The Cause of Creosote in Chimney Flues

The Products of Combustion from the Fire in Contact with Cold Flue Are Condensed and Deposited, Making Trouble

One of the most frequent questions which comes from country subscribers is on the trouble which they have with creosote, or rather the condensed vapors from the smoke gathering on chimneys and pipes and running down and spoiling walls and ruining smokepipes. This is worse with stoves burning green wood, but is also found with furnaces even where they burn dry wood or coal. These questions run about as follows:

1. What is the composition of this deposit and just how formed?
2. What effect does size and location and height of flue have on its formation?
3. Would jacketing or lining the flue aid in keeping down creosote?
4. Explain proper operation of stove or furnace to produce least soot and creosote, firing of fuel, draft from ash pit, draft above fire, check opening in furnace pipe or at back of stove, valve damper in smokepipe.
5. What cheap materials added to fire occasionally will prevent soot and creosote and why? One customer is very insistent that potato peelings burned in the fire will help. Is there any basis whatever to this?
6. Assuming that the farmer must burn green wood in his stove or furnace, what can he do to minimize creosote trouble without rebuilding fire, such as adding a length or two of stovepipe to top of chimney, putting pipe with damper into stove lid or door to carry cold air directly to top of flame, putting larger check opening into smokepipe, burning material with fuel, etc.

MOISTURE IN WOOD AND COAL

When wood is the fuel 1 cu. ft. weighs 35 lb. when oven dry and contains 10 per cent. of moisture or about 3½ lb., but when green it has 50 per cent. moisture or 17½ lb., and the total weight of 1 cu. ft. is then 53½ lb. Lehigh anthracite coal has 3.90 per cent. of moisture and bituminous coal from 4 to 9 per cent. As wood is prepared for fires in stoves for cooking or heating, or for furnace, it is split, and as piled in the firebox does not lie close as when the weight mentioned is considered. Then it is probable that 1 cu. ft. of space when filled with firewood does not contain more than ½ cu. ft. of wood, but if it is green wood it contains 8¾ lb. of moisture, or more than 1 gal. of water. If it is oven dry wood the same bulk contains a little less than 1 qt. of water.

It has been said that facts are stubborn things, and to make moisture go up the chimney is to make water flow uphill, which is not generally done. If the water is evaporated into steam it will go up, but the steam will chill and condense on the first cold surface, and the condensed water will then run down again.

A good deal of wood must be burned to make the heat to vaporize the water, and in the combustion other matter in the wood is changed to gases, carbon and ash. When there is so much water the combustion cannot be as complete as it should be and the free carbon becomes soot, and some sulphur supplies acid of several types, and pyroligneous acid, a form of acetic acid, is distilled. also creosote, a brown fluid of an oily nature that on condensation is annoying on account of its discoloring and staining effect. The acids start rust, the creosote produces stains. Now to avoid them means no simple detail can be overlooked.

WOOD SHOULD BE AS DRY AS POSSIBLE

It is best to dry the wood as much as possible. In country houses two or more days' supply is piled behind the stove and the pipe kept up so the drying will go on all the time. The stove must be airtight and a good bed of hot ashes helps keep up the heat when the green wood is put on the fire, and their heat keeps the temperature of the firebox from dropping so low when green wood is added that the products of combustion, smoke, soot and vapor, is hot enough to get out of the top of the chimney before it chills and condenses.

Then it is clear that green wood should never be put on a low fire, but should be put on a good bed of live coals. The question is, will they be there when the farmer's boy or girl gets up in the morning? If not there must be a supply of dry wood to start the day or there will be trouble in the chimney. That means the farmer cannot burn all wood. He must burn some brains. That means to use judgment in teaching his folks to dry some wood, to always use some dry wood when the fire is low and to give intelligent attention to the care of the fire. Too much air must not be admitted to a green wood fire. The draft must be regulated with care. With the fire intelligently managed and the stove tight, the stove pipe comes next.

It should be connected with the stove so no air can leak in at the collar. Now there is another matter. The run of the pipe must be reversed. That is, if there is much trouble the pipe must go inside of the collar on the stove and be cemented tight, then every section must have the end near the stove fit inside of the section it enters so that any moisture may run down into the stove until the fire is hot enough to send the vapor out hot and steaming all the way to the top of the chimney. Naturally the pipe must be so graded that the liquid creosote will run back to the stove. Most important is it that the chimney shall be airtight all the way to the last top brick. If the pipe is just shoved in a hole that is too large, expect trouble, for it is invited by such a connection. Make it airtight.

HELPING WET SMOKE THROUGH CHIMNEY

If the chimney is large it naturally will not be warmed up readily and a small fire may never overcome its cooling effect, with the result of a heavy distillation of the

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it may be used as a combination machine for wiring, burring and elbow edging operations.

