



SMOKELESS FURNACE—A smokeless household furnace of the University of Illinois, being inspected by Prof. J. R. Fellows, its inventor, has a coal-coking chamber in its front.

they are attracted to electric plates on the sidewalls.

Proper Firing

The principal part that home-owners can play in the smoke abatement program is in furnace firing. The handling of a home furnace requires skill. It pays to acquire the necessary skill. Proper firing not only eliminates smoke but it contributes heavily in fuel-bill savings.

Clean flues and properly operating checks and dampers are, of course, essential. Proper firing has to do with regulation of the furnace drafts and with the method that the coal is placed on the firebed. Bituminous coal contains considerable volatile combustible matters which are wasted up the chimney if not consumed in the furnace.

Spreading the coal over the entire bed of burning matter releases these volatiles, and releases also great quantities of smoke. Good firemen stack the bituminous coal in a cone in the center, or in a sloping heap on one side. Combustion then takes place at the foot of the slope, and little smoke results.

No matter how much the amateur or professional fireman may think he knows about the best methods of firing and operating a furnace, he should read the recommendations of experts which they base on scientific experimental work. Such recom-

mendations are available without cost from the U. S. Bureau of Mines, several state universities and technical schools, and particularly from Bituminous Coal Institute, Washington, D. C.

Smokeless Furnaces

Old-style bituminous furnaces will necessarily be in use for many years, but in time they will be replaced with smokeless home-heaters recently developed. Among agencies responsible for these new-type furnaces are Bituminous Coal Research, Inc., Pittsburgh; Battelle Memorial Institute, Columbus, Ohio, and the Engineering Experiment Station of the University of Illinois at Urbana. Work in the latter two is under joint sponsorship of Bituminous Research and a group of stove manufacturers.

The so-called Illinois smokeless furnace shows the trend in development. In it, each charge of fresh coal is converted to coke in a coking chamber at the front of the furnace. Coking heat comes from the coke-burning chamber in the rear. The volatile matter released as a gas from the fresh coal in the coking process mixes with secondary air introduced through vertical air passages adjacent to the combustion flue. The mixture then passes over live coals in the coke-burning chamber, where it is ignited. The result is "no smoke."

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ANATOMY

Fetal Heart Is Simple, Grows to Complex Organ

► WHEN the heart starts out in the beginning of a new life, it is a very simple sort of pump and not the complex organ that it is when the animal gets to the point of starting life on its own, Dr. Bradley M. Patten, anatomy professor of the University of Michigan School of Medicine, explained in his first national Sigma Xi lecture at the University of Illinois in Urbana, Ill.

The first heart beat does not occur in a miniature of the chambered and efficiently valved adult heart, Dr. Patten explained. In the egg cell there are very simple structures that develop into a temporary cardiac pump that starts the circulation going and keeps it in operation during the time the most elaborate heart mechanism is being formed.

The young heart cannot cease operations "for alterations", Dr. Patten explained. All the time it is changing from the simple tubular structure which first sets the blood in motion, until it becomes its chambered and valved final form, the circulation can never be allowed to cease, even momentarily.

Although most of Dr. Patten's work has been done on the chick, studies show that there are similar stages in the human and other mammal hearts, and that the stages in the formation of the blood corpuscles and the beginning of circulation are similar.

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PHYSICS

Stay Away from Bats If Noises Irritate You

► IF THE sound of fingernails scratched on a blackboard or the squeak of a street car as it goes around a corner is annoying to you, don't go near bats.

Prof. W. H. Pielemeier of Pennsylvania State College, has found that the cry of a bat four inches from its mouth is 104 to 110 decibels in the 13 to 14 kilocycle sound band. This is about equivalent to the nerve-irritating noises of a fingernail on a blackboard or a trolley squeak.

Normal speech is about 60 to 70 decibels, and a jump of 40 decibels to 100 means an increase of 100 times in the intensity of the sound.

The bat's loud warning cry can be heard at a distance of 12 feet or more.

When several bats are flying near each other and are using their sodar system, a natural detecting system similar to sonar or to radar, they are not confused by each other. Possibly each one knows his own voice by its ultrasonic spectrum, Prof. Pielemeier concludes in his report to the Acoustical Society of America.

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