at which the rock is found varies very considerably. At all the rapids and shallows the rock forms the bed itself; in the pools between, heavy layers of gravel, sand, or mud, are deposited. At or near the mouths of tributaries, the rock has generally been excavated by the action of the water to a great depth; the soft material has taken its place, and consequently good foundations can only be made by heavy expenditures. At the site of the bridge, a bed of blue limestone and shale, not very solid, underlies the river bed at a depth of about 12 ft. below the lowest part of the channel. A short distance above the bridge this shale is laid bare at low water on the Covington side, a part of it extending halfway across. Under the Covington tower, a heavy bed of coarse sand, mixed with gravel, is found above the rock, while the surface layer is composed of the original clay bottom, which forms the river banks. On the Cincinnati side, the original clay or leamy bottom had, to some extent, been washed away, and had a short time before the commencement of the works been filled up again by the materials obtained from cellar excavations.

In this artificial bank the excavation of the Cincinnati tower was commenced about the 1st of September, 1856, and sunk down to the level of the river, which, during this and the next two months, fell to low-water mark. A little rise of 4 ft. intervened, but the river fell again, and continued low until the month of December. It was owing to this remarkably favourable state of the river that the work of pushing on with the foundations was so successful; and the cost was very small, considering the magnitude of the works.

The faces of the blocks below the floor are left rough, as they came out of the quarry, but with a heavy draft run around the margin. Above the floor the face is bush-hammered, with a broad draft all around, and this finish appears to be in harmony with the architectural proportions which have been observed in this part of the tower.

Whenever the face of a Buena Vista stone is subjected to the action of the bush-hammer, and to much tooling, the surface, after a few seasons of exposure, will be found loosened and scaly. This effect is to some extent observable above the floor, and also on the anchor masonry, but no trace of it can be discovered below the floor, where the rock face is left untouched. The same failure may be observed on some of the most highly finished fronts in the city of Cincinnati. But this fact need not cause any apprehensions whatever. All sandstones are sedimentary, because they have been formed by deposits, layer after layer, during long periods of time. Sandstone is composed of quartz sand cemented together, and its durability depends principally upon the nature of the cementing material. Great durability is indicated by the chemical analysis of the Buena Vista stone, and this opinion receives additional force by the fact that it hardens by exposure to air and water.

The most prominent features of the towers are the arches, 75 ft. high above the floor, by 30 ft. wide. The roadway passes through without any contraction, but the sidewalks, for a distance of 20 ft., suffer a reduction from 7 ft. to 4 ft. This is compensated for by a walk outside of the masonry, which is supported by the projecting cornices, and protected by a railing. The stability of the arches, which are semicircular, is insured by the massive proportions of their shafts, which serve as abutments. On top a series of heavy anchor bars, extending from centre to centre of shaft, have also been walled in. The masonry above the arch is not one solid mass, but divided by two open spaces, each 4 ft. wide and 30 ft. long, which are again closed by the last three courses, which form the roofing and coping of the tower. An open passage is also provided, which leads to the top. The ornamental turrets, together with the balustrades around the upper and lower cornices, finish the architectural appearance of the towers. Their total elevation is 230 ft. above low-water mark, or 242 ft. above the first course of timber in the Cincinnati foundation.

The elevation of such masses of material, and to such a great height, of course necessitated the employment of some special contrivances, of which it may be interesting to give some particulars here. Two steam engines had been erected, one on each side of the river, for the supply of power. Four hoisting barrels, worked by friction clutches, were connected with each engine. At first it was contemplated to do the raising and setting by worked derricks, secured in their positions by wire-roping guys. The Covington tower was thus carried up 75 ft. A different plan, however, had been devised for the masonry above the floor, and a great portion of this machinery had already been ordered and made in 1857.

On this plan all the materials were raised by means of wire ropes of 1 1/2 in. diameter, winding upon a cast-iron drum of 3 ft. in diameter, the rope plying in spiral grooves, to save wear. Parallel to the masonry, a strong vertical framework was erected for the support of the hoisting sheaves, tracks, and trucks. Each block of stone thus rapidly raised was placed upon a truck and run either right or left to one of the setting derricks. The latter were balanced by traversing weights, and so constructed that they were absolutely safe, no matter how high they rose. The framing of such a derrick consisted of a sound white oak log, 20 in. in diameter and 38 ft. long, which served as mast, and had two booms attached, about 20 ft. above the lower end. Half-way down from this point, two cast-iron turntables, 6 ft. in diameter, supported by and revolving on cones, encompassed the mast, and thus allowed of an easy cir-