THE CANADIAN ARCHITECT AND BUILDER



RIQUET (PAUL-EDMOND), Etudes de meubles au chateau de Fontainebleau.

A CONCRETE BUILDING IN LIVERPOOL.

The disposal of the clinker from refuse destructors in Liverpool has been a problem of considerable difficulty for many years. Nine years ago, when Mr. H. Percy Bouldnois was city engineer, be used this material as the aggregate for concrete for lintels, windows, sills, doors-steps and similar part dwellings of low cost, but recently his successor, Mr. J. A. Brodie has used the material in a reinforced concrete tenement house. It has been built to prove that satisfactory dwellings for low rentals can be constructed from what is practically a waste material.

About 50,000 tons of clinker are produced annually at Liverpool, and the cost of disposing of the portions not utilized is about 60 cents per ton. At present time, Mr. Brodies reports, about 15,000 ton are dumped at sea at an even higher cost. The portion of the clinker for which a use is found is mainly crushed for the aggregate in the concrete sidewalk slabs, of which 160,000 sq. yd. have been laid. Recently it has been used for the foundation of pavements and simalar works and in the manufacture of paving blocks for roadways carrying comparativetly light traffic. At the best, however, not over a third of the clinker can be put to use by these methods, and accordingly permission was obtained from the Local Government Board two years ago to put up a clinker concrete tenement house, reinforced with a little steel.

The building covers 234 sq. yd. of a plot having 413 sq. yd. It has three storeys, each with four tenements. Each tenement has a separate doorway and is self-contained, and the balconies by which the upper tenements are entered are reached by open stairs from the streets. Each tenement has a $15 \times 10^{1/3}$ ft. living room, two bedrooms averaging $15\frac{1}{14} \times 7\frac{3}{4}$ ft. and 10 ft., a scullery and a toilet. Gas and water are piped into each tenement, and the living room contains a range and a food cupboard ventilated into the outer air. The bedrooms have grates. The roof is flat and fitted up as a playground and for drying clothes.

The construction of the building is wholly unlike anything attempted in the United States. Th_2 ceiling, the floor and each of the four sides are separate con-

crete slabs, weighing 1 to 11 tons and hauled to the site by a traction engine. The openings for doors, windows and fireplaces were made when the windows were manufactured, and mortices and tenons were left at the edges so that all parts would dovetail together. The joints were made with cement mortar, and two 1 in. bolts were used at each vertical joint to hold the parts together while the joint was setting. The balconies, stairs, parapet walls, and chimney tops were molded blocks, and the chimneys and ash chutes were lined with earthenware pipes. Except for a margin around each room, the floors were covered with 3/4 in. boards, bedded in a hot pitch mixture and nailed to scantlings set in the concrete.

The slabs were made 14 in. thick as recommended by the Local Government Board, instead of 7 in. as intended by the city engineer. The thick slabs had to be left six to eight days in the molds before they could be moved safely. Some of them met with an accident, and in order not to incur delay by waiting for fresh slabs to season, about half the floors were built of concrete in place, carried by steel beams. The toundations consisted of concrete piers 12 ft. deep carrying flat arches on which the walls were supported. This construction was necessary because the building was erected on a site where a cellared structure formerly stood.

The building was estimated to cost \$6,100 but about \$20,000 was actually spent, owing to the unnecessary thickness

of the walls, extra depth of foundations, troubles with molds, and needless expense for framing and scaffolds. Mr. Brodie is confident that similar buildings can be constructed at his original estimate which is considerably under the cost of like structures in brick.

From this experience Mr. Brodie is convinced that any size of slab likely to be used for building purposes in Liverpool can be made and erected safely. The largest yet made was 16×13 feet. Floor and roof slabs for the building were tested with heavy distributed loads without measurable deflection or appreciable injury, and the strength of the building seems to be beyond question. The method of jointing the slabs by bolts and cement mortar has proved entirely satisfactory. The buildings are particularly appropriate for low-rental homes, because they are fireproof and can be kept clean with a minimum amount of labor. Mr. Brodie points out that in this type of construction, any reduction in cost depends largely on the possibility of repetition of individual slabs without requiring any alteration of the molds.— *Engineering Record*.

COSTLY PUBLIC BUILDINGS.

Lhe 75 chief cities of America have \$100,000,000 invested in city halls. Philadelphia leads with a \$27,000,000 city hall, and San Francisco follows with one worth \$8,300,000.

After these cities come Boston, with a city hall representing \$7,500,000; New York with one standing for \$7,000,000, and Baltimore with a \$5,000,000 structure and grounds. The value in each case is based upon the value of the city hall itself and the park or grounds surrounding it.

Every American city of more than 300,000 population has at least a million dollar city hall with the exception of New Orleans. St. Louis, Cincinnati and Detroit have buildings worth more than \$2,000,000 each. Chicago falls \$250,000 below that figure. Pittsburg and Milwaukee follow.—*Exchange*.