6. INSIDE AIR TEMPERATURE AT ROOF:

The air temperature just below *roof* is higher than at the breathing line. Height of roof is 16 ft, or it is 16 − 5 = 11 ft above breathing line. Allowing 2 per cent per foot above 5 ft, or 2 × 11 = 22 per cent, makes the temperature of the air under the roof = 1.22 × 60 = 73.3 F.

7. INSIDE TEMPERATURE AT WALLS:

The air temperature at the mean height of the *walls* is greater than at the breathing line. The mean height of the walls is 8 ft and allowing 2 per cent per foot above 5 ft, the average mean temperature of the walls is 1.06 + 60 = 63.6 F. By similar assumptions and calculations, the mean temperature of the *glass* will be found to be 64.2 F and that of the *doors* 61.2 F.

8. AVERAGE WIND VELOCITY (Table 3).....11.0 mph

9. OVER-ALL DIMENSIONS (See Fig. 1).....120 x 50 x 16 ft

10. CONSTRUCTION:

Walls—12-in. brick, with ½-in. plaster applied directly to inside surface.
Roof—3-in. stone concrete and built-up roofing.
Floor—5-in. stone concrete on 3-in. cinder concrete on dirt.
Doors—One 12 ft x 12 ft wood door (2 in. thick) at each end.
Windows—Fifteen, 9 ft x 16 ft single glass double-hung windows on each side.

11. TRANSMISSION COEFFICIENTS:

Walls—(Table 9, Chapter 3)..... $U = 0.277$
Roof—(Table 29, Chapter 3)..... $U = 0.610$
Floor—(Table 28, Chapter 3)..... $U = 0.521$
Doors—(Table 33B, Chapter 3)..... $U = 0.382$
Windows—(Table 33A, Chapter 3)..... $U = 1.13$

12. INFILTRATION COEFFICIENTS:

Windows—Crack assumed 1/16 in. The leakage per foot of crack for an 11-mile wind velocity is 92.7 cfh, for a plain window. (By interpolation from Table 2, Chapter 4). The heat equivalent per hour per degree is

$$92.7 \times 0.075 \times 0.24 = 1.67 \text{ Btu}$$

Doors—Assume infiltration loss through door crack twice that of windows or

$$2 \times 1.67 = 3.34 \text{ Btu}$$

13. CALCULATIONS:

See calculation sheet, Table 4.

Residence. (See Fig. 2.)

1. LOCATION.....Chicago, Ill.
2. LOWEST OUTSIDE TEMPERATURE (Table 3).....− 23 F
3. BASE TEMPERATURE.....(− 23 + 15) = − 8 F
4. DIRECTION OF PREVAILING WIND (during Dec., Jan., Feb., Table 3).....Southwest
5. INSIDE TEMPERATURE.....70 F
6. TEMPERATURE DIFFERENCE (item 5 − item 3).....78 F
7. AVERAGE WIND VELOCITY (during Dec., Jan., Feb., Table 3).....17 mph

8. CONSTRUCTION:

Walls—Wood siding, building paper, wood sheathing, studding, wood lath and plaster.
Roof—Wood shingles on 1 x 4 strips spaced 2 in.
Attic Ceiling—Wood lath and plaster on roof rafters
First Floor (over basement)—Maple flooring on rough flooring on floor joists
Doors (outside)—Three, 3 ft x 7 ft x 1¾ in.; one, 2 ft 8 in. x 7 ft x 1¾ in. No weatherstripping
Windows—Double-hung, single glass, weatherstripped.

9. TRANSMISSION COEFFICIENTS:

Walls—(Table 21, Chapter 3)..... $U = 0.262$
Roof (including attic ceiling)—(Table 31, Chapter 3)..... $U = 0.288$
Floor (over basement)—(Table 26, Chapter 3)..... $U = 0.339$

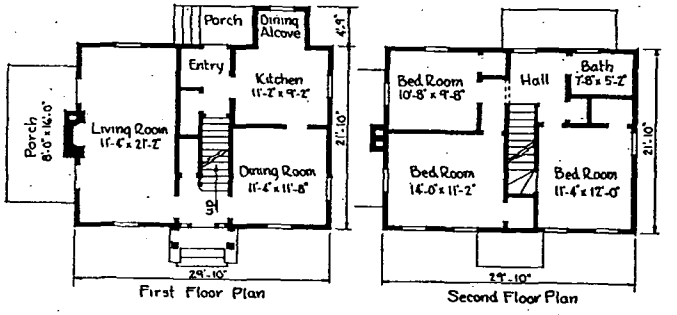

FIG. 2. FLOOR PLAN OF SIX-ROOM RESIDENCE
(Plan 6-F-3, Architects Small House Service Bureau.)

Doors—(Table 33B, Chapter 3)..... $U = 0.421$
Windows—(Table 33A, Chapter 3)..... $U = 1.13$

10. INFILTRATION COEFFICIENTS:

Windows—The leakage per foot of crack for weatherstripped, double-hung, wood sash windows is 27.7 cu ft per hour for a 17-mile wind velocity. (By interpolation from Table 2, Chapter 4). The heat equivalent is

$$27.7 \times 0.075 \times 0.24 = 0.5 \text{ Btu per hour per foot of crack.}$$

Doors—Assume 1/16 in. crack. Leakage = 139 cu ft per hour. (Table 2, Chapter 4). The heat equivalent is

$$139 \times 0.075 \times 0.24 = 2.50 \text{ Btu per hour per foot of crack.}$$

11. CALCULATIONS:

See summary of heat loss calculations, Table 5-A, and heat loss calculation sheet for living room, Table 5-B.