

rods being drawn out of the wall in removing the other side of the mould.

The concrete may be mixed near the building on the ground, or in the building in a rough mortar box of sufficient capacity to hold an extra mould of concrete in advance of that which is being laid upon the wall.

The ingredients for concrete should be sand, gravel, lime, or cement, in the following proportions:

Sand. 2 parts.
Gravel. 6 "
Lime. 1 "

If cement is used, then proportion in this way:

Sand. 3 parts.
Gravel. 6 "
Cement. 1 "

There may be substituted for a portion of the gravel large pebbles, pieces of stone, and broken brick. The sand and lime or cement form the cementing substance which binds the mass together, and should be thoroughly worked together with the gravel and stone, as they are thus made to resist greater pressure and wear. Sand should be taken from the pit with only a minimum of loam or earth. The gravel need not generally be screened. Cement is better to mix with than lime, as it produces a concrete of more hydraulic energy, and makes the walls less absorbent of moisture. Limes denominated *poor*, and possessing a proportion of silica and iron, are nearly as good as Roman, Rosendale, or Portland cements.

A much larger proportion of sand and gravel has been employed with the same proportion of lime and cement here designated, giving a wall of medium strength and little hydraulic energy, and requiring a rough-cast outside for protection; 15 to 20 parts sand and gravel, to 1 of cement being the proportions used.

Gravel 8 parts, and lime or cement 1 part, have been used, the proportion of gravel being as high in some cases as 12 parts.

Concrete walls may be constructed easily, with a hollow space by inserting a wooden core $1\frac{1}{2}$ or 2 inches thick in the centre of the wall enclosed by each mould, and removing it with the mould, and thus made to possess all the advantages of a hollow brick wall.

Door and window frames should be set and worked up to as the work progresses. The principal corners of the building should be carried up against a scantling, set plumb, and stay-lathed in place, and in working up between these on the sides of the building stretch a line for the outside face, and adjust the mould to it as in stone or brick-work. Scaffolding should be erected on the inside of the

walls. The partitions should be carried up with the outside walls, and grounds set for the openings.

Bonds should be inserted 1×2 inches and 24 inches long, alternated, to receive the interior wooden finish, at the division of each story, beam plates, 2×4 or 5 inches, should be laid to receive the beams, and tie anchors should fasten or tie the trimmers

to have a cellar, footings of concrete must be carried 12 inches below the cellar bottom, and projected 3 inches on each side of the superstructure walls. The trenches should be excavated the exact size and filled with concrete, and the earth back of the foundations taken off 5 or 6 inches to facilitate the use of the moulds, and allow room to set and remove them.

After the walls are completed, and before they are thoroughly dry, if it is desired to give the walls a highly finished appearance, the protrusions of concrete at the junctions of the moulds can be levelled with the trowel, and a thin coat of rough-cast of sharp screened sand three parts and cement one part, plain or colored, can be laid over the surface and floated evenly down. If the walls are to be left plain or without the exterior coat, the protrusions on the surface must be removed, and the floating of the surface carried on as the walls are built up.

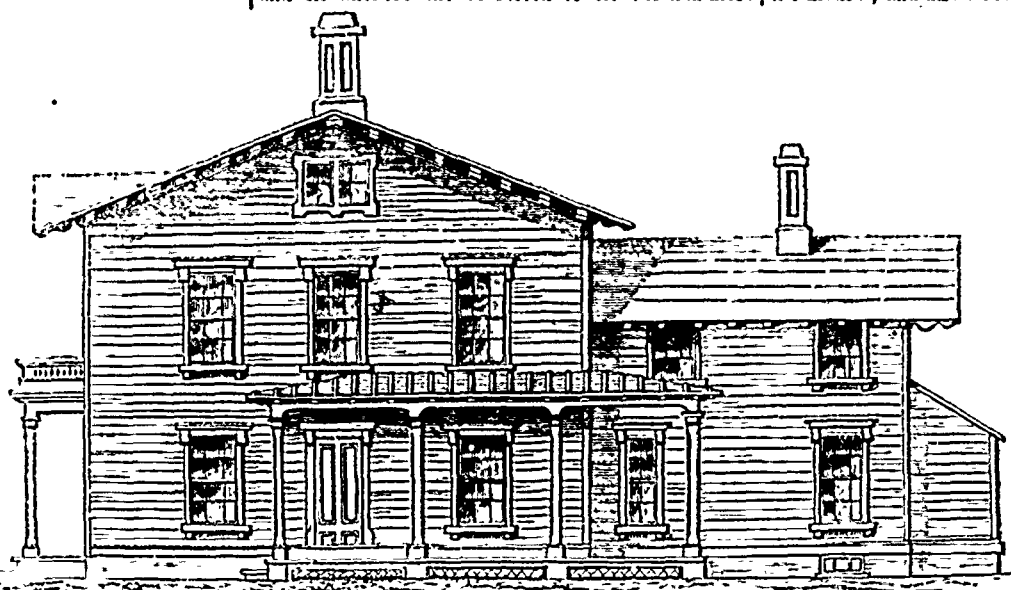
A second mode of building a concrete wall, consists of first grinding the mass of ingredients together with the addition of less than one quarter the quantity of water used for the same bulk in mortar. The grinding is continued until a tough paste is formed, which, placed in the moulds in thin layers and rammed hard, set with rapidity, and become hard as stone. The proportions for this work are as follows:

