VIEW.
PLANS AND SECTIONS.

OF THE

OBELISK

ON

BUNKER'S HILL.

WITH THE DETAILS OF EXPERIMENTS MADE IN QUARRYING THE GRANITE.

BY S. WILLARD.

ARCHITECT, AND SUPERINTENDANT OF THE WORK.

BOSTON.
1843.

Entered according to Act of Congress, in the Year Eighteen Hundred and Forty-three,

BY SOLOMON WILLARD,

In the Clerk's Office of the District Court of the District of Massachusetts.
TO

ARCHITECTS AND ENGINEERS,

AND TO THE

WORKING ASSOCIATES,

THE FOLLOWING WORK IS RESPECTFULLY DEDICATED,

BY

THE AUTHOR.
BOSTON:
PRINTED BY SAMUEL N. DICKINSON,
WASHINGTON STREET.

1803
INTRODUCTION.

It is a fact well known to architects of Boston, who were in the profession twenty years ago, that there was much difficulty at that time in obtaining a suitable material for the decorative parts of buildings. Boston was surrounded by a primitive formation, and consequently wanting in all the softer kinds of stone commonly used for such purposes. Quincy granite was not then in use, except for rough work; and no successful attempt had then been made in executing moulded and ornamental work in any other kind of granite. The walls of buildings were carried up of granite, in ashlar courses, and generally crowned with a cornice of wood. Sandstones of different kinds were also used for such purposes, which were brought from distant parts of the country. These sandstones, however, were not only expensive, but defective in structure. They also varied in color from the granite, and, when combined with it, gave to the whole a parti-colored and unharmonious effect. These difficulties, however, have been removed, in a great measure, by experience gained since that time.

The erection of the Obelisk on Bunker's Hill has led to various experiments in the quarrying and working of granite, which have shown that the common kind, which is obtained with great facility in our own neighborhood, is susceptible of being wrought into any of the moulded or ornamental forms required for the exterior of the best structures, and at a reasonable rate; and consequently has obviated all difficulties growing out of the want of a proper material, or want of skill in working it. This must be sufficiently obvious, in viewing the beautiful execution in the front of the new Exchange, in State street, and the work now going on at the Custom House.

The first full cornice known to have been worked of granite in this country, is now on a building near the head of State street, formerly occupied as a branch bank. This cornice was executed of Concord granite, at the State Prison in that place. Much improvement in workmanship has been made since that time, as may be seen by the specimens referred to, which have been recently executed.
A difficulty also existed, twenty years ago, in obtaining blocks of granite of the size required for good construction. The business of quarrying, at that time, was generally in the hands of those who had neither the means nor the skill which is necessary for conducting the business in a proper manner. The work most called for at the time was ashlar, and posts and lintels, from half of a ton to two tons in weight; and when a block of large size was wanted, it was obtained with great difficulty, and at a high price. Few blocks, however, had at that time been wanted of extra size; the columns and architraves at the Branch Bank, and similar parts at the Massachusetts General Hospital, being the principal.

The shafts of the columns at the bank were contracted for at nine hundred dollars each, finished and delivered at the quarry; and the capitals at one hundred and fifty dollars each, delivered at the bank. These shafts were split from a bowlder, or rolled mass of granite, on a plain in the town of Westford, near the Chelmsford line. The shafts of the columns at the new market-house were also split from the same bowlder. The shafts at the bank were four feet in diameter at the bases, three feet and one inch at the top, and twenty-two feet high; containing about two hundred and seven cubic feet. The architrave was quarried a short distance from the columns, and was in six pieces, averaging about five tons each, and were contracted for at three dollars per foot, measuring all sides and ends. The whole number of feet measured in this way was eight hundred and three feet and eight inches, which, at three dollars per foot, are . . . . . . . . . . . . . . $2411.00

If from this sum we deduct the price of the dressing, namely,

Three hundred and seventy-eight feet of fine, at say 110c. $415.80

Four hundred and ten feet of coarse, at 25c. . . . . . . . 102.50 518.30

It will leave, as the cost of the granite alone, . . . . . . . . . . . . . . . . 1892.70

And eighteen hundred and ninety-two dollars and seventy cents, divided by three hundred and seventy-eight, the whole number of feet in the architrave, will give five hundred cents as the cost per cubic foot for the granite alone. The cost of the blocks of a large size, at other places, so far as could be ascertained, was about one dollar per cubic foot. The contracts, on the part of the bank, were made by those who considered themselves shrewd in such matters; but, as there was little competition, and the work was attended with some risk at the time, high prices were consequently paid.

In works intended for monumental purposes, it must be obvious that stability is an important consideration. And stability depends, in a great measure, on good construction; and this, again, on the size of the materials used; on the bond, or lap of one stone upon another; and also on the clamps and fastenings, cement, and mechanical execution.

In designing the Obelisk, the mode of construction, and style of execution, had necessarily to conform to the limited means at disposal, after purchasing the land required, and paying the contingent expenses. This sum amounted to about thirty-three thousand and five hundred and seventy-six dollars, as will be shown further on; and it consequently became necessary, in order
to adapt the construction to the means, to make use of the cheapest kind, and the coarsest execution, that would possibly answer.

It will be seen, however, by referring to the plan, that there are forty-four blocks of stone, of five tons' weight, in the first course alone; and it has been found by calculation, that five tons is a little more than an average size of the stones composing this structure. The average size is, consequently, nearly equal to the architrave pieces at the bank, before referred to; and had the same price been paid for the stone in the Obelisk, that was paid for that at the bank, the granite alone would have amounted to an enormous sum, as must be sufficiently obvious; the quantity wanted amounting to eighty-seven thousand feet, and the price five hundred cents per foot.

It will be perceived, moreover, by the bills of prices annexed, that the market prices, at the present time, of blocks of granite of extra sizes, do not vary much from the prices twenty years ago. The following are the Railway prices, for the year 1836, for stone delivered at the landing, namely: "Posts and lintels, and other stone of cubic dimensions, fifty-seven cents per cubic foot, and the price to increase one cent per foot on all stones that contain more than twenty-five cubic feet." Three cents are added, instead of one, as the cubic measure increases five feet.

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It will be perceived by the foregoing table, that the price of a block of granite of twenty-five cubic feet, is fifty-seven cents per foot; and for a block of twenty-six feet, fifty-eight cents per foot; and so on.

The following is the tariff of prices for stone for the exterior of the Custom House, as delivered in Boston:

All stone of twenty-five feet in contents, or under, fifty cents per foot, and to increase one cent per foot, for each additional foot in size.
For cutting, first quality, 3.00 per foot, sup.

second 1.90

third 1.10

fourth .50

For beds and builds .25

Sixteen full columns, including capitals, thirty-two feet high, five feet and four inches in diameter at the base, delivered in Boston, cut and finished complete, fifty-one hundred dollars each; sixteen three-quarter columns, thirty-seven hundred dollars each.

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It will be seen by the first table, that a block of granite of fifty-four cubic feet, which is about the average size of those in the Obelisk, is one hundred and one cents per foot, and by the last table is seventy-nine cents per foot; and a mean between these prices is ninety cents, which, it is presumed, is now about the market price for blocks of granite of such dimensions.

A STATEMENT SHOWING THE ACTUAL COST.

