Malleable Iron Range Co. (manufacturer), 715 N. Spring St., Beaver Dam, WI 53916. Add-A-Furnace wood-burning furnaces (Fig. 85 and Table 10) are airtight with double-wall construction for heat exchange. Models AF224 and AF324 have thermostatically controlled primary- and secondary-air damper. All have cast-iron grates; Model AF324, a cast-iron door mounted on cast-iron frame.

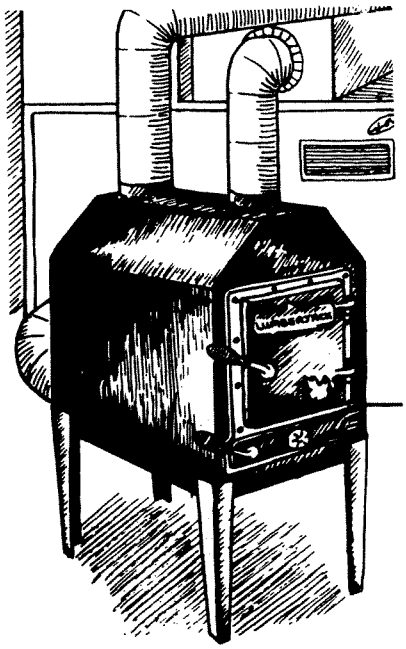


Fig. 84. Lumberjack add-on wood-burning furnace.

21. **Natural Energy Systems** (manufacturer), 530 Fremont St., Lake Mills, WI 53551. Another wood-burning supplemental furnace, the Johnson Energy Converter (Table 10) works with an existing heat system by using the same air ducts and chimney (50 square-inch, Class A chimney) used by a forced-air gas or oil furnace. Blower acts as heat exchanger, blowing cold air around firebox and into 7-inch stovepipe plenum leading to existing air ducts.
22. **New Hampshire Wood Stoves, Inc.** (manufacturer), P.O. Box 310, Fairgrounds Rd., Plymouth, NH 03264. Has two hot-air wood-burning furnaces.
23. **Oneida Heater Co., Inc.** (manufacturer), 109 N. Warner St., Oneida, NY 13421. Their Woodcraft wood-burning furnaces produce 80,000 to 120,000 Btu per hour. All three units have forced circulation and can be paired with existing gas or oil warm-air systems.
24. **Powrmatic Inc.** (manufacturer), 2906 Baltimore Blvd., Finksburg, MD 21048. Makes a wood-burning furnace/solar-air mover and wood/oil, wood/gas furnaces. Wood-burning furnace can be used as solar-air mover or as standby system for gas or oil furnaces with ducts. Airflow capacity adequate for air conditioning.
25. **Ram Forge** (manufacturer), Brooks, ME 04921. Ram's furnace is designed to be either a sole heat-source or a companion to an existing gas or oil hot-air system. For hot water heat, the Ram boiler has three 1¼-inch IP flow tappings, one for a pressure-relief valve and two for water flow. An insulated jacket is offered as an option. Body is welded quarter-inch steel plate, and the furnace has 30 fins on the firebox sides for greater radiating surface. The furnace is supplied with a 24-gauge, galvanized steel plenum having cross-broken panels for extra strength and quiet operation. The furnace has Ram Stat, an automatic, thermostatic fan control, and the boiler is equipped with the Aqua Stat to turn on the circulating pump. Firebox has horizontal baffle to burn logs from front to back, as in Scandinavian-type stoves. Hot water for tap optional on both. See Table 10.
26. **Riteway Manufacturing Co.** (manufacturer), Division of Sarco Corp., P.O. Box 6, Harrisonburg, VA 22801. Riteway furnaces (LF20–70; Fig. 86 and Table 10) are equipped with thermostatic controls, barometric damper, draft inducer, forced-draft and warm-air circulation blowers, filters, galvanized casing, heat exchanger, and a mounting tube for installation of an oil or gas burner.

    The boilers (LB20–70; Table 10) have combination temperature-pressure-altitude gauge, dual controls including pressure-relief valve, barometric damper, and thermostatic controls. Oil burners, gas burners, domestic water heaters, and humidifier are optional. Flow tappings are from 2 to 3 inches, depending on the model.

