one exposure must be based on the maximum loss. The heating plant, however, need not be figured on the sum of all maximum leakages, but in general only half of the total. However, the table gives accurate comparative figures which are probably not much too high for actual practice. In order to apply these values, a further study of the overall results as found in practice should be made, and the figures modified, if necessary, to fit practical conditions."

In their discussion of results as presented in the 1924 report of the Transactions, the authors state:

"The principal facts brought out in the first report were that increasing the crack around the perimeter of a plain sash did not materially increase

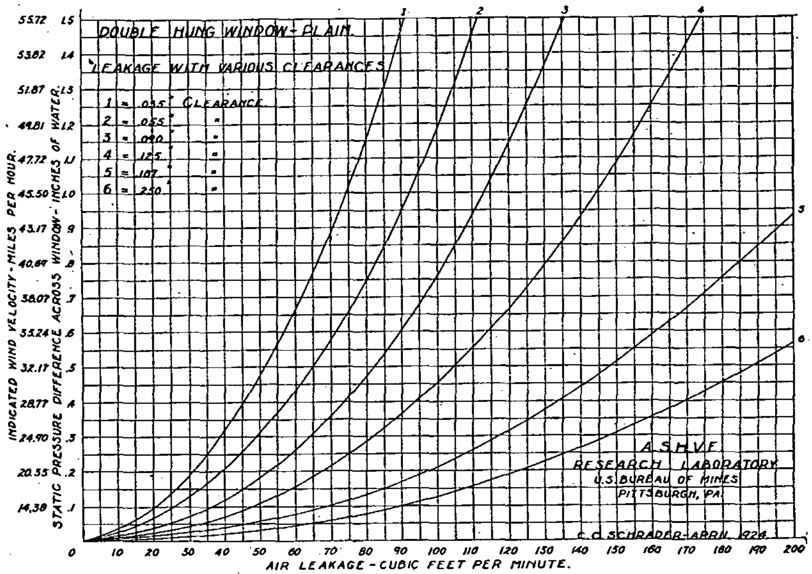

Fig. 6. Leakage through Plain Window with Various Clearances

the leakage, and that weather-stripped sash, while permitting much less leakage, showed a small increase in leakage with increase in crack. These facts were established by making several hundred tests. The present report deals with the effect of increasing the width of the stile, that is, increasing the clearance.

"Fig. 5 illustrates what is meant by crack and clearance. The crack around the sash perimeter is equal to one half the difference between the width of the frame and the width of the sash, that is, the crack is the same on each side of the sash. The clearance is the difference between the width of the stile and the thickness of the sash. These terms are chosen arbitrarily to distinguish the two principal air passages which are found in double hung windows, and they will be used frequently throughout the report and should not be confused.

"Four sets of sash were fitted with cracks of 1/16, 1/8, 3/16 and 1/4 in.

Each set was tested with clearances varying from 1/32 to 1/4 in. Each test was repeated a number of times because no two tests gave exactly the same leakage, and it was necessary to obtain average results. Before duplicating any test the window was opened and closed, and the stops were removed and then returned to as nearly the same position as possible. The weather-stripped sashes were tested in the same way.

"Fig. 6 gives the results of tests on a plain window with various clearances. The tests proved that the size of the crack around the perimeter of the sash has no appreciable effect on the leakage. Therefore the results apply to any window of the type tested with a crack of from 1/16 to 1/4 in. In practice most new sashes are fitted with the crack at least 1/16 in., and this crack becomes greater as the sash dries out and shrinks. It should be clearly understood that each curve is the average obtained from a number of tests, and the results of any one test may vary from the given curve by four or five per cent. The figure shows that the leakage increases rapidly with increase in clearance."

Calculations for Infiltrations

In order to arrive at the heat required for warming up the air entering by infiltration, the following procedure is necessary:

First, determine the average wind movement in miles per hour for the locality in question (Table 2);

Second, determine the inleakage of outside air per lineal foot of the given window or door crack in cubic feet per minute at the given wind velocity, Table 14 or 15;

Third, express the heat equivalent in B.t.u. per hour per foot of crack to heat this air 1 deg. fahr.

Thus, for a plain window having 1/16 in. *crack* and 7/64 in. *clearance* (see Fig. 5), which means the air channel around the edge of the sash is approximately 1/16 in. wide, the heat equivalent of the air leaking in for a 0–70 deg. fahr. temperature difference is 157 B.t.u. per foot of crack per hour (Table 14, Part II). This value is found in the seventh column of the table. The computation for obtaining 157 is:

$$124 \times 0.075 \times 0.24 \times 70 = 157 \text{ B.t.u.,}$$

where

124 = cubic feet of air per foot of crack per hour for a 15 mi. wind for 7/64 in. clearance from the 6th column of Table 14.
0.075 = air density at 70 deg. fahr., pound per cubic foot.
0.24 = specific heat of air, and
70 = difference in temperature between inside and outside air.

The most convenient values for use in infiltration calculations are the coefficients of infiltration for the particular kind of crackage with a wind velocity of 15 miles per hour under average conditions, with 1/16 in. *crack* and 7/64 in. *clearance* reduced by 20 per cent (Table 14, Part II).

For a wind velocity other than 15 miles per hour, use the proper velocity for that locality in place of 15.

(1) Plain unstripped window:

$$124 \times 0.075 \times 0.24 = 2.23 \text{ B.t.u. per hour per foot of crack.}$$

(2) Weather-stripped window:

$$22.9 \times 0.075 \times 0.24 = 0.41 \text{ B.t.u. per hour per foot of crack.}$$