Pit sand, 3 parts.
Slaked lime, 1 "
Portland cement .. $\frac{1}{2}$ "

A third mode consists of concrete blocks that may be moulded the thickness of the wall and 24 to 30 inches long, with hollows in the middle of each, or in the form of a common brick, and laid with stretcher and header courses. The ingredients may be the same as for agglomerated concrete, and made in the same proportions. The mass should be mixed or ground together in such a manner that the lime be brought mechanically in contact with the particles of sand, using as little water as possible; and after acquiring the proper consistency it should be placed in moulds and subjected to immense pressure.

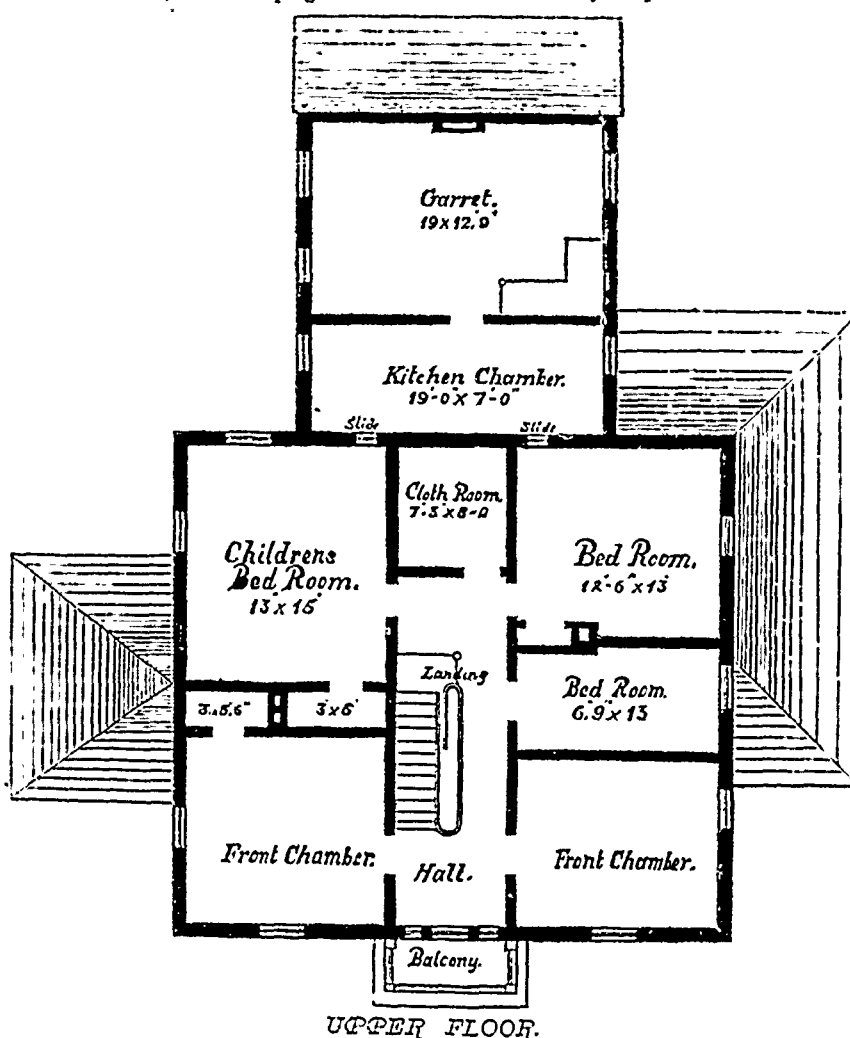
A firm in New York city, styled "The American Building Block Company," are manufacturing a concrete block or brick chiefly of lime and sand, of which they speak as follows:

"The Building Blocks are composed of the cheapest known materials—mainly sand and lime—and are made in such form and size, that walls can be constructed from them as cheaply as with good common bricks. The shape is entirely uniform,



SIDE ELEVATION.

and principal beams and walls together. Wall plates for the roof should be anchored in the same manner as in stone or brickwork. Flues may be carried up by inserting a round core with a handle to raise it with the progress of the wall. Breasts may be pro-



UPPER FLOOR.

jected into the room of any width by arching over the fireplace with brick, and topping out above the roof with terra-cotta or brick shafts. If it is designed

—and are made in such form and size, that walls can be constructed from them as cheaply as with good common bricks. The shape is entirely uniform,