In order to show the actual cost of this Obelisk, it may be necessary to premise, that the corner-stone was laid on the 17th of June, 1825, and that the work at the quarry was commenced on the 16th of November following. The work was continued until January, 1829, when it was suspended for the want of funds. It was afterwards recommenced, on the 17th of June, 1834, and proceeded until November, 1835, when it was again discontinued. In November, 1840, what then remained to be done was let out by contract, and the work is now nearly finished. The sums of money paid out, at different times, are as follows, as shown by the audited accounts, namely:

[8]
SECTION.
First Experiment.

Expenses of the work, from November 16th, 1825, to February 28th, 1829,
paid by the superintendent, .............................................. $56,525 19

Second Experiment.

Expenses from June 17th, 1834, to January, 1836, paid by the superintendent, 18,321 77
Paid by the treasurer directly to the workmen, .............................................. 2,100 00

Last Experiment.

The expense of this experiment was paid by the contractor, as follows:
To D. M. C. Knox, for granite, etc., .............................................. $1,725 12
To Rogers & Richards, .............................................. 11,021 00
To Josiah Babcock, .............................................. 856 91
To Wright & Barker, .............................................. 7,136 32
For superintendence, .............................................. 1,853 50
For drawings, bevels, patterns, etc., .............................................. 263 87
Cost of setting stone, by two experiments, .............................................. 4,160 00

$103,963 68

Deduct, for worth of apparatus at the close, .............................................. $1,400
Loss of house burnt, .............................................. 800
Overcharge for transportation, .............................................. 800 ... 3,000 00
Total, .............................................................................. $100,963 68

To this must be added the expense of the iron work, conductor, and bankage, which will increase the sum total to about one hundred and one thousand six hundred and eighty-eight dollars.

The question which now remains to be decided, is, what a work of such magnitude and construction ought to have cost? Or rather, what it would have cost at the market prices? It will readily be perceived, that this is the **hinge**, or **turning-point**; for if it should appear that the Association have paid no more than the market price for their work, they surely can have no cause for complaint. And if the sum which they have paid, namely, one hundred and one thousand six hundred and eighty-eight dollars, is shown to be little more than half the market price, or than half the sum paid by others for the same amount of work, it will prove that the facts in relation to the expenses of the work have been greatly misrepresented; and that the reports in circulation, in regard to waste of funds, are entirely without foundation.
THE FOLLOWING STATEMENT SHOWS WHAT THE WORK WOULD HAVE COST AT THE MARKET PRICES.

The market price of the work on the Obelisk may be shown in two ways, either of which will be conclusive, namely: By the result of advertising the last contract, which of course determines the market price of such work; or by measuring the whole, according to the rates charged at the principal places of business.

It has been shown that the stock and work, on the last contract, has cost the contractor about twenty-seven thousand dollars. This sum little exceeds one quarter of the whole sum expended on the work; and his contract specifies that he is to receive of the Association for the same, in cash, $43,800.00

And in apparatus, at the close, estimated at 1,400.00

He also receives an amount in tolls of visitors viewing the work,

estimated at 4,800.00

Total received by the contractor, $50,000.00

The amount of the last item, however, is generally estimated much higher. But allowing it to be correct, the contractor will receive, for the last quarter of the work, the sum of fifty thousand dollars. And it will follow, that, if the whole had been paid for at the same rate, the total amount would have been two hundred thousand dollars, as proposed to be shown.

Another method of arriving at nearly the same result, is by measuring the whole according to established prices. It has been found by calculation, that the granite alone, for the Obelisk, measured according to the first table, would have come to eighty-six thousand nine hundred and forty-two dollars and sixty-six cents; and, according to the last, to sixty-seven thousand five hundred and forty dollars and ninety-nine cents, in a rough state. The fine dressing on the Obelisk, at the price of first quality work, in the preceding bill of prices, would have come to one hundred and forty thousand two hundred and fifty dollars, and the beds and builds, at twenty-five cents per foot, to thirty thousand dollars; amounting, in the whole, to two hundred and thirty-seven thousand seven hundred and ninety dollars and ninety-nine cents; to say nothing of the hoisting, mason work, mortar, iron cramps, etc., etc. And, at any price at which such work has ever been done, it could not have amounted to less than two hundred thousand dollars.

The following is the estimate for an obelisk of the same dimensions, but of cheap construction, previously referred to.
A COPY OF COL. BALDWIN'S ESTIMATE.

Memorandum and estimate of an obelisk, of thirty feet base, fifteen at the top, and two hundred and twenty feet high, with a winding stairway round a circular hollow newel, composed of a wall one foot and six inches thick, with openings through it for stairs, for air, and light. Quincy stone. Namely:

<table>
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<tr>
<th>Description</th>
<th>Quantity/Measure</th>
<th>Unit Cost</th>
<th>Total Cost</th>
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<tr>
<td>3538 perches of stone for the wall of the Obelisk, of which 1179½ for</td>
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<td>$5,895 00</td>
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<td>outside, at $5 per perch,</td>
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<tr>
<td>2349½, for the interior, at $3 per perch,</td>
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<td>7,047 00</td>
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<td>19,800 feet of hammering on surface, at 50 cents per foot,</td>
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<td>9,900 00</td>
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<td>Average area of masonry — 402 feet, 147 18-inch courses — gives for beds</td>
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<td>and builds, 118,188 feet. Add one half for perpendicular joints = 59,094</td>
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<td>= 177,282 feet. From this deduct one sixth = 29,547, outside, it will leave</td>
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<td>147,735 feet of hammering, at 6 cts., $8,864</td>
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<td>29,547 feet outside hammering, at 25 cts.,</td>
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<td>7,386 00</td>
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<tr>
<td>330 steps, 8 inches rise, average tread 1 foot, hammering rise and tread,</td>
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<td>1,980 00</td>
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<td>say 2 ft. wide, 4 ft. long in the clear, 4×2×330=2640, at 50c. $320 00</td>
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<td>Stock delivered for do., at 20 cents per foot,</td>
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<td>330 00</td>
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<td>Laying do., per step, $1,</td>
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<td>330 00</td>
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<td>Extra hammering, and laying circular staircase, and hollow newel, say</td>
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<td>20,000 feet, at 20 cents,</td>
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<td>4,000 00</td>
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<tr>
<td>Laying 3538 perches of stone, $5 pr. perch, including scaffolding and</td>
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<td>rigging, 17,690 00</td>
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<td>100 casks of Roman cement,</td>
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<td>$700 00</td>
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<td>Lime and sand, at 75 cents per perch,</td>
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<td>2,653 00</td>
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<td>Foundation, with 50 feet base, 12 feet deep, 784 perches, which,</td>
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<td>3,353 00</td>
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<td>including stones, mortar, and laying, at $10 per perch,</td>
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<td>$7,840</td>
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<td>150 squares of digging, at $2 per square,</td>
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<td>300...8,140</td>
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<td>Foundation for platform, 24 feet wide all round, 6 feet deep=143 squares,</td>
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<td>at $1,</td>
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<td>143 00</td>
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<td>Platform, say 20 feet wide all round, and 3 steps, 1.2 tread, each, equal</td>
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<td>5029 square feet, top surface, rise of steps 8 inches, say one foot for</td>
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<td>lap 1176, and 5029 equal 6205 square hammered face, at 125 cts. 7,756 00</td>
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<td>Foundation wall for platform and steps, say equal to half wall under the</td>
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<td>whole, 6 feet deep, 603 perches, at $5 per perch,</td>
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<td>3,015 00</td>
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<td>Windows, iron cramps, railing to staircase, roof, door, etc.,</td>
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<td>4,831 00</td>
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<td>Contingencies, superintendence, etc.,</td>
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<td>10,000 00</td>
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<td>Total,</td>
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<td>$100,000 00</td>
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The estimated cost of the Obelisk, as shown by the foregoing memorandum, was one hundred thousand dollars, and the funds available at the commencement of the work, were thirty-three thousand five hundred and seventy-six dollars, as will be shown further on. It appears, therefore, that the amount of funds at disposal, when the work was commenced, was only about one third part of the sum wanted for the purpose intended, had the Obelisk been constructed in the cheapest manner, and probably not more than one sixth part of the sum wanted to have built it in the style adopted, had the market prices been paid for the work.

