THE CRAFTSMAN FIREPLACE: A COMPLETE HEATING AND VENTILATING SYSTEM

On account of the number of inquiries that have been received in regard to the Craftsman fireplace-furnace, I have thought it advisable to publish another description and set of drawings embodying several improvements over the form of fireplace originally shown. These improvements have simplified not only the construction of the heater but also the work of installing it.

As shown in Figures 1, 2 and 3, the body is made of large sheets of steel, welded together by special welding machinery into one piece of continuous metal, making leakage of gas, smoke or dust an impossibility. It is so constructed that each smoke compartment is self-cleaning; the smoke area being vertical, there is no place for soot and moisture to collect. The heater is six feet high and four feet wide, and weighs complete with grates and other iron parts needed in the construction about 1,000 pounds.

Grates for the burning of coal or coke are supplied with each heater. These consist of only three parts and are easily and quickly set in place, no fastening being required. Figure 1 shows the removable metal hearth and grates in place for the burning of coal. The ashes sift through the grate and fall into the ash pit, which is so large that it needs emptying only once a season. This arrangement also eliminates the objectionable feature of dust from the ashes escaping into the room. If it is desired to burn wood upon an open hearth, the metal hearth and grates are removed and the opening into the ash pit is covered by a metal plate on which andirons may be placed, for burning wood, as shown in the photograph. As evident from both these illustrations, whether the fireplace is equipped with hearth and grates for the burning of coal, or is arranged with open hearth and andirons for the burning of wood, the impression is at once satisfactory and permanent.

The heater is set on the floor level, and the installation consists in merely building a four-inch brick wall around it. This wall, carried up to the ceiling and roofed over, forms the warm-air chamber above the furnace body. In one leg of the chimneypiece is set a fire-clay smoke flue, shown by dotted lines in Figure 2, which is connected with the body of the heater. I furnish one section of this flue lining having three holes, one which fits onto the flange around the smoke outlet of the heater, another which may be connected with a pipe from the kitchen range, and a third which opens by register into the room for the purpose of checking the coal fire, but which is kept closed when wood is burned. This flue starts at the bottom of the smoke outlet on the heater shown in Figure 3. This arrangement leaves the leg of the chimney below the flue free for the circulation of air.

Any mason can build the wall and make a correct installation. The cost of the brickwork competes with chimneys is less than that for the usual fireplace of
equal size. About 3,000 brick are required where there is a cellar and the chimney is carried up two stories. At a cost of $10.00 per thousand for brick and an equal sum per thousand for sand, cement and labor, the entire cost of brickwork, including $5 for flue lining, would be about $65.00.

I have used the common hard-burned brick as a basis for the above figures; where the owner desires to make the fireplace of plaster, stone, Tapestry brick or tile, the additional cost will depend, of course, upon the material selected. Hard-burned brick, at the above cost, if laid up with a wide mortar joint will make a beautiful fireplace. There are no limitations as to the design of the chimney-piece, the only requirement being that the inside measurements are kept to those shown in Figure 2.

The Craftsman fireplace may be installed in houses already built, as well as in new ones, the work in each case requiring a new chimney and the cost being practically the same. Because of the universal favor of the open fire it seems best to make only a medium-sized heater, as many people would prefer to have two or even more fireplaces in different parts of the house. The piping of warm air to the various rooms is then a small factor of the cost, as the pipes will necessarily be few and short. These are to be furnished by the owner, since they are always in stock at the local hardware store and are inexpensive.

The operation of the heater itself is as follows: As shown in Figure 1, which is a vertical section through the center of the fireplace, the smoke generated by the fire passes up through the smoke compartment, down behind the steel smoke wall to the bottom of the heater, then up through another smoke compartment to the top of the heater, where it passes through the smoke outlet flue shown in Figure 3, and out through the chimney.
The Craftsman Fireplace

During its passage the smoke heats the steel walls of the smoke compartments, which in turn heat the air in the air compartments, as will be seen by reference to Figures 1 and 2. The air is thus caused to rise and pass up into the warm-air chamber. This action draws in outside air through the fresh-air inlet, up through the air compartments into the warm-air chamber. At the same time air is also being drawn in from the room through the registers at the base of the fireplace, up through the air compartments into the warm-air chamber, where it mixes with the warmed fresh air from outside. The warmed air passes through the upper registers into rooms on the first floor, and also through the air pipes to the upper rooms. These air pipes and registers are proportioned in size so that each one will deliver the proper amount of air to the various rooms.