    Fig. 87 shows *(1)* the ash-pit blower, which provides a forced draft and is usually operated by an aquastat maintaining the desired water temperature. The blower may be operated by a room thermostat, if

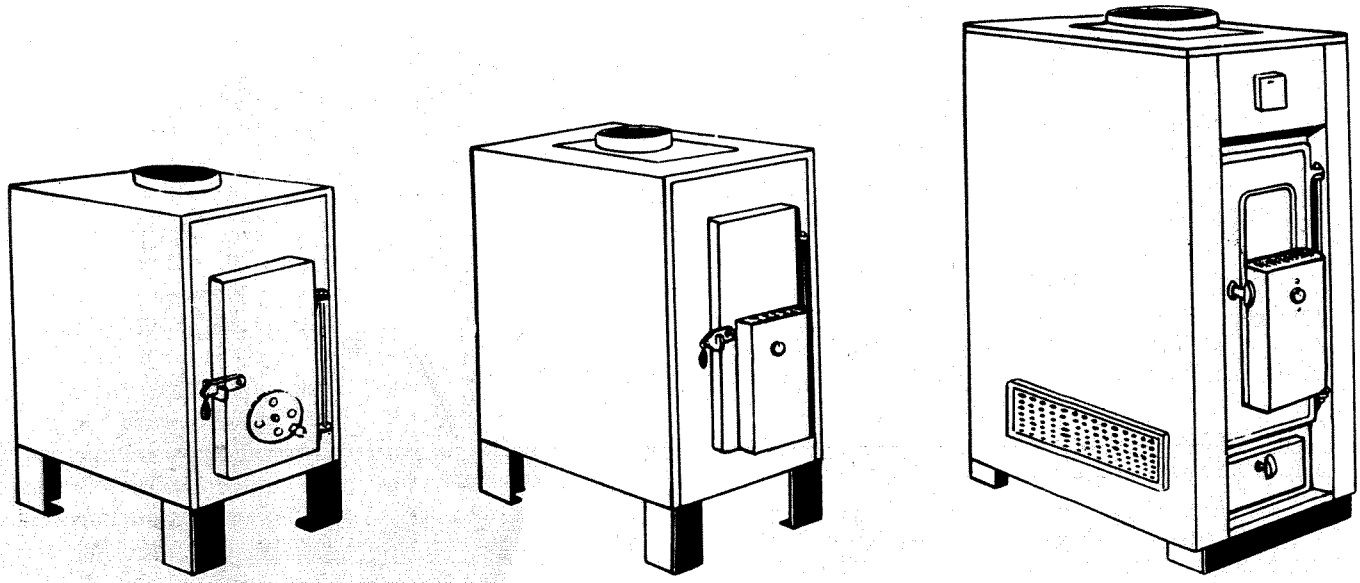


Fig. 85. Add-A-Furnace wood-burning furnaces, Model AF124 (left), Model AF224 (center), and Model AF324 (right).

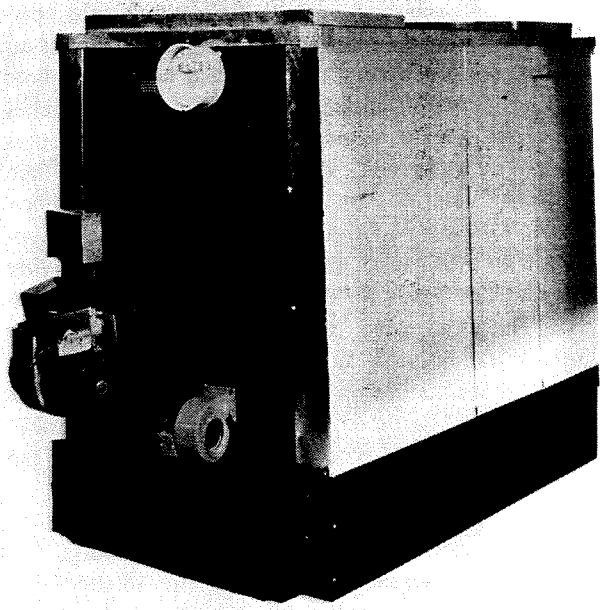


Fig. 86. Riteway furnace.

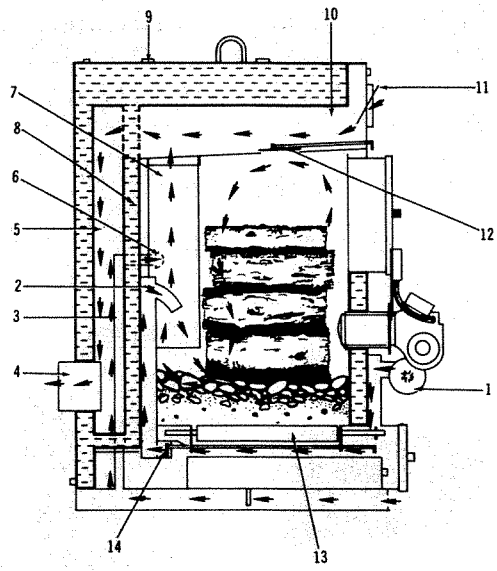


Fig. 87. Riteway boiler.