COMMENTS ON THE FOREGOING ESTIMATE.

It will be seen by the foregoing memorandum, that the estimated cost of an obelisk of thirty feet base, and two hundred and twenty feet high, was one hundred thousand dollars; and in order to ascertain whether this is a high, or low estimate, it will be necessary to examine the items that make up the amount.

The first item is for eleven hundred and seventy-nine and one third perches of stone, at five dollars a perch, equal to twenty cents per cubic foot, nearly, delivered on Bunker's Hill. According to the estimate, there were to have been one hundred and forty-seven courses in the Obelisk, of eighteen inches rise, and eighteen inches thick; and, as no drawing accompanied the estimate, it is to be presumed that they were to have been from six to twelve feet long, and consequently would have been about equal to posts and caps of the same dimensions. This lot of stone is estimated at twenty cents per cubic foot, delivered at the site of the Monument. It will be seen at once, by those acquainted with the business, that twenty cents per cubic foot, for stone of that quality, is a low estimate; that it would barely pay the prime cost, under the best management. The transportation alone has generally cost about twelve cents per foot, leaving but eight cents per foot, for the quarrying, loading, bankage, and tools. The average price paid at the State Prison for such stone, for the last seventeen years, where competition has been allowed, and, consequently, the stone has been obtained at the lowest market price, is about thirty-four cents per foot. And by the Railway and Custom House prices, such stone would come much higher.

The next item in the estimate, is for twenty-three hundred and forty-nine and two thirds perches of stone for the interior. These are estimated, as will be seen, at three dollars per perch, or at twelve cents per cubic foot; which was the price of common cellar stone at the time. It must be obvious, therefore, that the price was low, or that a very ordinary material was estimated for.

The hammering, on the outside, appears to be estimated at about a fair rate. It should be noticed, however, that the inner walls were to have been left in a rough state; and in the design which has been executed, the fine dressing on the inner walls is about equal to the
fine dressing on the outside; and, consequently, there is nearly double the number of feet of fine dressing on the design which has been executed, that there was to have been on the one estimated for.

The hammering of the beds and builds, amounting to one hundred and forty-seven thousand seven hundred and thirty-five feet, is estimated at six cents per foot. This again, it will be seen, is a very low estimate for decent work, including tools; and it will be obvious, to every one acquainted with the business, that any thing that could be done for six cents per foot, must necessarily be ordinary work; the lowest work of the kind in the Custom House bill of prices being twenty-five cents. The laying of three thousand five hundred and thirty-eight perches of stone, at five dollars per perch, including scaffolding and rigging, amounting for the whole mason work, above ground, to seventeen thousand six hundred and ninety dollars, seems to be a moderate estimate; as it is understood that a sum of nearly the amount, was carried in for the last contract alone, which was only about one third part of the work.

Of the remaining items, no particular notice seems to be necessary. It must be obvious, however, that the foregoing estimate was intended for a cheap kind of work, in order to adapt it, as far as possible, to the low state of the finances; and, notwithstanding the low rate, it amounts to the sum of one hundred thousand dollars.

ABSTRACT FROM THE TREASURER’S REPORT, FOR 1830.

Receipts.

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole amount of subscriptions</td>
<td>$58,582 81</td>
</tr>
<tr>
<td>Grant of the State</td>
<td>7,000 00</td>
</tr>
<tr>
<td>Ladies’ donations</td>
<td>2,225 38</td>
</tr>
<tr>
<td>Cash borrowed on hypothecation of land</td>
<td>22,400 00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$90,208 19</strong></td>
</tr>
</tbody>
</table>

Expenditures.

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>For land on Bunker’s Hill</td>
<td>$23,332 43</td>
</tr>
<tr>
<td>For quarry in Quincy</td>
<td>325 00</td>
</tr>
<tr>
<td>For a monument in Concord</td>
<td>500 00</td>
</tr>
<tr>
<td>Expenses connected with the celebration of the fiftieth anniversary, and laying the corner-stone</td>
<td>4,720 85</td>
</tr>
<tr>
<td>Drawing, engraving, printing, advertising, taxes, &amp;c.</td>
<td>2,440 13</td>
</tr>
<tr>
<td>Fixtures, apparatus, tools, &amp;c.</td>
<td>9,606 67</td>
</tr>
<tr>
<td>Expense of the monument</td>
<td>46,951 13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$87,772 21</strong></td>
</tr>
</tbody>
</table>
Deposited with the Massachusetts Hospital Life Insurance Company, as an accumulating fund for Ladies' donation, 2,325 38
Cash in the Treasurer's hands, 210 60
Total, 4,435 98

Brought over. $87,772 21

$90,208 19

Boston, Aug. 18th, 1830. N. P. K., Treasurer.

It will be perceived that the foregoing is an abstract from the Treasurer's report, for 1830; more than four years after the commencement of the work. It appears by this abstract, that the whole amount of the subscriptions to August 18th, 1830, was $58,582 81
And the grant of the State, 7,000 00
Total, $65,582 81

In order to show the sum which was available at the commencement of the work, we must deduct for the cost of the land which was bought, $23,332 43
For the quarry, 325 00
For a monument in Concord, 500 00
For the expenses of laying the corner-stone, 4,720 85
For drawing, engraving, printing, taxes, &c. 2,440 13
Interest deducted from State security, say 688 00
Total, $33,576 40

Leaving, according to the above statement, thirty-three thousand five hundred and seventy-six dollars, and forty cents, as the whole sum on hand and available at the commencement of the work. It is presumed, however, that this is a high estimate, as contributions to a considerable amount, were known to have been made after the commencement of our work in 1825, and previous to August eighteenth, 1830, when this report was made. It is supposed, however, to be sufficiently near for the purpose intended.

It has been shown, that the actual cost of the Obelisk was about one hundred thousand dollars; this being the total cost, notwithstanding all the impediments that have attended the work. Had it been well sustained, and completed in the course of about three years—which would have been a reasonable time—it would have made a great difference in the final cost. It must be obvious, however, that, whatever the difference might have been, it cannot be accurately ascertained; but is estimated at twenty thousand dollars, leaving eighty thousand dollars as the probable cost of the Obelisk, had the work gone on without interruption or embarrassment.

The suspensions at different times were disadvantageous to the economy of the work. In the first place, the expensive apparatus, which was indispensable in carrying on such a work, by a delay of five years, became unfit for use, and consequently it required a new outfit, at every recommencement of the work. And the whole apparatus had lessened much in value at the end of seventeen years; whereas, had the work been executed in the proper time, the same apparatus would probably have sold for half its first cost.
And, secondly, there was a loss in discharging gangs of workmen, who, by practice, had become expert in the execution of the difficult work required for the Obelisk; and in consequence, being under the necessity of drilling in a new gang at every recommencement of the work. These suspensions had also a depressing effect on the spirits of those engaged in the executive parts, which was unfavorable to the economy of the work.

