ing the heat capacity of the calorimeter. The time required for complete solution, which will vary with different cements, is about 10 to 25 min.

The temperature rise obtained on dissolving the cement must be corrected for the heat of stirring, as already described. The corrected temperature rise, multiplied by the heat capacity of the calorimeter, gives the heat of solution of the 3-gram cement sample. This is converted to the heat of solution per gram of cement.

Since the partly hydrated cement contains a considerable quantity of water, an additional correction must be made for the heat required to change the temperature of this water from room temperature to the final temperature of the calorimeter. Thus, if the room temperature is 25 deg. C., the final temperature of the calorimeter 26 deg. C., and the partly hydrated cement sample (which was introduced to the calorimeter at room temperature) contains 1 gram of water, then one calorie will have been required to raise the temperature of this water from room temperature to the final temperature of the calorimeter. Hence one calorie should be added to the previously calculated heat of solution of the hydrated cement sample.

The quantity of dry, unignited cement contained in the damp calorimeter sample is computed from ignition tests on corresponding dry and partly hydrated samples. This quantity is used as a divisor in place of the actual weight of the calorimeter sample for computing the heat of solution of the partly hydrated cement from the total heat of solution determined in the test.

The heat of hydration of the cement is then obtained by subtracting the heat of solution of the partly hydrated cement from the heat of solution of the original cement.

Comparative results

The heats of hydration of nine commercial cements have been determined on similar specimens both with the outlined thermos-bottle procedure and with the National Bureau of Standards isothermal calorimeter. (Specifications No. 566 for Boulder Dam, published by the U. S. Bureau of Reclamation, 1934, p. 28-35.) The results obtained are given in the accompanying table. It may be observed that the largest discrepancy in results obtained between the two methods was 2.6 calories per gram (cement No. 7), which is a difference of about 5 per cent. With the other eight cements, the values obtained by the two methods did not differ more than 2 per cent. Where duplicate determinations were made with the thermos-bottle calorimeter, the agreement between the maximum and minimum values was of the same order as the agreement of comparative values that was obtained with the different calorimeters.

COMPARATIVE VALUES OF HEAT OF HYDRATION OBTAINED WITH THE BUREAU OF STANDARDS CALORIMETER AND WITH THE THERMOS-BOTTLE CALORIMETER*

All Values Expressed in Calories Per Gram

Cement No.	Thermos-Bottle Calorimeter Values Max. Value	Min. Value	Aver.	Bur. Standards Calorimeter One Determination	Difference
1	One determination		89.2	89.8	— .6
2	"	"	63.0	62.6	+ .4
3	"	"	107.0	107.7	— .7
4	"	"	87.2	88.9	—1.7
5	66.0	65.2	65.6	65.6	0
6	66.5	65.8	66.1	65.7	+ .4
7	51.8	50.7	51.2	48.6	+2.6
8	61.5	60.7	61.1	62.3	—1.2
9	52.3	49.4	50.8	49.9	+ .9
				Probable error	± .9

*The samples of cement and partly hydrated cement used in this investigation, and the heat of hydration values as obtained with Bureau of Standards' isothermal calorimeter were obtained through the courtesy of F. B. Hornibrook, Bureau of Standards.

Using the isothermal calorimetric values as the basis of comparison, the probable error of the modified thermos-bottle values, as computed from the data presented, is slightly less than one calorie per gram.

It should be noted that these comparative values are obtained by using the same samples of cements and of partly hydrated cements. Thus, the values given may be used for a direct comparison of the two calorimetric methods. Other variables involved in the determination of the heat of hydration of cement, such as the selection of the cement sample, the preparation of the specimens, the differing rates of hydration of different specimens, etc., are not involved in these data.

The results obtained with the simple, inexpensive thermos-bottle calorimeter appear to be reproducible and in good agreement with values obtained with the National Bureau of Standards isothermal calorimeter.