The warm air, upon entering each of the upper rooms, being lightest rises and spreads out in an even layer against the ceiling. This layer, as it cools, descends to the floor and passes out under the door down the stairway opening to the lower floor. Part of this air is drawn into the fire and passes out through the chimney, and the rest is drawn into the lower registers. The circulation is rapid and positive, being accomplished, as seen, by gravitation, the heavier or colder air seeking the lowest level, and the lighter or warmer air the highest. The heater thus maintains a constant circulation between the various rooms as well as a movement of the air within the rooms, making a given air supply go much farther than with other heating systems.

In this circulation, the air absorbs all impurities, and naturally the zone of the most vitiated air is nearest the floor. It is from this zone that the fireplace draws immense quantities of air and discharges it through the chimney. An adult vitiates from 2,500 to 3,000 cubic feet of air per hour. The fireplace is constructed to admit 20,000 cubic feet of fresh air and discharge through the chimney the same amount of vitiated or used air per hour, thus making perfect ventilation for seven adults. In this way the air throughout the house is entirely replaced with fresh warmed air from outdoors every fifteen or twenty minutes. Doors and windows should be kept closed in order that the circulation of air may not be disturbed, for upon the proper circulation depends the efficient heating and ventilation of the house. Under these conditions, there can be no draughts.

The danger of the fireplace smoking is entirely eliminated, as the smoke and air openings are properly proportioned and, being part of the steel body, do not depend upon the judgment of the mason. Moreover, it is not only impossible for back draughts to force smoke into the room, but sparks are prevented from escaping through the flue, thereby removing all danger of fire on the roof.

The conserving within the brick walls of all heat which has formerly been lost in the cellar, the circulating of volumes of air in contact with the large areas of smoke surface, thereby extracting practically all the heat from the smoke, and the radiation of heat direct into the room from the open fire, make the Craftsman fireplace a most efficient heating system. One fireplace will amply heat a seven-room house, with a consumption of from seven to ten tons of coal per year in a climate like that of our central States. The exact amount of fuel consumed, however, depends largely upon the exposure, the number and size of the windows, and the construction of the house. Coal or coke will furnish a more even and steady heat both day and night than wood, but because of the slow combustion due to the down draught, wood may be used as fuel with entire satisfaction from a standpoint of both economy and attention.

One of the most practical features of the Craftsman fireplace, as previously mentioned, is its adaptability to various forms of fuel, and the readiness with which the change can be made. For the burning of coal, I am making a shaker grate, and this, together with the metal hearth and upright
grates, can be simply slid into place. As shown in Figure 1, the grate rests upon a half-inch shelf made by the projection of the brick; thus, when the grates and hearth are removed and the steel plate (which I also furnish) is in place, there is no mechanism left to indicate the transformation from grate fire to open hearth.

I have designed the fireplace in this way because, in most localities, there is an occasional chilly day in the summer when a little fire would be welcome, or a damp day when its warmth is needed to dry out the house. At such times a coal fire would give more heat and incur more trouble than would be desired, while a wood fire requires very little care, need not be kept in longer than it is wanted, is cheaper than coal and much quicker. Besides, the crackling logs on the open hearth, and cheery glimpse of sparks and flames seem more companionable for such a day than the more steady glow of coal behind a grate. Then, of course, there are many weeks during the late fall and early spring when a wood fire can be kept in all day, giving sufficient heat, so that the regular coal fires need not be started until the beginning of December nor kept in after March. Especially would this be the case in localities where wood is cheap, plentiful and easily procured. In any case, it is always pleasant to know that one can have a few logs ablaze at any time with very little trouble.

In the next number of The Craftsman I am planning to have another article with further details about the fireplace, and I shall then show just how the fire may be checked or increased by the double regulating dampers which control the draughts.

The price of the steel heater complete with grates, registers and all metal parts (except the pipes needed to conduct warm air from the heater to rooms distant from it) amounts, with the freight, to $150.00. By combining this with the cost of the brickwork and the pipes one can easily install the heating plant complete inside of $250.00. The fireplace is sold only direct to users. I require the plans of each house in which it is to be installed, and from them I make and furnish free to the owner a heating layout which shows the location and size of warm-