

How to Keep Warm This Winter

I WANT to talk about a problem which we will all have to face in a few months' time. It probably seems a bit early in the year to start worrying about house heating, but if you are going to do anything about your present heating system—now is the time to do it.

Generally, our New Zealand climate is not too severe in the winter. This means that central heating, as it is used overseas, is not necessary in the average home. Nor do we need the whole house heated to an even temperature. We can be satisfied with some sort of heating arrangement which will keep one room nicely warmed—and the chill off the rest of the house.

So that we can examine this business with some degree of logic, I've divided the talk into three parts: First of all an examination of the heating arrangements in the average New Zealand home. In particular I'm going to discuss the conventional open fire. Then I'm going to suggest an alternative to the open fire—namely, the slow combustion stove. And finally, I'll deal with the economics of the two systems; I'll compare the initial cost of installing these two methods of heating, and the amounts of fuel needed to obtain the equivalent amount of warmth from each appliance.

Now, getting back to the first point—an examination of our present heating arrangements. Most houses have at least one open fireplace which is used as the main defence against the cold winter evenings. Let's have a look at the design of the average open fire, and briefly trace its development. It's about 18 inches wide and perhaps 2 feet high; but it wasn't always as small as this. I remember one that I saw in action some years ago. It must have been all of four feet

The talk reprinted below was given recently in "Science Commentary," by R. F. BENSEMAN, of the Dominion Physical Laboratory, who has made a special study of heating problems

wide and the best part of three feet high. It burnt a prodigious amount of fuel, but it was certainly cheery and most effective in keeping the room warm. The modern equivalent of this old style of fireplace has been developed for economic reasons. Fuel is no longer available for the taking, as it was 50 or more years ago. As a result the fireplace has been scaled down so that it will use less fuel. The present day open fire is only a shadow of its former self—and its continued use as a heating appliance has become a luxury which few of us can really afford.

Now I'm going to introduce a few figures to make some of my points clearer. In the laboratory at Gracefield, we've measured the efficiency of an ordinary open fire, mainly to give us results to compare with the more advanced methods of heating. The results did not surprise us, since we expected them, but they may come as something of a shock to you. For every ton of coal that is burnt in the open fire—between 17 and 18 hundredweight are effec-

tively lost up the chimney in the form of smoke and heated gases. The heat into the room is obtained only from the two or three hundredweight which are not lost in this way. At the Laboratory we would say that the open fire has an efficiency of between 10 and 15 per cent. This is bad enough in itself, but add to it an air-flow up the chimney of about 20,000 cubic feet per hour, and you have not only a most inefficient method of heating, but the makings of a good sized draught as well.

But let's be fair, and admit that the open fire is excellent company, and forms a focal point during the winter for the family circle. For this reason, many



Ten to 15 per cent. heating efficiency—and a 20,000 cu. ft. draught

people are prepared to put up with the low efficiency; but if you are in any way concerned about the cost of keeping warm, then the open fire which you are using at present should be examined again in the light of what I'm going to say about the slow combustion stove.

The slow combustion stove has been in use on the Continent for the last two hundred years. Its introduction was brought about by much the same conditions which face this country. Fuel was becoming scarcer and dearer so that an appliance which could convert more of the fuel into useful heat for the house was needed. We in New Zealand have been fortunate in that our need for stoves has come so much later. As a result, suitable stoves are already available from overseas, which will fill our requirements quite nicely.

Let's examine one of these stoves. It consists roughly of two boxes—one inside the other. The inner firebox has doors in front through which the fuel is fed. An air control governs the draught through the fire and so regulates the rate of burning and the amount of heat given off. The outer box is merely a shield, put there for safety and decorative purposes. I haven't time to explain how a stove works, but briefly, the main heating effect is caused by the passage of air over the outside of the firebox. This warm air circulates throughout the room, and even further if the doors are left open, and brings even heating to a large part of the house.

We have tested the various makes of stoves which are available in this country, in exactly the same way that we tested the open fire—and we found several interesting features in their operation. We found, for example, that the heating efficiency is closely related to the speed at which the fuel is burnt. The slower the burning, then the higher the efficiency. By carefully limiting the supply of air to a stove, we have been able to get efficiencies of over 70 per cent. These were rather special tests and a figure of between 50 and 60 per cent. would be nearer the practical truth. Compare this with an efficiency of between 10 and 15 per cent. for an open fire—and the savings that can be made by using a stove, are immediately apparent. And here's another point—the air requirements of a stove are usually in the neighbourhood of 200 cubic feet per hour. This is a big reduction on the needs of the open fire, which as I've said earlier, can be as great as 20,000 cubic feet per hour. In fact one of the first things you will notice when using a stove, is the almost complete absence of draught.

The figures I've given so far have put me in a position to make a few calculations on the cost of running the open fire as compared with the slow combustion stove. Since the stove is at least four times as efficient, in one winter, where formerly you used say 20 bags of coal—with a stove you should not need more than five. This seems a straightforward calculation, and yet it is at this point that human nature defeats the logic of mathematics. In a practical case we have generally found that about the same amount of fuel is burnt, irrespective of whether an open fire or a stove is used. Perhaps you are already ahead of me and have seen where I made a wrong assumption. The average householder will seldom light the open fire before the late afternoon—generally it will burn from say 4.0 until 10.0. The stove on the other hand is seldom used for such a short time, and it is almost

(continued on next page)

(Solution to No. 688)

S	C	A	N	T	R	E	G	A	T	T	A
E	S	A	E	L	U	V					
R	E	T	A	I	N	S	A	M	B	L	E
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C	O	U	N	T	E	R	A	C	T		A
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F	S	T	E	N	T	O	R	I	A	N	
E	T	E	D	P	N	A					
C	L	E	A	R	U	N	I	F	I	E	D
T	A	A	R	N	S	I					
S	T	R	A	N	G	E	E	T	H	E	R

Clues Across

- Put after a kind of lettuce to pamper.
- Overhanging mass of snow, containing grain as well as something much more in keeping.
- See 18 down.
- Mimic (4, 3).
- Live fast in this celebration.
- Palindromic doctrine.
- Back-seat ones don't need licences, but they should be suppressed, all the same.
- Twisted thorn.
- Adversary.
- No rates? this is treachery.

"THE LISTENER" CROSSWORD

- "Man is a noble —, splendid in ashes, and pompous in the grave." (Sir Thomas Browne, "Christian Morals.")
- Name of the treaty which brought to a close the War of the Spanish Succession in 1713.
- Assimilate.
- Stop her (anag.).
- 18 and 9 across. The creator of the appalling school of St. 14 down and its devilish schoolgirls.
- "When the hounds of — are on winter's traces" (Swinburne).
- Banal.

No. 689 (Constructed by R.W.H.)

Clues Down

- To stare in confusion.
- What the what-not did in the Fruity Melodrama "Only a Mill Girl."
- Mock derisively at, and very loudly in the end
- Upset an open vessel?
- "I — with none, for none was worth my strife" (W. S. Landor).
- "his big manly voice Turning again toward childish —" ("As You Like It," Act 2, Scene 7).
- Ardent.
- See 18 down.
- Comforted with cold sea.

