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# SMOKE PREVENTION

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Until the last few years smoke prevention was one of those problems that everyone talks about, but no one does anything about. When the manufacturers were in the height of their power all attempts to deal with the matter were swept aside. Only in recent years have cities begun to regulate the smoke nuisance.

Several years ago the manufacturers and the railroads were the two main sources of smoke. Since cheap fuels were available, they did very little to prevent smoke.

Then partly because of public criticism, and partly because of the farsightedness of the manufacturers, action was taken. The larger companies hired combustion engineers and smoke inspectors to attempt to solve smoke problems in conjunction with city officials. The railroads have their corps of inspectors and have introduced special methods of firing their boilers.

Private dwellings, apartment houses and small commercial establishments are now the main sources of smoke. They burn fuel at the lowest furnace temperature and make the most soot per pound of coal burned.

Probably the best way to study the smoke problem is to see what action has been taken in the past and what part of it proved beneficial.

Public discussion of the smoke evil has been going on in St. Louis so long no one remembers when it started. Then in a single day St. Louis came into national prominence because of the seriousness of its problem. Smoke prevention was on the front page of every St. Louis newspaper. A Smoke Elimination Committee was appointed by the mayor and an amendment was proposed to the city's governing body. Conflicting opinions were voiced by the parties most vitally concerned. The coal operators said, "The Smoke Elimination Committee lost sight of the poor people who cannot afford smokeless fuels." Said the railroads, "The railroads' provision would cause the terminal to spend millions of dollars which would not solve any part of the smoke problem." Said the doctors, "Smoke is a primary factor in causing carcinoma of the lungs." Said the Chamber of Commerce, "We are unanimously behind the proposed ordinance." So, despite selfish criticism, an ordinance was passed which applied to all offenders. The essential provisions were: "Those using a high volatile fuel must employ mechanical fuel burning equipment to burn it smokelessly. All others must use smokeless fuel."

In a surprisingly short time results were noted.

Pittsburgh soon followed St. Louis' lead. They sent a delegation to study that St. Louis situation; and on October 1, 1941, an ordinance similar to the one passed by St. Louis was put into effect.

Birmingham, Alabama, also is conducting an interesting campaign against smoke. They found what has proven to be the most desirable solution to the smoke problem. Their main weapon is education. Pamphlets on best methods of firing a furnace were distributed to thousands of persons. The pamphlets' main point recommended a reverse of the usual method of building a fire. That is, the coal should be placed on the bottom of the fire box and the wood on top. This assures plenty of ventilation. Commissioner Morgan, who is one of the leaders in Birmingham's smoke campaign, declared that 50% of the smoke could be eliminated by proper firing of the furnace. When Birmingham officials believe the city has been sufficiently educated, they will enforce appropriate laws.

There are three stages in the combustion of coal. Heat is first absorbed to raise the fuel to kindling temperature. The distillation and combustion of the volatile portion then follows. Finally, there is combustion of the remaining carbon portion of the fuel. Smokeless combustion depends upon the construction and the operation of furnaces in such a manner that the volatile products evolved in the second stage of combustion are completely consumed.

Air in sufficient quantities for complete combustion must be admitted at the proper time, and must be thoroughly mixed with the gaseous portion of the fuel. The temperature of the gases must be maintained above their kindling point until the chemical process known as combustion is complete. With bituminous coal it is necessary that half of the air, the primary, should be fed through the grates and the other half, the secondary, over the top of the fire. In home fired furnaces much more secondary air is required to take care of the green coal. An ideal chimney is also necessary to insure proper draft. The chimney must have a cross section sufficient to carry away the gases of combustion without undue friction and a height sufficient for draft.

The city of St. Louis has recently passed two ordinances that aid in controlling the sale and consumption of solid fuels. One ordinance controls the solid-fuel dealers. It requires the dealers to obtain fuel permits before they are allowed to sell their prod-

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ucts. This insures the small consumers of a good supply of the best fuel for domestic use.

The other ordinance prohibits the importation of inferior grades of coal. This ordinance specifies that it shall be unlawful to import and sell any coal in sizes which will pass through a two inch circular opening or its equivalent, which contains more than twelve per cent ash or two per cent sulphur on a dry basis unless such coal has been cleaned by a process known as washing. When the coal is washed, it should contain no more than twelve per cent ash on a dry basis. The term "washing" is meant to include purifying, cleaning or removing impurities by a mechanical process of removing refuse from coal, regardless of the cleaning medium used. The ordinance also prohibits the importation and sale of any coal in sizes which will pass over a two inch circular opening or its equivalent unless such coal has been hand picked or cleaned by other modern methods, so that the visible impurities shall not exceed three-fourths of one per cent per ton. Visible impurities shall be deemed not only to include all free foreign matter, but shall also include bands one-fourth inch or more in thickness visible to the eye on two faces of a piece of coal, or any band one inch or more in thickness visible in one face. These provisions went into effect July 1, 1937.

But now since cheap soft coal cannot be used because of the large amount of smoke it produces, natural gas may prove practical in these localities. Prospective builders of new homes could well consider natural gas as a good investment.

Also now available on the market are coal briquets, made by heating coal dust and subjecting it to extreme pressure. This drives some of the high volatile components out of the coal. It is convenient to use, produces better than average heat, and leaves very few ashes.

One of the main difficulties in changing to smokeless fuels is the increase in the cost of heating the domestic household. In St. Louis a change to smokeless fuels will double the cost of heating the average home. It is hard to realize the increased expense will cause an equal decrease in laundry, dry cleaning, painting, and doctor bills.

At the same time smokeless fuels are being sought, stoves, stokers, furnaces, heaters and other coal burning devices are being improved; so we can expect a steady reduction in atmospheric pollution from these devices.

The logical solution of the smoke problem is to employ a combination of education and legislation. First conduct a campaign to educate the citizens in

the basic principles of smoke prevention. When this is completed enforce appropriate legislation; being lenient at first and then become rigid for the continual offender.

The fundamental fallacy in all smoke prevention programs is that air can be purified by legislation. No administration or public official can wave a wand and clear the skies. The public must come to a full realization of its responsibilities. The final solution can only be attained through the wholehearted and continued cooperation of all concerned.

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