But notwithstanding the unfavorable circumstances that have attended the work, it is presumed, that, in regard to economy in the execution, it will not suffer in a comparison with any work whatever, that has been executed in modern times. And such a comparison would probably exhibit its merits more clearly than could be done in any other way.

It is found by comparison, that the Washington Monument, in Baltimore, contains but about half the number of cubic feet of material that are in this Obelisk. It consists of a column of about nineteen feet in diameter at the base, set on a pedestal, and altogether about one hundred and sixty feet high. It is well executed, but of cheap construction. The foundation is of slaty granite, in small pieces, and the body of the work is of bricks, faced with limestone, and in ashlar courses of about one foot rise. And, notwithstanding, has cost, as stated on good authority, about two hundred and twenty thousand dollars. And, consequently, has cost twenty thousand dollars more than twice as much as the Obelisk.

It will be seen, also, that the Obelisk will compare still more favorably with the work now going on at the Custom House in Boston.

It appears by the debate in Congress, that this Custom House, which it is presumed contains about an equal quantity of granite with the Obelisk, has already cost the sum of seven hundred thousand dollars, and requires three hundred thousand more to complete the work. The whole amounting to a million of dollars, and consequently equal to the cost of ten such obelisks as that on Bunker's Hill. And it is presumed, that the columns and pilasters alone, which are attached to the body of the work, have cost as much as two such obelisks.

It must be obvious, therefore, that if these works have been executed at fair rates, the Obelisk has been built at a very low rate; and could not have been executed at such a price had not the work been skilfully planned, and had not the plan been well sustained, by close attention and hard labor.

It has already been shown, that the work done on the Obelisk, had the Association paid its full value, would have cost them the round sum of two hundred thousand dollars; whereas, the actual sum paid out for the work is but about half that amount; and, consequently, there has been a clear saving of one hundred thousand dollars, by the course taken in carrying it on. And as the saving of that amount is equivalent to contributing the same amount in cash, it follows, that those who have planned and conducted the executive parts of the work, have, in effect, borne half of the expense, by contributing to that amount in cash or its equivalent,
OF THE OBEISK: ITS ORIGIN, ETC.

It is already well known, that the ceremony of laying the corner-stone of the Monument intended to commemorate the Battle of Bunker's Hill, did not take place until the fiftieth anniversary of that action. The cause of the delay in erecting a suitable memorial, to mark the spot on which it occurred, may be traced to various circumstances. The deranged state of affairs at the close of the revolutionary war was unfavorable for works of the kind. The attention of the People was necessarily directed to more pressing concerns. They were busily engaged in repairing the damages occasioned by the war; and it was only, when, by years of industry and economy, they had arrived at a state of competence and ease, that such a work could be successfully undertaken.

Soon after the close of the second war with Great Britain, however, the public attention was drawn to the subject. The prompt manner in which a kindred nation pays the tribute that is due to its heroes and benefactors, had often been noticed, and it is presumed had some effect in calling the attention of our citizens to a subject too long delayed. A meeting for devising the best mode of accomplishing the object in view, was called by a few patriotic citizens. The first meeting, however, was but thinly attended; but, as the object became better known, the number increased, and in the year 1823 an act of incorporation was obtained, under the name of the 'Bunker Hill Monument Association,' for the purpose of erecting an appropriate Monument.

The Government of the Association was organized by a choice of officers on the 17th of June, 1823; and an address was made to the Public, stating its objects, and soliciting pecuniary aid.

The principal part of the time from this date, to June 17th, 1825, was employed in making the preliminary arrangements; in collecting subscriptions; securing the battle-ground; and deciding on the most appropriate form for the intended monument.

In regard to the last, there was a diversity of opinion. The advertising for the best design, resulted—as is usual in such cases—in the exhibition of some fifty plans, of every imaginable form, of which the obelisk and the column seemed to have the preference, and were, consequently, selected as the two from which a choice should be made.
By referring to the records, it may be seen, that a meeting of the directors was held on the 19th of May, 1825, and a committee was appointed to report a plan of an obelisk, and also of a column, with estimates of the expense of each.

"At a meeting of the directors on the 7th day of June, this committee made a report (it is presumed in favor of a column). A proposition was then made, and supported, which was as follows: that the directors of the Association do now decide on, and adopt the column, as the form of the object for the proposed monument. This proposal having been discussed at great length, the question was finally taken by yeas and nays, each director being called on in turn; and there being five in the affirmative, and eleven in the negative, the proposition was rejected.

"It was then voted, that the form of the obelisk shall be adopted for the proposed monument; or, in other words, a pyramidal structure, such as may be hereafter agreed on. A committee was then chosen by ballot, to report a design of an obelisk or pyramidal structure, and to consider and report on the subject generally.

"At a meeting of the directors on the 24th of June, the chairman of the committee to present the design of an obelisk, stated, that he should be ready to report in about ten days. Ordered, that the committee be continued."

"July 5th, 1825. A meeting of the directors was held. After a short discussion, it was voted unanimously, to accept the report of the committee on the plan of the monument."

It appears, therefore, that the design of the Monument was not determined on, until the 5th of July, 1825, five weeks after the ceremony of laying the corner-stone.

The general dimensions of the obelisk that was adopted was thirty feet at the base, and two hundred and twenty feet high; with stairs to the top; and a foundation twelve feet deep and fifty feet in diameter at the bottom. The directors would have preferred a structure of greater magnitude, had the state of the finances warranted it.

In order to ascertain the size of the largest obelisk that could be safely undertaken, estimates were made of the expense of three, of different dimensions; all, however, of two hundred and twenty feet in height.

An estimate was made for one of fifteen feet base, with a pedestal, in imitation of one of the Roman antiquities. Another estimate was made for one of the dimensions finally adopted; and a third for one of forty feet base.

But, after mature consideration, it was decided, that one of thirty feet base was as large as could be safely undertaken with the means at disposal.

It will be perceived, therefore, that the size of the Obelisk had necessarily to conform to the means available; and was so decided by the committee on the designs. But whatever related to the form and arrangement of the details—the construction, and mode of carrying the work into execution—was left entirely to the architect and superintendent of the work.
At a meeting of the directors, July 5th, 1825, it was also voted, that the building committee consist of five, instead of three; and a report was made, of rules and regulations for their government, which were as follows:

1st. There shall be elected by ballot, a building committee of five persons, all of whom shall be members of the board of directors.

2d. The committee shall have power to commence and prosecute the building of the Obelisk; to contract with the architect and mason, and with all other persons to be employed in erecting the same, and to superintend the building, and to prescribe and direct the performance of the duties and services of all persons who may be employed, and to dismiss such as they may find to be incapable, unfaithful, or negligent, and to employ others in their stead.

3d. The board of directors shall appropriate and place at the disposal of the building committee, sums of money in the treasury of the Association, from time to time, as the directors may see fit; and the sums of money, so appropriated for the building of the Monument, shall be drawn from the treasury by an order signed by the major part, at least, of the building committee; and if the building committee shall expend or contract in such a manner as to cause the expenditure of the money, at any time, more than shall have been so appropriated and placed at the disposal of said committee, the directors shall not be, nor the corporation, liable for such excess.