the unit is a gravity-type boiler. The air travels from the ash-pit blower into the ash pit and upward through two air ports on either side of the gas combustion flue. The flow of air helps to create a back-to-front burning pattern, which, in turn, maintains the very hot zone around the gas combustion flue needed to burn the wood gases. Two cast-iron air ports (*2*) direct the flow of primary air into the combustion chamber, and a secondary air duct (*3*) supplies air to the cast-iron distributor (*6*) in the gas combustion flue. The preheated secondary air provides the oxygen necessary for complete burning of the wood gases. The smokepipe collar (*4*) is located at rear of boiler, and flue gases flow down the heat chamber (*5*) and pass out through the smoke pipe opening. A heavy cast-iron gas-combustion flue (*7*) is mounted entirely within the combustion chamber in order to maintain the high temperature necessary to burn wood gases. Thick plates welded to two water circulating tubes (*8*) form a downdraft chamber and provide long fire-travel. The steel plates also aid in conducting heat to the tubes. Flow tappings (*9*) are located on top of boiler. The bypass air heating flue (*10*) has a barometric damper (*11*) which prevents excessive draft in the boiler during windy weather. The dry, warm air is mixed with flue gases and helps prevent sweating in the smokepipe and chimney. The direct-draft damper (*12*) helps prevent smoking when starting a fire or adding fuel. Extra-heavy grate bars (*13*) are made for long service, and the fuel selector

damper (*14*) permits shifting draft when burning coal or wood (Fig. 87 and operating information courtesy Riteway Manufacturing Co.).

27. **S/A Energy Division** (distributor), 730 Midtown Plaza, Syracuse, NY 13210. The Multitherm (Fig. 88) is a multifuel furnace that converts from wood to coal, oil, or gas. The S/A Anthratherm is also available for automatic coal operation. The Multitherm boiler is of cast-iron and steel construction with cast-iron grates. Automatic temperature controls can be regulated for hot-water or low-pressure steam systems. Built to ASME standards with optional domestic hot-water coil.

    The Surefire furnace comes in several models for home or commercial use and is to be connected to an existing oil or gas furnace, using the existing duct-work and blower. Firebox holds logs up to 30 inches long; heat exchanger provides 64 square feet of heating surface; unit delivers up to 140,000 Btu per hour.

28. **Self Sufficiency Products** (manufacturer), One Appletree Square, Minneapolis, MN 55420. The Gibraltar Tie-In wood-burning furnace measures 44 by 20 by 26 inches, weighs 300 pounds, and has a capacity of 60 pounds of wood. The furnace works with existing oil or gas forced-air systems and is automatic.

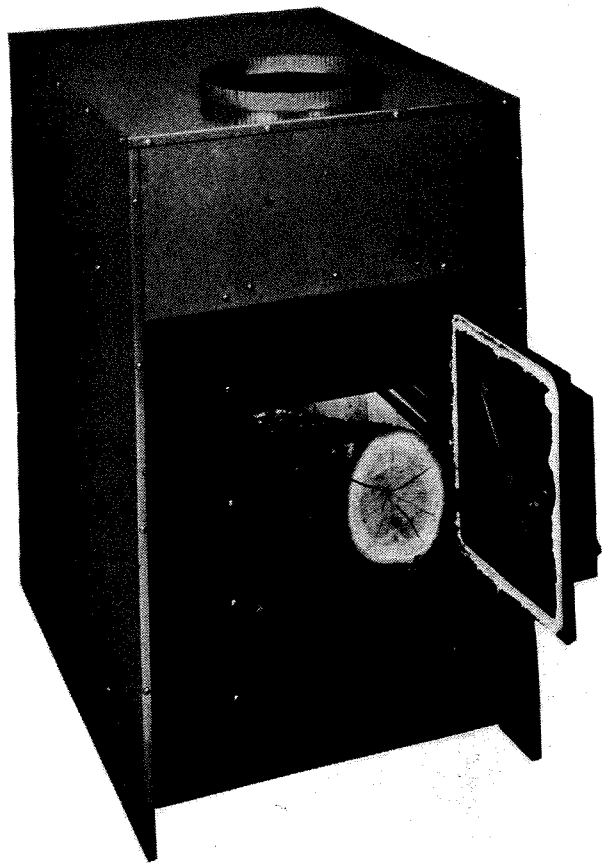


Fig. 89. Woodmaster supplemental furnace unit.

