

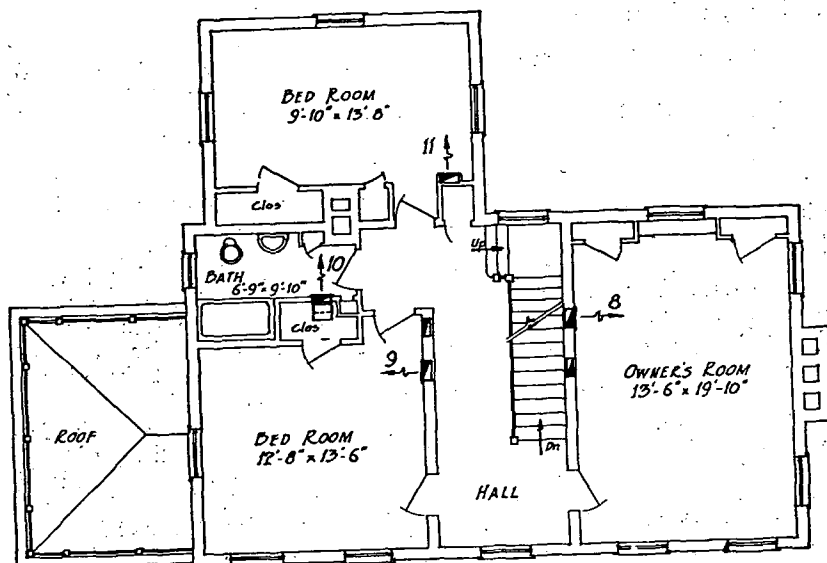


FIG. 10. SECOND-FLOOR PLAN, RESEARCH RESIDENCE

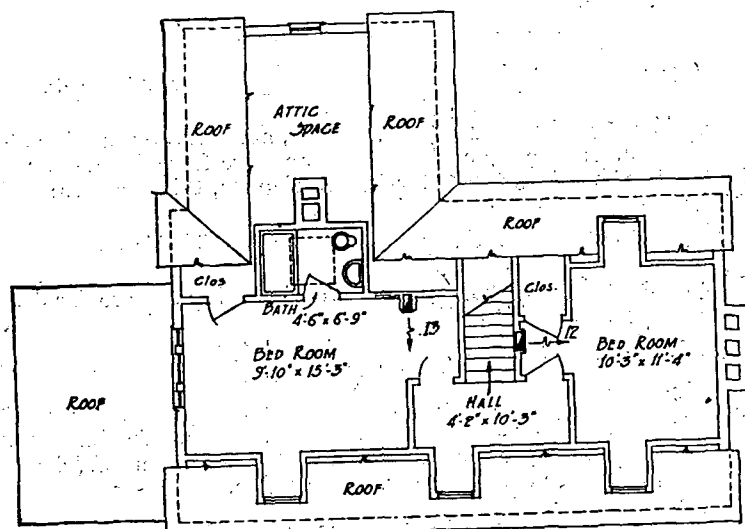


FIG. 11. THIRD-FLOOR PLAN, RESEARCH RESIDENCE

the Warm Air Research Residence of the *National Warm Air Heating and Air Conditioning Association* erected at the University of Illinois³.

Leaders, Stacks and Registers. (Direct Method)

Living Room, 1st floor:

$17,250 \div 111 = 155$ sq in. leader area. See summary, Table 1; also example under Standard Code⁴, Art. 3, Basis of Working Rules for Pipes.

Leader diameter = 14 in.

Register size = 155 sq in. net area. Gross area = net area $\div$ 0.7 = 14 in. $\times$ 16 in.

Owner's Room, 2nd floor:

$15,030 \div 167 = 90$ sq in. leader area. See Summary Table; also example under Standard Code⁴, Art. 3, Basis of Working Rules for Pipes.

Leader diameter = 11.4, say 12 in.

Stack area = $0.7 \times 90 = 63$ sq in. = say 5 in. $\times$ 12 in.

Register area = 90 sq in. net area. Gross area = net area $\div$ 0.7 = 12×12 or 12 in. $\times$ 14 in.

In like manner the leaders, stacks and registers are calculated for each room in the house.

Leaders, Stacks and Registers. (Code⁴ Method. See Art. 3, Sec. 1, 2, 3)

Living Room (Glass = 90, Net wall = 405, Cubic contents = 2405)

Leader = $\left(\frac{90}{12} + \frac{405}{60} + \frac{2405}{800} \right) 9 = 155$ sq in.

Register, same as Direct Method.

Owner's Room (Glass = 68, Net wall = 394, Cubic contents = 2275)

Leader = $\left(\frac{68}{12} + \frac{394}{60} + \frac{2275}{800} \right) 6 = 90$ sq in.

Stack and Register, same as Direct Method.

Assuming all air recirculated, the minimum furnace for the plant will be:

Grate area = $0.0034 \times 132,370 = 450$ sq in. = 24 in. diameter at 175 F register temperature. (Equation 7)

Grate area = $0.0040 \times 132,370 = 530$ sq in. = 26 in. diameter at 160 F register temperature. (Equation 8)

If provision should be made for certain outside air circulation, then increase the building heat loss by, say 25 per cent and obtain by Equation 7 a 27-in. grate and by Equations 8 and 10 a 29-in. grate.

Experiments at the University of Illinois⁵ have shown that the capacity of a furnace may be increased nearly three times by an adequate fan,

³Plans used with permission. Bathroom on third floor not heated.

⁴Standard Code Regulating the Installation of Gravity Warm Air Heating Systems in Residences. This code has been sponsored by the *National Warm Air Heating and Air Conditioning Association*, the *National Association of Sheet Metal Contractors*, and the *AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS*. It is recommended that the installation of all gravity warm air heating systems in residences be governed by the provisions of this code, the eighth edition of which may be obtained from the *National Warm Air Heating and Air Conditioning Association*, 50 W. Broad St., Columbus, Ohio.

⁵See University of Illinois Eng. Exp. Sta. Bulletin No. 120, p. 129.