4th. The building committee shall make a quarterly exhibit, in writing, of their proceedings, to the board of directors, and shall then make known all the contracts made; moneys expended; moneys contracted for; and progress of the work, at each successive exhibit.

5th. The building committee may establish rules and regulations, for their own government, and may employ a clerk at the expense of the corporation.

6th. The building committee shall be, in all things, and all respects, subject to the control of the board of directors, in the execution of their trusts.

7th. On the removal, resignation, or decease of any one or more of the members of said committee, the directors shall convene, and fill the vacancy or vacancies so occasioned by ballot; notice to be given of the purpose of the meeting, at which such election shall be made, seven days, at least, previous to holding such meeting.

October 17th. Voted, That the building committee be a standing committee, with authority to exercise all the powers of the directors, in the management of the affairs of the Association, and to call meetings of the directors, whenever they shall judge it expedient.

Voted, That this committee be authorized to fill all vacancies in their body.

Owing to the restrictions imposed on the building committee, by the directors, in the foregoing rules, there was some difficulty, in finding those who were disposed to act on this committee,
and it was not until near the middle of October, that the committee was organized, by the choice of Dr. John C. Warren, as Chairman.

The Architect and Superintendent was then appointed, and the requisite models and working draughts were made out. In order to obtain the work at the lowest rates, the usual course was followed, of advertising for the best proposals for doing it: and the following advertisement was inserted in the papers of the day, by the chairman of the building committee, namely:

"Proposals will be received, for furnishing the granite for an obelisk, to be erected on Bunker's Hill. The quantity required will be about nine thousand tons, and must be delivered at the prison in Charlestown, or at a wharf near the Navy Yard, as may be required. The dimensions of the blocks to be about two feet six inches wide, and twelve feet long. The granite, for the foundation, may be of a coarse kind, and it will require about fourteen hundred tons. The outside courses of the Obelisk, must be of the best Quincy granite, of uniform color, of which about twenty-six hundred tons will be required.

"Proposals will also be received for Chelmsford granite, for the outer courses. Those who estimate, may furnish any quantity, to suit their own convenience. Proposals are to be handed to S. Willard, architect and superintendent of the Monument, next to St. Paul's church, Boston, who will furnish all necessary information on the subject."

The plans and models were examined by most of those in the granite business; but no proposal was offered, except by one individual, who offered to furnish a part at a price three times the estimated cost.

A quarry had been purchased, and it was intended to quarry the stone by the day, should no favorable proposal be offered. It was estimated, that the prime cost of the granite, in this way—delivered at the site of the Monument, would not exceed twenty cents per foot, for the largest blocks wanted.

The object in advertising, however, was to give every one a chance, who might have been disposed, to furnish it; and, had the price offered been less than twenty cents per foot, it was the intention to have abandoned the project of quarrying the granite on our own account.

It was finally concluded, however, to work our own quarry, and the result has shown, that there were important advantages attending it. In the first place, the work was obtained by the Association at prime cost; no profit being allowed to any one. And, secondly, it placed the Association in a position beyond the reach of any combination, that might have been disposed to extort a high price, for the difficult work which was required for the Obelisk.

Instead of paying ninety cents per foot, which was about the average market price for the kind of stone wanted, the first thirty-six thousand feet were delivered at the site of the Monument, at about twenty cents per foot, namely:
The cost of the quarrying, including tools, was 10 cents per foot.
The cost of transportation to Devens's wharf, by railroad, 5.8 mills.
The cost of wharfing, and hauling to the site of the Monument, 3.7 mills.
The cost of loading at the quarry, estimated at 5 mills.
The total cost per cubic foot, delivered on the hill, 20 cents.

The quarrying of the remaining fifty-one thousand feet was done at the same rate; but, as it was carried by land, the transportation cost about twelve cents per foot. This, together with the quarrying, amounted to twenty-two cents per foot, for the last part of the work.

The market price of a block of average size in the Monument has been shown to be about ninety cents per foot, and the difference between twenty-one cents, the average cost of the whole, and ninety cents, the market price, is sixty-nine cents. This, multiplied by eighty-seven thousand, the whole number of feet, will amount to sixty thousand dollars, as the saving in the granite alone; which may be considered important, when the low state of the finances is taken into the account. No contingency attended this part of the work, except a small one in preparing the quarry, and estimated at a cent per foot, on eighty-seven thousand feet.

It was well known to the working associates at the time, that a work of the magnitude and construction adopted, and at the prices which had been uniformly paid for such work, would have cost the sum of two hundred thousand dollars; but it was calculated, that, by working a good quarry in a skilful manner, the same might be obtained for half that amount. That course was, therefore, recommended to the intelligent chairman of the building committee, and adopted by him, and has fully answered every expectation; as the whole work, together, has been done at half of the market price; and, so far as relates to the granite, has cost but a quarter part—the actual cost being twenty-two cents per foot, and ninety cents per foot, being the market value.

It follows, therefore, that the main purpose of these experiments, has been fully accomplished; namely, the building of the Obelisk, at the lowest possible rate, which the impediments attending the work would allow.

There are other important considerations, connected with these experiments, however, and advantages growing out of them—only secondary to the main purpose; namely, the effect they have had in improving the style of building, and the taste in architecture, by the introduction of a building material not before in use; and showing that it can be worked into any moulded or ornamental form required, for the exterior of the best structures, and at a reasonable rate. And thereby having supplied a desideratum which had always existed, until the commencement of these experiments.

A strongly marked improvement in taste, and in construction, immediately followed the commencement of this work; as will be obvious, on viewing the public structures which have been erected since that time. Improvement in construction may be noticed in the Dry Docks in Charlestown and Norfolk, executed soon after the commencement of our work. And many of
the buildings recently erected in Boston, and New York, will show improvement in architectural
taste, and mechanical execution. And particularly the Astor House, and Exchange, in New York,
and the Tremont House, Exchange, and Custom House, in Boston. A change for the better
may also be seen in the recent blocks of stores, of which the same material forms an essential
part.

The building of the Obelisk, led also to the construction of the first railroad in the country,
this having been built expressly to carry the granite for this Obelisk. It may therefore be recurred
to, by those concerned, with some pride and satisfaction on that account, as exhibiting enterprise
in the introduction of valuable improvements.

In a pecuniary point of view these experiments have also been advantageous. In establishing
the credit of a new building material it created a new demand; and, consequently, a business
has grown out of them since the work commenced — and in a space of a few square miles
— amounting, as estimated, to three millions of dollars, which would not otherwise have been
done at these quarries, and of which the work on the Obelisk is but about one thirtieth part.

DESCRIPTION OF THE PLATES.

No. 1. Is a general view from the south.

No. 2. Is an angular view of the part of the foundation which is below the present surface,
and consequently not open to inspection. This view is intended to show the connection of the
different courses with each other, and also the bond. This foundation consists of six courses,
of two feet rise; and, consequently, required the foundation to be sunk twelve feet below the
present surface. The first course is fifty feet in diameter. The blocks of stone composing it
being rough dressed, and covering the whole surface, except the corners. It will be seen, by
the plan, that there are forty-four stones in this course, twelve feet long, two feet six inches
wide, and two feet thick; equal to five tons in weight, each, and the remainder, averaging about
three and a half tons. It will also be perceived, that the first course presents a row of twelve
headers, on each side. The second course are stretchers, falling back three feet, and lapping
on to the centre of the blocks in the first course. The third course shows headers, going back
into the body of the work; and the fourth, stretchers, as before. The top course seen in this
view, is now wholly above ground, and exhibits the construction of the first course, and also a
view of Holmes's Derrick.

