CASE STUDY No. 1

RADIANT HEATING IN A SMALL RESIDENCE

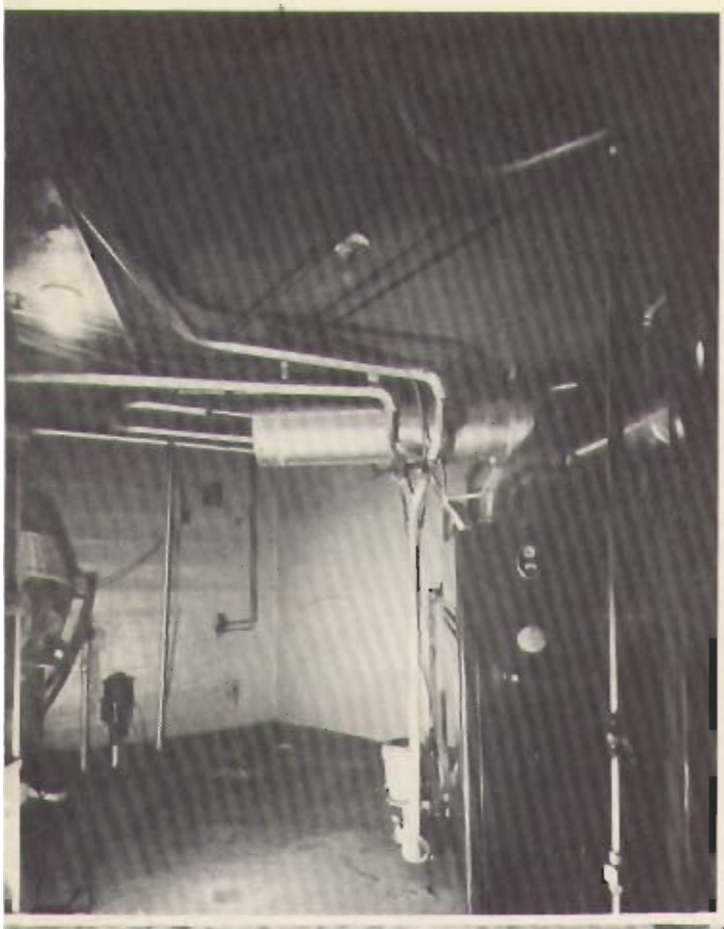
Example: Notz Residence, Mifflin, Pa.

Architect — Mrs. Cornelia Berndtson, under the supervision of Frank Lloyd Wright, Taliesin, Spring Green, Wisconsin.

Fabricator of Coils — York Ice Machinery Corp., York, Pennsylvania. (Cleveland Plant)

Description of House — The Notz Residence is a single-story country house, in the $10,000 bracket, situated on an open hill overlooking the Allegheny County Airport, in Mifflin Township, Pa. A large living room, irregular in shape, also serves as the dining room; two bedrooms and a kitchen complete the floor plan. The house is basementless except for a utility room.

Walls are partially of stone, and partially of three layers of 1" cypress with building paper separating the horizontal boards on the inside and outside from the vertical boards between. Single-glazed windows extend from the floor to a height of about seven feet, and are about 10' wide, giving the house more glass area than that usually found in traditional homes, but a comparatively moderate area for a house of modern design. During the first winter the windows were not weather-stripped, but weather-stripping was contemplated for future installation.