Welding Used Extensively in Tall Apartment House in Poland

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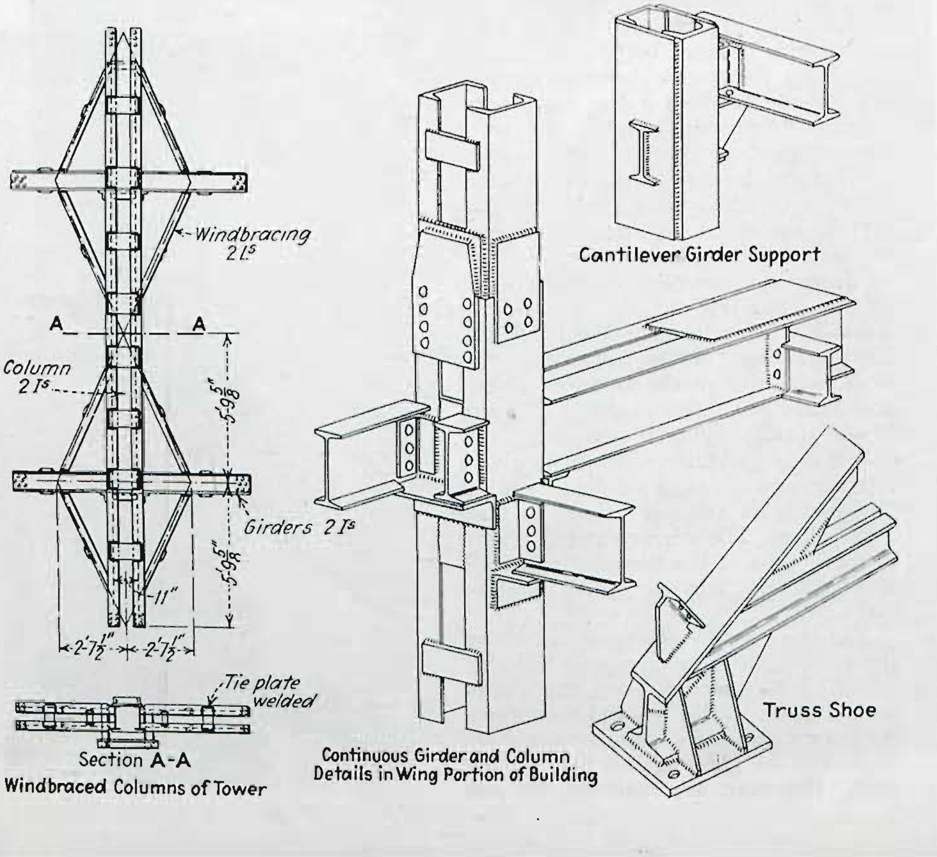
In constructing the Prudential House in Warsaw, the highest apartment house in Poland and the second highest in Europe, all shop work was done by arc-welding while the field joints were riveted. The building consists essentially of a seventeen-story tower, 220 ft. high above the street and 54x72 ft. in plan, flanked on either side by five-story wings, which extend back a

FIG. 1—TYPICAL WELD DETAILS in the Prudential House, an apartment building in Warsaw.