No. 3. Exhibits the construction of a part of the first course, on a larger scale. It will
be seen, that the headers go through the wall in every other course. The length of the first
headers is six feet; this being the thickness of the wall at the base of the Obelisk. The weight
of the blocks of granite, in the lower part of the Obelisk, range from nine to five tons.
No. 4. Is a view of a part of the first, second, and third courses in the foundation, on a larger scale, and shows the connection of these courses. The hollow cone commences at the top of the first course.

No. 5. Is a section through the Obelisk, showing its diameter at the base, and at the top, and also the height. The footing in the ground is also shown, and the number of revolutions in the stairs, which are required to reach the chamber. It has also a table of contents, showing the number of cubic feet of granite in each course; and also the number of feet of fine dressing.

The foundation is fifty feet broad at the bottom, and twelve feet high to the surface of the ground. The Obelisk is thirty feet in diameter at the base, fifteen at the top of the truncated part, and two hundred and twenty feet high. The outer wall is six feet thick at the bottom, and two feet at the top. The diameter of the hollow cone is ten feet at the bottom, and six feet at the top. The thickness of the wall of the hollow cone is one sixth at the bottom and one foot at the top. The chamber is a circular room, eleven feet in diameter, and seventeen feet high, with four windows, facing nearly the four cardinal points.

No. 6. Shows the plan of the Obelisk, with that of the foundation, projecting ten feet on every side. It also shows the number of the blocks of stone which compose the first course, with the door and the commencement of the steps. The outside courses were two feet eight inches rise, the courses of the cone one foot four inches each, and the steps eight inches. In construction the courses are alike, except diminishing as they recede from the base upward. In order to preserve the bond, however, the headers are shifted to opposite sides in each succeeding course, namely: in the first course, the headers show on the east and west sides, and in the second on the south, and so on.

No. 7. Plans of the first and second courses of the foundation, showing the change in the dimensions, and form of the blocks of stone, in each succeeding course. These dimensions are marked, and plain to inspection.

No. 8. Plans of the third and fourth courses in the foundation.

No. 9. Plans of the fifth and sixth courses of the foundation.

No. 10. Shows the construction of the first course. The bond of the header, in the second course, over the stretcher and skirting, in the first course; and also the locking of the quoins, and bond of the centre stretcher, in the second course, over the header in the first course. It also shows the corner-stone, in its first position. Fig. 1. After the box had been put into an excavation prepared for it (which is shown in the drawing), the stone was turned down; and, with the hoisting apparatus, was set in its place. Fig. 2. This was done without ceremony, under the direction of the chairman of the building committee, Dr. John C. Warren, by the master mason of the work.

The ceremony of laying the corner-stone in a temporary manner, had taken place some time previous to this date; in consequence of a desire that it might be done on the fiftieth anniversary of the battle, and during the visit of General Lafayette. The design of the Monu-
PULLING JACK.
ment, however, had not been matured at the time, and consequently nothing was intended to be permanent. The box was deposited between two small blocks of granite, which were cramped together; and for further security were overlaid by a mass of rough granite. When the design was matured, however, it became necessary to sink the foundation much deeper; and all was taken up, and the box intrusted for safe keeping to the chairman of the building committee. When the present foundation was completed, the box was deposited in its proper place, in a stone of about nine tons' weight; forming the quoin at the northeast angle, as has been already stated.

The view also shows Holmes's Hoisting Apparatus, which was used for setting the first fifty-five thousand feet of the granite in the Obelisk.* This apparatus, with various modifications to adapt it to different purposes, appears to have been the original invention of Almoran Holmes, of Boston. He was a practical seaman, and a bold and skilful hand in this department of engineering. He had recently given his attention to the different kinds of machinery, required for the hoisting of heavy weights, and, from his early training, was well prepared to direct in all difficult cases, and particularly where rope purchases were required. He finally lost his life by a casualty which occurred at Long Wharf, in Boston, in lowering a diving bell. He had the entire charge of contriving the apparatus, and hoisting the first thirty-six thousand feet of granite in the Obelisk; but, previous to the recommencement of the work in 1834, the fatal accident occurred, which deprived the Association and the public of his invaluable services.

This hoisting apparatus is remarkable for its compass, and for the ease and grace with which it performs its work. With a gaff, or arm of fifty feet (when well adjusted), it will command a circle of a hundred feet in diameter. It will take a weight at the point of the gaff, and land the same at any part of the outer circle; or on any point of a concentric circle, until it arrives at the foot of the derrick, and vice versa. It is consequently well adapted to buildings of magnitude, in setting the stone work; and for wharves, and other places of deposit, in stowing the materials in the most compact manner; and reloading them when wanted. This apparatus, with some variations, has come into general use, and is so well contrived for the purpose intended, as to leave little to be wished for, in regard to apparatus for hoisting.

Something of the kind is said to have been used at the Bell-Rock lighthouse, for setting the stone work; and it is quite possible that this apparatus, and indeed every other modern invention for the purpose of hoisting, may have been in use before. The great works of the ancients that have come down to us, prove that they must have had an apparatus of great power of some kind; and it seems quite probable, that this, as well as other inventions of modern times, may have been repeatedly invented and lost, within the last four thousand years.

No. 11. Exhibits three views of the lifting jack. This jack has been found to be a useful machine for turning heavy blocks of stone. It is a compact and powerful machine, calculated

* All the remaining stone were hoisted by steam power.
for hard service, and, for some purposes, seems to be better adapted than any other power. It consists of a rack, and one or more wheels and pinions, according to the power required.

Something of the kind has been in use from the earliest times; but was not used in the granite business until the work on the Monument commenced. Those in use were constructed for other purposes, and not adapted to hard service. They were generally made of thin plates of iron, bolted to a large stock of wood, having a feeble rack, and without proper boxes for the gudgeons. They were also weak and of rude workmanship, and, when put to hard service, either broke or wore down and out of gear in a short time.

In order to adapt it to hard service thicker plates were used, and these plates were screwed to a hoop of iron. This iron hoop extended to the foot of the jack, and the foot was bolted on, giving the whole a firm bearing on the ground; a piece of wood was bolted between the sides, leaving a groove for the sliding of the rack.

It was considered important, that the best of materials should be used, in order to obtain the greatest strength, with the least weight. And, consequently, the whole was made of the best of wrought iron and cast steel; except the boxes, which were of bronze, or composition. The rack and the wheels were of wrought iron, and the pinions of cast steel.

It will be seen, by the side view, that the claw of the jack rests upon the ground, when the rack is run down; and, consequently, a hold may be obtained of a stone laying on the ground.

No. 12. Is a view of the pulling jack. This jack is constructed much like that for lifting; but is always in a horizontal position. The crank pinion is extended two or three feet, and turned by four arms about three feet long. The rack has a claw at the end to receive a chain, which may be led to places which are inaccessible, and dangerous for using the common jack. It is a powerful and convenient purchase, for canting and haulling out heavy blocks of stone.

The power of the one exhibited is about ten tons; but, by the addition of a sheive, the power is nearly doubled — amounting to twenty tons. If more is necessary, it is obtained by adding another jack. This machine was contrived and first used at the Bunker Hill quarry.

