masonry has to resist. No allowance is here made for the additional resistance of the surrounding earth, but on the other hand there will be a reduction of weight in case of a high flood. The above considerations and calculations warrant the conclusion that the safety of the work has been amply provided for in its anchorage.

The bridge floor is suspended to two cables. Each cable is composed of 5180 wires, No. 9 gauge, and forms a cylinder of 12¾ in. in diameter; 18 ft. of this wire weigh 1 lb., and 60 wires have an aggregate metal section of one square inch. The deflection of the cables is 89 ft. at a medium temperature.

The wires composing the cables are laid parallel to each other, so that each single wire will occupy the same relative position throughout the whole length. It is easy to see the importance of this arrangement. A cable may contain a great number of wires, but if these wires do not all bear alike, each its appropriate share, their aggregate strength may be far below what it theoretically should be. In order now to insure an equal and uniform tension of the wires, their parallel position must be first secured.

The uniformity of tension depends upon the uniformity of deflection, and this is coincident with parallelism. At first sight this appears easy to accomplish, but it is a task attended with numerous difficulties. As Mr. Roebling has remarked, the novice in cable-making will have to learn step by step, and when he thinks he has mastered the art, he will every now and then encounter new contingencies which will tax his ingenuity. Simple as are the principles involved in this process, its practice is by no means so simple. To produce an uniform tension throughout means to make every wire do its allotted duty.

Any attempt at the manufacture of a 12 in. cable in one process, no matter what its length, would result in a complete failure. It is simply impossible to do this. Any cable exceeding 5 in. in diameter, must be made in parts, no matter whether the manufacture is undertaken across the river in site, or on shore. Mr. Roebling preferred to make all large cables in separate parts, or strands, so arranged, that one occupies the centre, and is surrounded by the other six. According to this plan, Mr. Roebling proceeded to make one strand at one time, and, when finished, placed it in position. The cables of the Ohio Bridge are wrapped from end to end with No. 10 wire.

Owing to the width of the Ohio valley, and its course at Cincinnati being from east to the west, the line of the Cincinnati Bridge is struck at right angles by the prevailing west and north-west winds, and their violence is equally felt for the same reason.

Before the manufacture of the cables could be commenced, a temporary foot bridge, extending from one abutment to the other, had to be thrown across. After this was accomplished and the machinery put up, the cable-making was commenced the 1st of November, 1865. Two strands were made in operation, one for each of the two cables. These being completed, lowered to their final position, and adjusted, the next pair was commenced. This process was repeated seven times, and was terminated on the 23rd of June, 1866. Eight months were thus consumed, which included the winter months, the most unfavourable part of the season.

The total and exact quantity of wire worked into the cables, including the wrapping, is 1,050,183 lb.

Four massive cast-iron saddles, with an easy curvature for the support of the cables, are placed on the summit of the towers. Each rests upon 32 rollers, and these are supported by the bedplates. All the working surfaces are, of course, planed off true, and the rollers are turned off to an exact size. All these parts are accessible, and may be examined and repainted at any time. One million pounds of the cable wire were manufactured by Messrs. Richard Johnson and Nephew, at Manchester.

The suspenders form connecting links between the cables and the floor. Except one hundred in the centre of the main span, they are all made of wire rope. To obtain more stiffness the short ones in the centre are made of solid rods, 1¼ in. in diameter. The rope suspenders are 5 in. circumference, equivalent to 45 U.S. tons ultimate strength. Those next to the towers are greatly relieved by the action of the stays, and consequently reduced to 96 tons strength.

The weight of the floor for a length of 5 ft. is 11,365 lb., or 5,692 U.S. tons. To support this we have two suspenders of an aggregate strength of 90 U.S. tons, or nearly 16 times the weight. An ordinary crowd of people upon the same area will weigh 4800 lb., equal to 24 U.S. tons which, added to the weight of the floor, makes a total of 8,008 tons, or about 1/16 of the ultimate strength of the suspenders.

The attachment of the suspenders to the floor beams is effected by substantial stirrups, made of bolts 1¼ in. diameter, and of the best quality of charcoal iron. Their connexion with the cables is formed by means of wrought-iron sockets, and these are held by the pins, which close the cable straps. Corresponding to the suspenders, the cables are firmly clasped by these straps every 5 ft., and these not only serve to connect the suspenders with the cable, but they also form an additional means of insuring their compactness and solidity. This latter point being one of great importance, these bands have been made of the best material, and are screwed up tight.

Where the cables enter the towers on the river side,