

**ECONOMY OF COAL IN HOUSE
FIRES; OR, HOW TO CONVERT AN
ORDINARY FIRE-GRATE INTO A
SLOW COMBUSTION STOVE AT A
SMALL COST (PP.7-47)**

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Economy of coal in house fires; or, How to convert an ordinary fire-grate into a slow combustion stove at a small cost (pp.7-47) by T. Pridgin Teale

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T. PRIDGIN TEALE

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IN

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HOW TO CONVERT AN ORDINARY FIRE-GRATE INTO A SLOW
COMBUSTION STOVE AT A SMALL COST,

BY

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SURGEON TO THE GENERAL INFIRMARY AT LEEDS.

—
ILLUSTRATED.
—

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ECONOMY OF COAL IN HOUSE FIRES.

"It is an ill wind that blows nobody any good." A smoky bed-room fire, by compelling the replacement of a dog-grate by a modified Parson's grate, forced upon my attention the principle of the economical and effective combustion of coal in house fires. Moreover, I cannot suppress the hope that the principles which are found to be true for house fires, will also prove to be true, in some degree, for the fires of steam boilers.

This discovery, for to me it was a discovery, seemed to be of such far reaching importance that I felt bound not only to communicate it to my friends, but also to publish it in the most effective way within my reach.

Let me guard myself at the outset on one point. The experience recorded in these pages has been gained almost exclusively from the use of *Good Yorkshire Coal*, and I am unable to say whether equally good results, or even approximate results, would be obtained from other kinds, and from inferior qualities, of coal.

The discovery which I made was this: that slow and efficient combustion of coal in house fires depends upon *two conditions in combination*; one, that no current of air should pass through the grate at the bottom of the fire; the other, that the space or chamber under the fire should be kept hot; and that these two points could be secured in ordinary ranges

at the cost of a few shillings. The means by which they are attained, consist in a *simple shield resting on the hearth, whereby the space beneath the fire is converted into a closed hot chamber.* Others have made the discovery before, and have embodied it in the invention of slow combustion stoves, but, as far as I know, no one has taught the public how this principle may, at a small cost, be applied to nearly every ordinary fireplace.*

A Popular Fallacy.

It is a popular fallacy, until recent years almost universally prevalent, that a fire will not burn unless a current of air passes through the bottom grate. This error is natural, seeing that the ordinary fire goes dead when the bottom bars are choked with chilled cinder and ash. Moreover, it is common enough to hear the question asked even by men extensively conversant with the use of coal and machinery, "but how *can* a fire burn without a supply of air"? *i.e.* air through bottom grating.

Waste of Fuel in House Fires.

It is a fact, constantly brought before the public by men of science, that the consumption of coal in house fires is miserably wasteful, and successful attempts have been made in recent years to lessen this waste, by retarding combustion, and by the invention of, so-called, "slow combustion grates."

* Mr. Fletcher, of Warrington, has advised that the chamber under every fire-place should be made solid, with brick and fire-clay, in an interesting pamphlet on "Economy of Fuel for Domestic Purposes, with special reference to the improvement of old fire-places."—*Guardian* Office, Warrington.

The Remedy—"Slow Combustion."

Combustion can be retarded by cutting off the stream of air which passes underneath and through the centre of the fire.

This retardation has been attained mainly by three methods.

a.—By an iron plate which rests on the grating, and closes the slits against the passage of air. This method makes a fire burn slowly—saves coal—but spoils the fire. It fails because it does not secure the "second condition," the keeping of the space below the fire hot.

b.—A second method very extensively employed has been the substitution of solid fire-brick for the open chamber beneath the fire, as in the Abbotsford grates, in the various forms of Norwich and Parson's grates, made by Barnard and Bishop, and in the elegant and ingenious, and, I believe, satisfactory, Nautilus stove. The solid fire-brick far surpasses the simple iron plate. It fulfils the two conditions essential to effective slow combustion, by cutting off the "under-current," and by keeping the base of the fire hot. As the brick becomes heated, the fire burns brightly, but, when the fire is low, the brick cools, and the fire burns dull, and does not quickly revive when mended. Mr. Fletcher, of Warrington, one of the highest authorities on heating by gas, and coal, strongly advocates the fire-clay bottom, and in a lecture* explains how every grate can be made economical and almost smoke-consuming by filling up the chamber and the bottom of the fire over the grating with fire-clay. But he tells me that such ranges need careful selection of coal.

* The lecture above referred to, which anyone interested in the subject would do well to purchase and read.

c.—In the third method, the space or chamber under the fire and the ordinary grating are retained, but the chamber is shut in in front by a shield or door, whereby the two essential conditions of “excluded draught” and “retained bottom heat” are secured. This principle forms the basis of all the best kinds of slow combustion stoves, whether it be applied as a sliding door, as may be seen in an old range in an old house in Mayfair, and in the stoves made by Smith and Wellstood, of Dublin; or as a plate of iron, closing the space between the lowest bar and the hearth, as in the Coalbrookdale modification of the Parson’s grate; or as a closed ashpan, which not only shuts in the chamber, but also catches the ashes: or as a simple shield standing on the hearth, and reaching as high as the bottom bar of the grate, which it is my object to advocate as applicable at a very small cost of money and trouble to every house, kitchen, and cottage in the kingdom which has not already been provided with a good slow combustion range.

I am convinced that the closed chamber under the fire is superior to solid brick. For ten or twelve years I have used and been satisfied with two Abbotsford ranges, and with their superiority to my ordinary grates. But since the “economisers” have been applied to my ordinary grates they have surpassed the Abbotsford ranges, giving a brighter fire, and one much more easily revived by “mending,” even when nearly burnt out. The advantages of the open grating and chamber are that the ashes leave the cinders and the cinders burn brightly and tidily, and the chamber of air surrounded by brick on three sides with the floor provides a larger surface for storage of heat than the fire-brick bottom. This storage can, if necessary—*e.g.* in the case of inferior coal—be increased by substituting for the iron shield in front a shield of fire-brick, tiles, or other badly conducting material.

Our Fire-places should be a "Focus," not a Blast Furnace.

The fact is that we have been burning coal in house fires on an *entirely false principle*, on the principle of a blast furnace, letting cold air pass through the centre of the fire to blaze the coal rapidly away, and hurry the heat and half burnt gases unused up the chimney. We have gone back from the good old principle of the embers on the earth, when the hearth was a true "focus," a centre of accumulated, stored up heat. Let us then return to truer lines and make our fire-place again a "focus," a "crucible," even a "well" of stored heat, into which we put our fuel, first to be distilled into gas which, rising at a high temperature from its hot bed, meets the air gliding rather than rushing towards the chimney, and bursts into flame, communicating heat to the firebrick back and to the room. Then, when all gases have been burnt off, the red hot coke remains, and burns away in the bottom of the well at a slow rate, owing to the limited access of air, yet radiating abundant heat into the room. Surely in this we closely approach the ideal of Dr. Siemens, one of the great advocates of economy of fuel. We, in truth, burn our fuel twice over—first converting it into gas which will burn, and not escape unconsumed as smoke up the chimney to foul the air and blacken the neighbourhood, and then utilising the coke as it slowly melts away into ash.

The Construction of the Fire-place.

It is not my intention to express any opinion upon the various slow combustion stoves recently invented; firstly, because I am not competent to do so, having no personal experience of any except the Abbotsford; secondly, because a report is being drawn up by scientific experts after careful com-