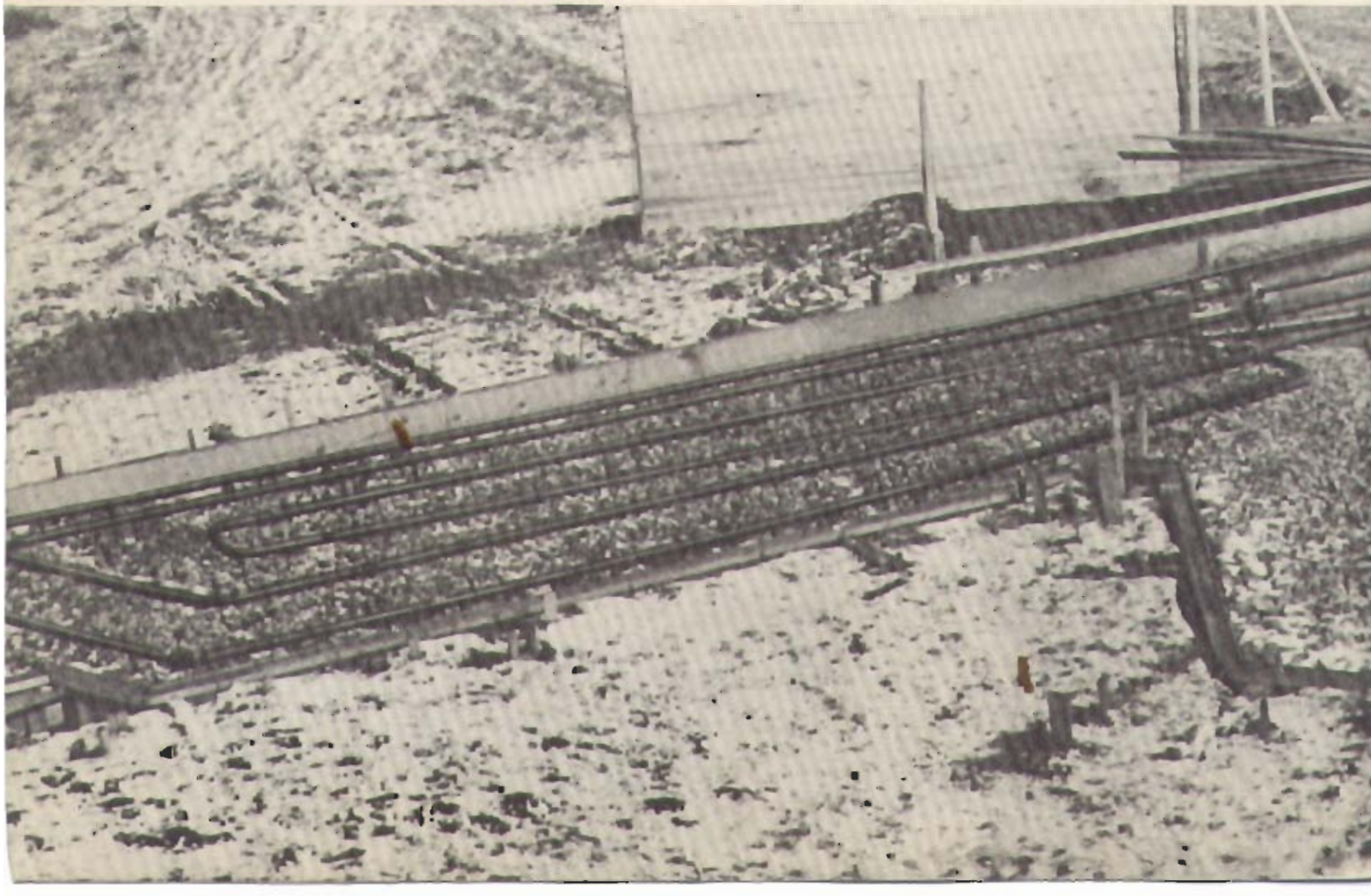


Floors are of concrete, the slab being laid on a foundation of broken stone and scored in hexagonal blocks about 4' across the flats. Broadloom carpet covers the floors to within one and a half to two feet of the walls.

Description of the Radiant Heating System — The radiant heating system of the Notz Residence consists of two circuits of 2" standard weight black wrought iron pipe laid in broken stone so that the top of the pipe is flush with the top of the broken stone fill. The concrete floor slab is poured directly on the coils and broken stone.

Coils were fabricated of 600 feet of Byers Genuine Wrought Iron pipe at the Cleveland plant of York Ice Machinery Corporation, and between 20 and 30 field welds, made by a welder and his helper in a day and a half, completed the assembly of the coils.

A Yorkaire gas-fired boiler, sold by York Ice Machinery Corporation, heats the water. The system is designed to maintain an air temperature of about 64°F. with floor temperatures of



about 80°F. and a water temperature in the coils of about 130°F. This, of course, permits operation at higher water temperatures and higher floor temperatures whenever it is desirable to use air temperatures in the 68-70°F. range.

