Read the article "Keeping Warm in the Winter."

Keeping Warm in the Winter

by Tom Kernan

1 During colonial times, one of the most daunting tasks people faced was trying to stay warm during the cold winter months. Although cast iron wood stoves existed in colonial America, they were generally rare in many households. Settlers in upstate New York typically heated their rooms with fireplaces that, during the coldest winter months, at times would not even bring the room temperature above freezing. Warren Johnson, while visiting his brother Sir William Johnson at Johnson Hall in Johnstown, NY, wrote in his journal:

> *"December the 28th, 1760. It was so cold as to freeze almost anything even by the fire's side: The frost is soe intense, that if you walk in leather shoes & gloves, you are frostbitten."*
>
> *"January 11, 1761. That strong Punch in 20 Minutes, is covered with a Scum of Ice, & Ink on a Table is frozen, before the fire."*
>
> *"January 24–25, 1761. The weather soe cold that handling Brass, or Iron leaves A Blister on the fingers & in Bed People are cold even with ten blankets on."*

2 Therefore, it was important to have certain implements in the house to help [people] stay warm during winter. One of those items was a bed warmer. A bed warmer is a brass pan and lid attached to a long wooden handle. By filling the pan with hot embers[1] and running the pan under the covers, colonials could warm up their beds before getting in. Another similar item was the foot warmer. A small box made of either brass, wood and tin or just wood with a tin pan inside, it too was filled with hot embers and placed at the feet to keep one's toes warm. To keep your food warm while eating, hot plates were used. These are deep hollow plates usually made of pewter or ceramic filled with steaming hot water. To keep the body warm, people dressed in layers of thick wool clothing starting with long underwear, which stayed on the body until the weather warmed up in the spring. The following quote from the *Farmer's Almanac*, 1784, gives advice on how to keep warm during winter:

[1]hot embers—pieces of hot coal or wood from a fire

"RECIPE TO KEEP ONE'S SELF WARM A WHOLE WINTER WITH ONE PIECE OF WOOD."

"Take a piece of wood, fling it out the window into the Yard; then run downstairs as hard as you ever can; when you have got it, run up again with the same measure of speed; keep throwing and fetching up until the Exercise shall sufficiently heated you. Renew as often as the occasion shall require!"

a colonial foot warmer

EL628455630 Passage

Read the passage about a type of woodburning stove invented by Benjamin Franklin.

from "How to Keep Warm"

by Kathleen Krull

1 Ben Franklin was not a scientist in the sense of a person coming up with a hypothesis and trying to prove it. Rather, he started with a practical problem and tried to find a solution, and in the process he observed scientific principles at work. And the problem most on Franklin's mind was health. Everyone, not just the Franklin family, suffered from the brutal winters in the Colonies.

2 The way homes were heated at the time was terribly inefficient. Huddling near traditional open fireplaces meant burning your feet while your rear end remained numb with cold and drafts blew elsewhere around the room. In addition, everyone was breathing smoky, sooty air, which produced coughs, itchy eyes, colds, and diseases.

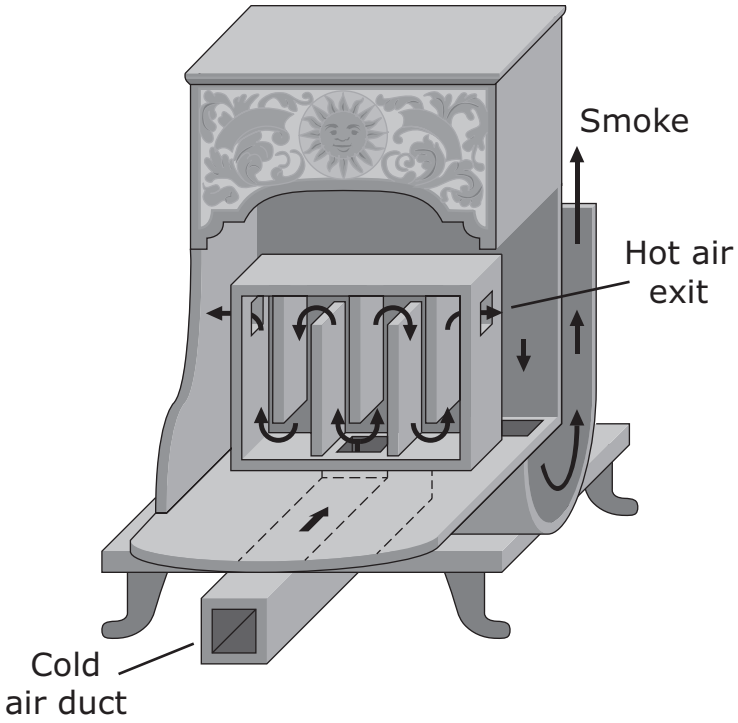
3 What would help? Ben started tinkering with home-heating designs around 1740. Others were working on this same problem, but not with the same scientific understanding that Ben possessed. Franklin was keenly interested in how the human body regulated heat. He carried out experiments with a machine he built, verifying for himself William Harvey's finding that the circulation of blood distributed heat within the body. A room was like a body, needing its temperature to be properly regulated.

4 Without a lab of his own, using his own house instead, Franklin investigated the flow of air, seeing if there was a way to control it. He held a lit candle up to a keyhole to observe the candle flame bending toward the keyhole, showing that the warmth was escaping. He did experiments heating empty bottles, then inverting them in water, observing that as the temperature of the air in the bottle decreased, the air contracted and created space so that water was drawn into the bottle. This demonstrated that warm air took up more space than cold air.

5 When wood was burned in an ordinary open fireplace, the heat radiated out. Since heated air rises, most of the heat went directly up and out the chimney and was quickly lost. Meanwhile, if there were any chinks in the walls or windows, the fire actually pulled *cold* air into the room, because as hot air went out the chimney, *cold* air rushed in to replace it. According to Franklin, this makes "a continual whistling or howling; and it is very uncomfortable as well as dangerous," causing "colds in the head, rheums, and defluctions[1] which fall into [the] jaws and gums."

[1]rheums and defluctions—symptoms of a cold, such as a runny nose

6 Franklin's idea was a new kind of woodburning stove. He would move the fire from an open hearth into a metal box that was inside the fireplace and connected to the chimney. Behind the metal box, he added a "winding passage" of small metal chambers that made hot air travel a longer path and kept it from escaping so quickly. Metal is a good conductor of heat, so the heat in the metal box was captured and radiated into the room, while the smoke was directed into the chimney.



a diagram of Franklin's stove

7 Now instead of crowding near the fireplace, people could move around a room. They could see the fire, which was comforting psychologically—something other enclosed stoves such as the Dutch oven did not afford.

8 Franklin's stove represented an improvement in comfort, and it was also energy efficient. Franklin worried that the clearing of so many forests in the New World might result in such a terrible shortage of wood that coal for heating would have to be imported from Europe—much too expensive. Franklin's iron stove used one-quarter the amount of wood that a typical fireplace used, he claimed, even though it gave off more heat.

9 The Franklin stove was a perfect example of how science could improve everyday life. It was useful. It was practical. It was wonderful!