Section A-A
Windbraced Columns of Tower

Continuous Girder and Column Details in Wing Portion of Building

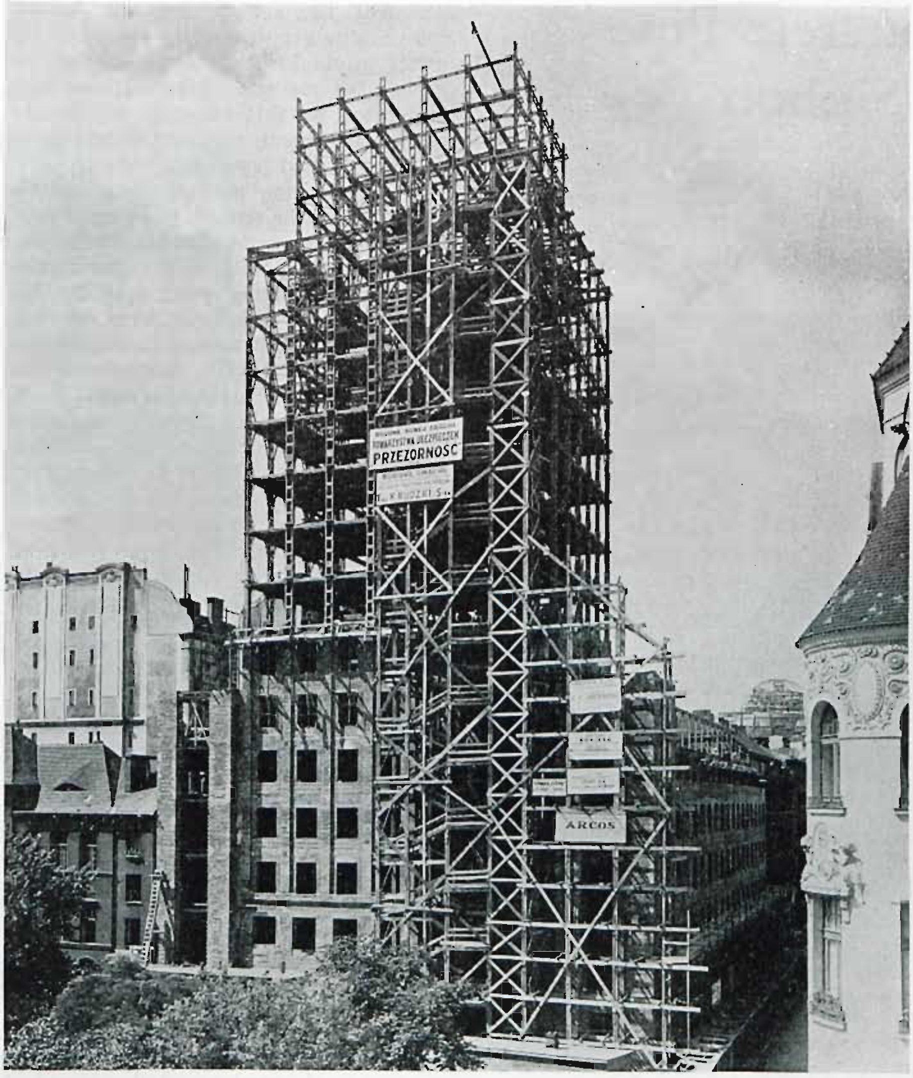


FIG. 2—SHOP-WELDED and field-riveted, this structure is the tallest apartment house in Poland.

distance of 179 ft. The total width across the front of the building, including towers and wings, is 109 ft. The structure required 1,075 tons of steel, of which 560 tons was used in the tower. The first two stories are faced with a pink-gray granite, while the remainder of the building is faced with a sandstone. In the accompanying photograph only the brick backing for this facing is in place. The heaviest load on an interior column is 280 tons, while the heaviest load on an exterior column, including wind, is 313 tons.

The tower and the wing portions of the building are completely separated by an expansion joint. In the tower, special windbracing was required only in the north and south walls, perpendicular to the front of the building. Because of uncertainty as to the eventual layout of the floors, windbracing could not be used on interior columns, while on the exterior columns it had to be arranged so as not to obstruct windows. A K-type bracing, therefore, was utilized, with the point of intersection at mid-story height, on the axis of the columns.

The wind pressure was assumed as follows: up to a height of 50 ft., 10 lb. per sq.ft.; then increasing lineally, reaching 30 lb. per sq.ft. at a height of 100 ft., and continuing at this figure to the top of the building.

The make-up of the tower columns is, in general, two I-beams connected by means of welded straps; in the upper stories and in the wing portions, channels are substituted for the I-beams. Offset girders are required over the street entrance and at the fifteenth floor; these girders consist of pairs of rolled beams joined by welded diaphragms. In the five-story part the girders are chiefly continuous, being led through the columns between the channels and resting on angles and on coverplates welded to the channels. The girders are, in general, placed in pairs because of the small depth available. Off-center girders are also to be found in the frame, especially on the outside wall. Such a construction is shown in one of the accompanying details where an I-beam is inserted into holes cut in the web of the column by means of an oxy-acetylene flame and supported on the far side by an angle welded to the column. The girder that rests on this I-beam bracket also has a welded attachment to the column web.

In the outside walls extensive use is made of cork insulation applied in $\frac{3}{4}$-in. strips stuck on the inside face of the backing. Floors are relatively thin, to reduce the dead load. In the tower, precast concrete floor beams are used, spaced apart by sheet-iron boxes upon which concrete was poured to form the monolithic floor. In the wing portions of the building similar precast beams are used, but the sheet iron is replaced by hollow tile made of a mixture of concrete and sawdust. The fill concrete is also of this special mixture.

A part of the building area immediately behind the tower, measuring 40x40 ft., is covered with a glass roof supported by eight half-trusses meeting at a central point. A detail of the end of one of these shop-fabricated trusses is shown in the accompanying drawing.

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Effect on the Eyes of Sodium-Vapor Lighting

THE INVESTIGATION made under the supervision of the Port of New York Authority to determine whether the yellow light of sodium-vapor lamps adversely affects the eyes of persons performing clerical work under this light as compared with a tungsten light (*ENR*, Feb. 22, 1934, p. 258), were completed with the following conclusions:

1. Sodium light had no permanent effect upon the eye, either beneficial or detrimental, which could be detected by the clinical tests used, in a group of subjects performing intensive clerical work under this light for about four hours a day during a period of twelve weeks.
2. A temporary contraction of the form field of about 10 deg. on the temporal side was observed for most of the subjects under both the tungsten and sodium lights when the examination was made during the working hours of the subjects. This contraction of the form field, however, disappeared when the subjects refrained from any work requiring convergence for 48 hours.
3. No significant difference in the amount of work performed by the sodium and tungsten groups was observed.

During the greater part of the time the illumination on the working plane was maintained between 9.5 and 10.5 foot-candles. The illumination was semi-indirect and unusually free from glare. All of the persons upon whom the tests were performed stated that, while they recognized the complete lack of color contrast in the sodium light, they liked the light, characterizing it as soft and easy on the eyes.