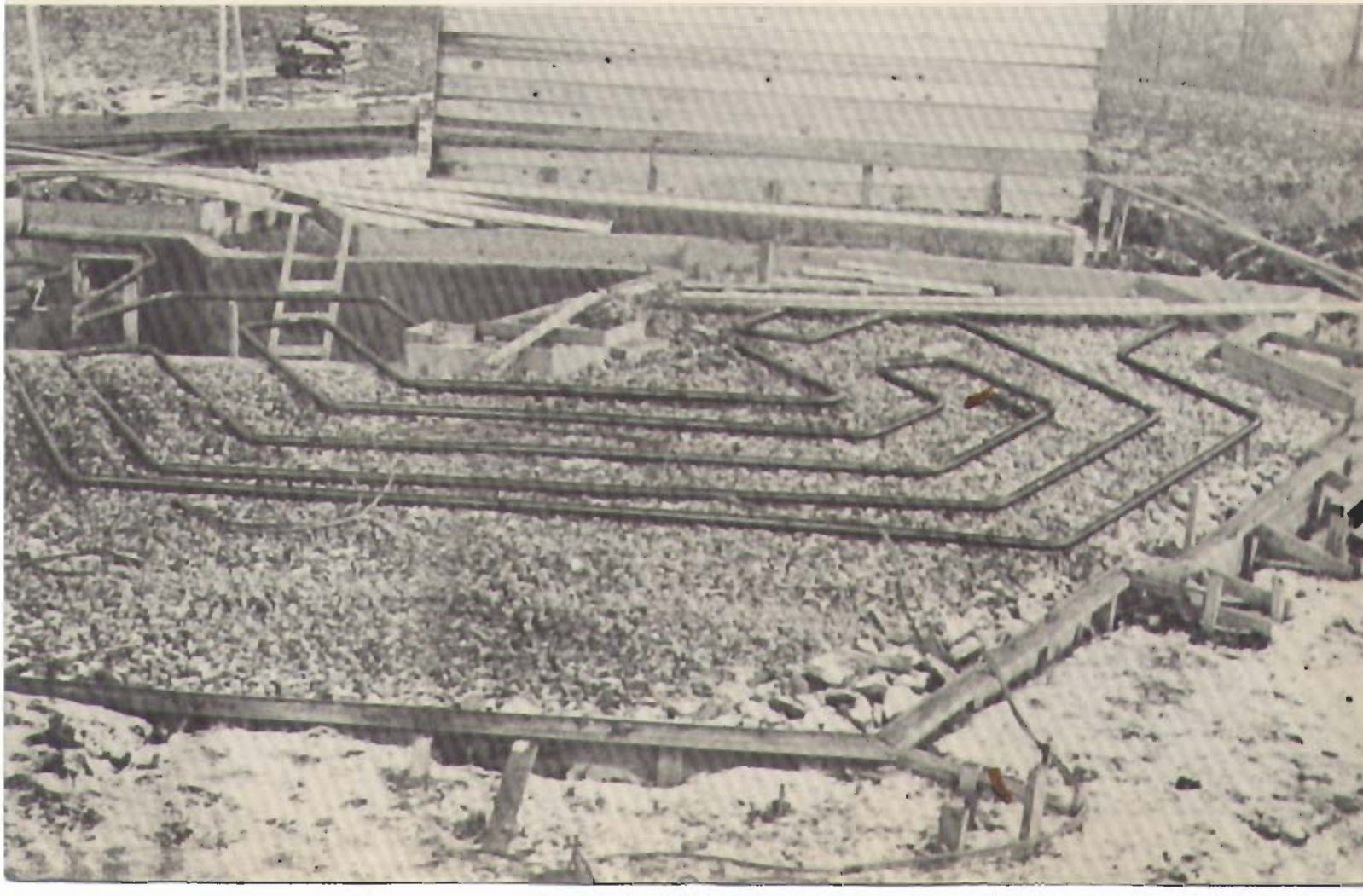
Where the two pipe circuits come back to the boiler, they are welded into "Y's" of 1¼" wrought iron pipe. Two 1¼" valves located in the arms of the "Y" at the return end of each circuit balance the flow of water.