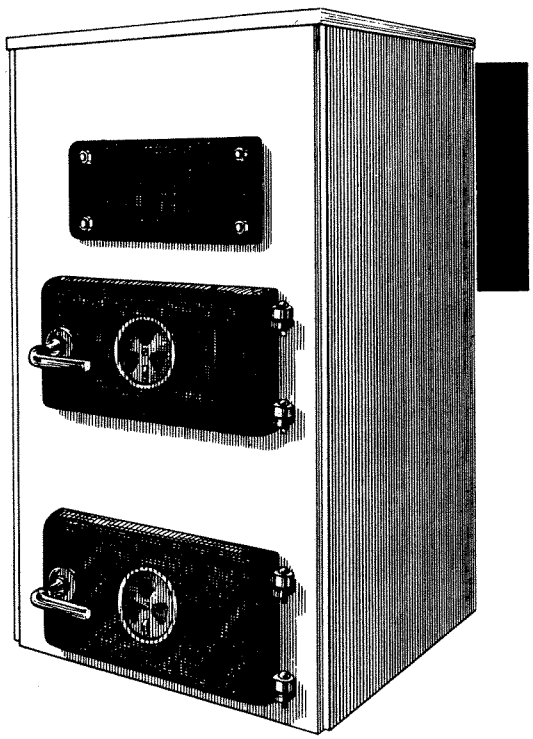


Fig. 88. Multitherm boiler.

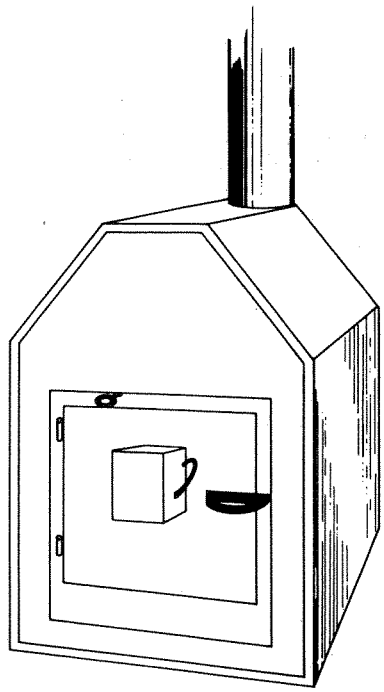


Fig. 90. Thermo-Control Model 500A wood-burning furnace.

29. **Skaggs Manufacturing & Foundry Co.** (manufacturer), Box 157, Crocker, MO 65452. Makes wood-burning furnaces.
30. **Suburban** (manufacturer), P.O. Box 399, Dayton, TN 37321. Makes the Woodmaster supplemental furnace unit (Fig. 89 and Table 10), with optional blower.
31. **Thermo-Control Wood Stoves** (manufacturer), Howe Caverns Rd., Cobleskill, NY 12043. Both models (Fig. 90 and Table 10) operate in horizontal flow-pattern similar to Riteway models ("down-draft"). Door contains preheat chamber. Interior vertical baffle has bypass damper door operated by lever in front of furnace. Leg height is adjustable. Secondary draft is preheated in tubes running along both sides and exiting at the bottom of baffle in the path of exhausting gases and smoke for secondary combustion. Airtight doors have gaskets. Both models work in tandem with existing furnaces. Model 500W comes with 3/4-inch black iron pipe already installed in the firebox. Model 500A includes warm-air hood. Options include domestic hot-water piping ($79.00), warm-air hood ($100.00—for 500W), and tool set ($24.95).
32. **Vermont Counterflow** (manufacturer), East Hill, Plainfield, VT 05667. Vermont Counterflow offers the Counterflow Wood Furnace, which is a kit for making a steel-and-firebrick furnace that can be adapted to heat water.
33. **Wilson Industries** (manufacturer), 2296 Wycliff, St. Paul, MN 55114. The Yukon wood/oil, wood/gas warm-air furnace (Table 10) has its oil or gas burner in a separate combustion chamber, and has a secondary-air inducer (forced air). Burning is controlled by a cadmium sulfide cell flame-detector. The two heat exchangers amount to 63 square feet of available heating surface. Comes with blower, motor, and filter.
34. **Wood Heat** (dealer), Route 212—Pleasant Valley, Quakertown, PA 18951. The Len-Jay wood-burning furnace can be connected to your present forced air furnace and although automatic, can be adjusted to gravity-feed in a power failure. Firebrick-lined with 1-year guarantee on parts, 5-year guarantee on firebox. Approved by Western Casualty Underwriters Insurance Co.