What has already been stated relative to turning and wiring machines applies to average sheet metal shop conditions. For the very large sheet metal shop and for the shop of the industrial manufacturer where output in any given working day is of more vital importance than what a machine will cost, for producing the desired results, the power turning and wiring machine as shown in Fig. 6 was chiefly designed to meet the demand for a productive machine of good wearing qualities. The frame is one solid casting and a heavy hand wheel is used for depressing the rolls. A treadle friction clutch attachment is applied which places the machine under the control of the operator, enabling him to start and stop the rolls instantaneously. This machine has bronze bushed bearings and it is so constructed that the same will produce the best results for 10 hr. a day, every working day in the week. It has rolls measuring 2⅜ in. in diameter, its capacity is 16-gauge iron and lighter and it will operate with the use of wire up to 5/16 in. in diameter and with special rolls up to ⅜ in. in diameter.

By the general run of manufacturers and in the future modern sheet metal shops where machines will be operated by power a high-grade machine with unlimited capacity as shown in Fig. 6 will be considered more readily. Passing from a tin into a steel age, the sheet metal worker of to-day is called upon to grind out work at the expense of customers and out of the shop owner's profits on machines unfit for the work in hand which were made for conditions as they existed in the days when there was not a foot of railroads in the United States. The progressive sheet metal working shop will never get out of the rut unless the policy of larger manufacturers is pursued in demanding not the cheapest but the best productive and man-saving power equipment that the market offers regardless of cost.

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moisture and a poor draft. Then if a few joints of stove pipe are run up inside the chimney the wet smoke will be delivered high enough up to climb the rest of the way out of the chimney without falling back to make trouble. The pipe will rust out some time, but it will warm the chimney and serves its purpose without any stains on the walls, and that is worth the cost.

Just remember the chimney must be airtight. That means stop every fire board and pipe hole airtight and permanently tight. Fix the top of the chimney so there will be no rush of wind down on its outlet to cause a back draft or let in snow or rain, but the outlet must not be restricted in capacity.

Before winding up, a review of the questions shows enough has been said about the first. On the second some experts think a furnace chimney should be 35 ft. high, a cooking stove 25 ft. high, and a bedroom stove will generally work on the chimney it is connected with if there is but 10 ft. above the stove. The size should be at least an inch in excess of the size of the pipe that enters it. A chimney should be near the fire, and the fire should be near its work, but in most houses the chimney is put on one end or the other.

On the third question, a warm flue works best, and some flues have been greatly improved by building on the outside another course of brick the entire height. Tile linings are so irregular and are so poorly constructed that they leak so that a brick flue laid in cement mortar with struck joints is better if it is thick enough to hold the heat.

On the fourth question, build the fire with dry wood, and use enough to heat the chimney. Then cut down the draft at the point where the air enters the fire and control the fire at that point. Put a damper in the pipe to prevent too lively a draft when the fire is needed, and between this damper and the chimney a check draft that lets air into the pipe may be used.

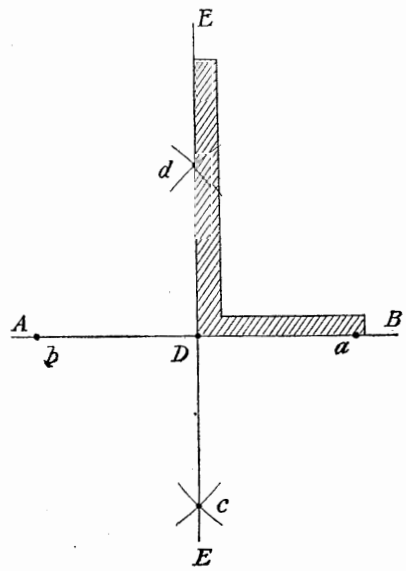
No quack stuff is needed to help fuel and air make a heat. A pound or two of zinc burned on a good fire will make soot peel off a chimney and drop down so it can be taken out. Burning refuse vegetable matter or garbage has nothing to recommend it over zinc for cleaning the flues.

The sixth question has been answered in the above, and all makeshifts are worthy of little consideration if the main point is handled properly. For shiftless and lazy people who have most trouble with chimneys the one recommendation is to hustle, think and do the right thing, using plain common sense to remove the main cause of the trouble.

Making An Emergency Square on the Job

By P. L.

A few months ago we were sent out to the country to put up some dormers and bay windows. When the scaffolds were erected, fires started and ready to put on the returns, we found that we had forgotten to ship



HOW AN EMERGENCY SQUARE WAS MADE ON THE JOB

out our steel square. As the framers and carpenters were not on the job, I showed the man in charge how he could construct his own square or a right angle of 90 deg., by bisecting a line.

A line was drawn on a sheet of metal, as shown by A-B, and using any points as *a* and *b* as centers, with a radius greater than one-half of *a b* arcs were drawn to intersect each other at *c* and *d*, and the line E F was drawn through these intersections as shown. Thus either one of the four angles F D B, B D E, E D A, and A D F, become right angles. The lines D B and D F were extended as long as desired, or the same as a 2-ft. steel square and lines drawn parallel to F D and D B as shown. The shaded portion then represented the square desired.