A 1" Gulf Stream Super Circulator Pump, manufactured by Atlantic Valve & Pump Company, Chicago, and powered by a ¼ horse power Westinghouse electric motor mounted with the shaft vertical, circulates the hot water. When the pump is not operating, a Thrush Flow Control Valve No. 114A, manufactured by H. A. Thrush & Company, Peru, Indiana, prevents the water from circulating through the system.

Make-up water enters the system, when the pressure drops, through a Kainer Pressure Governor and a Kainer Deluxe Model B-2 Pressure Relief Valve. When pressure exceeds safe values, due to expansion of water in the system, the pressure relief valve allows water to escape to the drain. The units are manufactured by Kainer & Company, Chicago. Provision is also made for draining the entire system.

Temperature Controls for the Radiant Heating System — A Minneapolis type T-11A Acratherm wall type thermostat, located in the living room, near the kitchen, operates a Minneapolis type R-132-A1K1 relay, which in turn actuates a type V126A combination diaphragm gas valve regulating the flow of fuel to the boiler. All units are manufactured by Minneapolis-Honeywell Regulator Company.

Performance of the Radiant Heating System — The Misses Notz express themselves as being very well pleased with radiant heating. During the first winter, temperatures dropped as low as zero, but even in the coldest weather, the system operated perfectly and they were quite comfortable.



Cost of Operation — Low fuel cost has been one of the features of the radiant heating system in the Notz Residence. The following figures show the cost of 1175 to 1200 Btu per cu. ft. gas furnished by Carnegie Natural Gas Company, Pittsburgh:

September	4,000 cu. ft.	$ 1.40
October	22,000 cu. ft.	7.70
November	25,000 cu. ft.	8.75
December	22,000 cu. ft.	7.70
January	37,000 cu. ft.	12.95
February	30,000 cu. ft.	10.50
March	23,000 cu. ft.	8.05
April	8,000 cu. ft.	2.80
May	2,000 cu. ft.	.70

Estimates of the operating cost of this radiant heating system should take into consideration the fact that fuel used for other purposes costs about a dollar a month during the summer.

Why Radiant Heating was chosen for this residence — Comfort is one of the first considerations in planning any residential heating system, so radiant heating was chosen for its ability to provide the comforts of warm floors and even temperature throughout the rooms. The comparatively large glass area of the casement windows in the living room made elimination of drafts a factor that favored the selection of a radiant heating system. Cleanliness is another feature of the system that impressed the owners, and they feel that radiant heating has lived up to expectations on all points.

WHAT MAKES WROUGHT IRON IDEAL FOR RADIANT HEATING INSTALLATIONS?

Corrosion Resistance — Because radiant heating coils are inaccessible for repairs, they must be fabricated of corrosion-resistant pipe. The corrosion resistance of genuine wrought iron, in applications similar to radiant heating systems, has been shown by its long service life in hot water piping systems, and in embedded coils in skating rinks. Wrought iron, because of its corrosion resistance, is the most economical protection you can buy against the cost of repairing or replacing coils.

Weldability — Wrought iron's superior weldability is doubly important, for it assures tight, strong seams, free from pin-hole leaks, and it enables sound welds to be made in assembling the coils in the shop and in the field.

Bendability — The soft, ductile nature of wrought iron pipe makes it easy to fabricate into radiant heating coils. It can be bent cold with a minimum of effort and expense.

Heat Transfer — Surface effects, of course, are extremely important in determining rate of heat transfer. The dark, slightly rough surface of black wrought iron pipe encourages heat transfer.

Proper Expansion — Genuine Wrought Iron expands at practically the same rate as concrete. It can, therefore, be embedded in concrete, buried in gravel, or placed between concrete and gravel without ill effects to either the pipe or surrounding materials.

Additional information is available concerning radiant heating installations as well as data on the characteristics and handling of genuine wrought iron. Information can be obtained by writing to the Engineering Service Department.

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