No. 13. Shows two views of a hoisting apparatus, calculated for weights too heavy for shears, or derricks, and has been found convenient for loading any stone from five to fifty or even sixty tons in weight. A horse or timber frame is set over the stone to be raised, supporting a screw and nut. A chain from the weight, leads to a shackle, which is connected with the screw. The nut is then turned round by long arms, and the weight raised to a proper height for the carriage to pass under it, and, when properly adjusted, the weight is lowered to its bearings.

For blocks of granite of great length, such as columns and pilasters, &c., two horses and screws were used. In unloading the same, the apparatus was placed over them, and the weight raised sufficiently to clear the carriage. The carriage was then drawn out, and the weight lowered to the ground. Many hundreds of loads have been raised in this way without accident, and of all dimensions over five tons in weight, and less than sixty, without accident, and with
great facility and economy. This apparatus was contrived at the Bunker Hill quarry, and first used in loading a large mass of the granite for the Obelisk.

No. 14. Represents a large carriage, constructed for carrying the columns for the Merchants' Exchange in New York, from the quarry to the wharf, about five miles.

There were eighteen of these fluted columns, of about thirty tons each. There were also about fifty blocks of other large stone carried on the same carriage for this Exchange, consisting of pedestal blocks, architrave pieces, &c., from twelve to sixteen tons in weight.

The same carriage, with some modification, was used in transporting the pilasters for the new Exchange in Boston, and a part of the columns and architraves at the Custom House. The corner pilasters at the Exchange, being about fifty-five tons in weight, four additional wheels were connected; and the four fluted pilasters were carried on two carriages, of four wheels each.

The axles of the forward carriage were made about twenty years ago, for transporting the columns at the Branch Bank, and have been in use since that time. They were first used in transporting these columns from Westford to Boston, and afterwards for carrying the four columns at the meeting-house in Quincy.

The axle of the hind wheels is 6 inches in diameter.
The axle of the middle " is 5 " " 
The axle of the forward " is 4½ " " 

The experiments in the transportation of heavy stone have been entirely successful, the whole having been accomplished with much ease, and without any serious accident.

The average cost of transporting the columns for the Merchants' Exchange in New York, from the quarry to the wharf, was about one hundred dollars each. The distance about five miles.
APPENDIX.

INSTRUCTIONS TO THE SUPERINTENDENT.

The building committee of the Bunker Hill Monument Association, in the name and behalf of the corporation for erecting a monument to commemorate the battle of Bunker Hill; to Solomon Willard. Whereas, this committee, having special confidence in your abilities and integrity, do hereby appoint you architect for the construction of said Monument; and, furthermore, they do also appoint you superintendent for the execution of the same in all its details, and also commit these important trusts to your charge, in full confidence that you will employ your best ability to complete the same with all the economy and despatch so great a work will permit.

In the execution of the Monument you will take for your guide a plan drawn by yourself and accepted by the directors of the Bunker Hill Monument Association, which plan is now in your hands—and all models and plans, are to be formed on the ground of the above plan, and you are requested to have all plans, models, and all parts of the work under your care, so arranged, that, in case of any accident befalling you, (which may a good Providence avert,) the plans, models, and other works, may be delivered over to your successor, so that the great work which you have conducted thus far, may be continued without impediment.

As a considerable quantity of the material for the construction of the Monument is already got out, and as your experience on this subject will guide you as to the times and quantities of preparing it; it is not necessary to give any instructions, on this head. Our wish is, that a sufficient quantity of stone should be got ready, to begin the construction of the Monument as early in the spring as the weather will allow; and to carry it on without delay through the following season.

We do not consider it best to transport any stone to Charlestown this season, except a small quantity, as an experiment made to gratify the public curiosity. But we should wish that contracts should be made for the transportation of the stone to Charlestown, in season to open the spring without delay. It would be best, also, to make all other contracts for the
sand, lime, and other materials, and also for mason’s, and carpenter’s, and blacksmiths' work, as far forward as you can see the necessity of employing such workmen.

In order to determine whether it will be best to have the stone hammered at the quarry, or in Charlestown, we wish you to make an experiment of the cost of hammering stone, of the various forms you may require; and, this being done, to apply to the superintendent of the State Prison, to ascertain what the hammering of similar stones would cost at the Prison. In case we should decide to have the hammering done at the quarry, we authorize you to erect the necessary buildings, procure the requisite apparatus, and to employ as many hands as may be required for such work; and the sooner this is done, after the principal point is settled, the better.

You will no doubt employ this winter in making such plans and models as may be wanted, in getting all the machinery in good order, and placing it in the most convenient situation, and for these purposes you are authorized to employ suitable artificers. It will be best to see that a proper wharf, or place for landing the stone at Charlestown is secured for the benefit of our operations, as long as may be required; provided the expense thereof be not great. Also, that the wharf thus procured be in a proper condition to receive the material, and all necessary works be erected there in good time. We also authorize you to lay flagstones of granite on that part of Bunker Hill where you determine to carry up the stone.

In case of any deficiency in your instructions; or the occurrence of any new questions, you will refer to the committee through the chairman; and, whenever the case is important, this should be done in writing.

You will be provided with such moneys as you may require by applying to the chairman; giving him sufficient notice, so that he may have time to draw money from the Treasury; and you will exhibit the state of your accounts monthly, or as nearly so as your duties permit, to Amos Lawrence, Esq., who, with the chairman, constitute the committee of accounts.

Should you find it necessary, in order that you may devote your time to more important objects, officers will be appointed under you for writing, payment of moneys, and the performance of other duties which might interfere with higher concerns.

By order of the building committee of the Bunker Hill Monument.

JOHN C. WARREN, Chairman.

Boston, Dec. 1st, 1826.
CONTRACT FOR CARRYING THE STONE.

This agreement made and concluded this twenty-seventh day of March, in the year of our Lord eighteen hundred and twenty-seven, by and between the Granite Railway Company, herein acting by Thomas H. Perkins, their President, on the one part, and the building committee of the Bunker Hill Monument Association; herein acting by John C. Warren, chairman of said committee, on the other part, witnesseth, that the said Granite Railway Company hereby promise the said John C. Warren, chairman as aforesaid, to receive on the said Company's Railway, during the year eighteen hundred and twenty-seven (three thousand tons) of hewn stone, to be used in building the Monument aforesaid; at such times during the said year as the said John C. Warren, or the superintendent, shall offer to be carried, and not exceeding thirty tons in a day—and that said company will carry the same hewn stone from the place where the same shall be delivered, on the Railway, to the wharf of the said company, and thence by water to Devens's wharf, in the town of Charlestown, and there deliver the same on to the said wharf, the said Warren, or the superintendent, or other agent of the said building committee, furnishing a crane at the building committee's expense, properly prepared for hoisting the said stone from the said company's boats, on to the wharf; the said company assuming on themselves the expense of transportation from the place of delivery, which is to be on the Railway, and actually between the sides thereof, until the delivery on the said Devens's wharf, with the use of the crane, to be by said company furnished. And the said company hereby promise to do the said carrying, with all reasonable care and fidelity, and without doing any injury to the stone, which can be avoided with due care and reasonable diligence.

And the said company further promise and assume upon themselves, to take, carry, and deliver any quantity of stone daily, which the said Warren, or the agent employed under him, or said Committee may require, not exceeding thirty tons of stone in any one day.

And the said John C. Warren, chairman of the said building committee, hereby promises, and assumes upon himself, to pay to said company, at the expiration of each successive three months, from the commencement of the delivery, at said Devens's wharf, in Charlestown, the sum of seventy-five cents for each and every ton which shall have been delivered, in full, for the transportation from the place of receiving aforesaid, to the place of delivery aforesaid.

Provided, Always, that in case the state of the weather shall render it impossible on any day, or days, to effect a delivery, it shall be a sufficient performance of the contract to make the delivery as soon thereafter as can be done; and provided, also, that the said company may deliver more than thirty tons in a day, if it shall suit the convenience of the said company to deliver more than thirty tons in any one day.
HAULING COLUMNS.
In witness whereof, the said Thomas H. Perkins, President, as aforesaid, and the said John C Warren, Chairman, as aforesaid, have interchangeably signed this instrument, on the day first aforesaid.

T. H. PERKINS, (seal.)
President.

JOHN C. WARREN, (seal.)
Chairman.

CONTRACT FOR HAULING UP THE STONE.

This agreement made by and between Thomas O. Nichols and John Pierce of Charlestown, in the County of Middlesex on the one part, and the Bunker Hill Monument Association on the other part; said Association herein acting by John C. Warren, chairman of the building committee, witnesseth, that the said Thomas O. Nichols and John Pierce do hereby agree and take upon themselves to do and perform, for the said Association, the following work and service.

1st. Said Nichols and Pierce will take at Devens's wharf in Charlestown, and carry thence to the site of the Monument, three thousand tons of stone, at forty-three cents per ton, and will carry all the sand that may be wanted, from said wharf in Charlestown, to said site of the Monument, at the same rate per ton.

2d. That said Nichols and Pierce will find all the necessary means of transportation, at their own cost and charge.

3d. That the said corporation will make the passage-way, on to the hill from the common highway, in Charlestown, convenient for said carrying, and will permit the said Nichols and Pierce to use gratis the machinery for moving stone, belonging to the corporation, at the said wharf.

4th. The said corporation agree and hereby engage to pay the said Nichols and Pierce three quarter parts of the money which may be due to them for performing this contract, at the end of each successive month, and the balance which may be due when the contract is performed, or within one month thereafter.

In witness whereof, the parties have hereunto set their hands and seals, the twenty-fifth day of April, 1827.

JOHN C. WARREN,
Chairman of the Committee.

THOMAS O. NICHOLS,
JOHN PIERCE.
An account of the expenses attending the mason's work, including the working of the quoin heads and headers—jointing and fitting the stone—lewising, cutting in cramps, &c. &c., with the hoisting and mason's work, mortar, and iron cramps, and every other expense incurred on Bunker's Hill, except the first cost of the hoisting and other apparatus. The amount laid up, at the suspension of the work in 1828, was found to be thirty-six thousand eight hundred and seventy-six cubic feet, and the bills paid on account of this work were as follows, namely,

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>James S. Savage's bill for mason's work</td>
<td>$649 34</td>
</tr>
<tr>
<td>Part of Devens's bill for Lime, &amp;c.</td>
<td>63 25</td>
</tr>
<tr>
<td>N. Jewett's bill for fitting stone</td>
<td>40 00</td>
</tr>
<tr>
<td>Richards's bill for sharpening tools</td>
<td>43 77</td>
</tr>
<tr>
<td>Part of Nichols and Pierce's bill for teaming</td>
<td>116 21</td>
</tr>
<tr>
<td>Second bill of James S. Savage for mason's work</td>
<td>1,120 83</td>
</tr>
<tr>
<td>Part of Devens's bill for sand and lime</td>
<td>44 18</td>
</tr>
<tr>
<td>Part of Holmes's bill for hoisting</td>
<td>1,109 28</td>
</tr>
<tr>
<td>Thompson's bill for iron for cramps</td>
<td>213 95</td>
</tr>
<tr>
<td>Holmes's for hoisting, second bill</td>
<td>755 23</td>
</tr>
<tr>
<td>Whipple and Adams's bill for rope</td>
<td>84 65</td>
</tr>
<tr>
<td>Johnson's bill for hauling water</td>
<td>20 44</td>
</tr>
<tr>
<td>Part of Holmes's for hoisting, third bill</td>
<td>381 40</td>
</tr>
<tr>
<td>Part of Nichols and Pierce's bill for teaming</td>
<td>27 95</td>
</tr>
<tr>
<td>Thompson's for iron for cramps, second bill</td>
<td>230 91</td>
</tr>
<tr>
<td>Third bill of J. S. Savage for mason's work</td>
<td>921 27</td>
</tr>
<tr>
<td>Part of Devens's bill for lime and sand</td>
<td>51 27</td>
</tr>
</tbody>
</table>

Total cost of laying up 36,876 cubic feet, $5,873 93

And five thousand eight hundred seventy-three dollars and ninety-three cents, the whole cost, divided by thirty-six thousand eight hundred and seventy-six, the whole number of cubic feet laid up, gives 16 1-2 cents as the cost per foot cubic, for this part of the work.
SECOND EXPERIMENT.

When the work was recommenced in 1834, an experiment was made in fitting, hoisting, and setting one thousand six hundred feet of stone, and the bills paid on that account are as follow, namely,

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>William Frederic</td>
<td>Nine days' work, at $2 00,</td>
<td>$18 00</td>
</tr>
<tr>
<td>Warden</td>
<td>Nine days' work, at 10s.,</td>
<td>15 00</td>
</tr>
<tr>
<td>S. Frederic</td>
<td>Nine days' work, at 10s.,</td>
<td>15 00</td>
</tr>
<tr>
<td>Carkin</td>
<td>Three and three-quarters days' work, at 10s.,</td>
<td>6 25</td>
</tr>
<tr>
<td>Irvine</td>
<td>Nine days' work, at 10s.,</td>
<td>15 00</td>
</tr>
<tr>
<td>Murphy</td>
<td>Nine days' work, at $1 50,</td>
<td>13 50</td>
</tr>
<tr>
<td>Butterfield</td>
<td>Nine days' work, at 10s.,</td>
<td>15 00</td>
</tr>
<tr>
<td>Berry</td>
<td>Eight days' work, at $2 00,</td>
<td>16 00</td>
</tr>
<tr>
<td>Rogers</td>
<td>Eight days' work,</td>
<td>12 64</td>
</tr>
<tr>
<td>Cairnes</td>
<td>Eight days' work,</td>
<td>12 64</td>
</tr>
<tr>
<td>Johnson</td>
<td>Four days' work,</td>
<td>6 32</td>
</tr>
<tr>
<td>Peterson</td>
<td>Eight days' work,</td>
<td>12 64</td>
</tr>
<tr>
<td>McDougall</td>
<td>Five days' work,</td>
<td>7 90</td>
</tr>
<tr>
<td>Pratt</td>
<td>Nine days' work, at $3 00,</td>
<td>27 00</td>
</tr>
<tr>
<td>Priest</td>
<td>Eight days' work, at $2 17,</td>
<td>17 36</td>
</tr>
<tr>
<td>Stodder</td>
<td>Seven and three-quarters days' work, at $2 25</td>
<td>17 43</td>
</tr>
<tr>
<td>Brack</td>
<td>Eight days' work, at $1 25,</td>
<td>10 00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>237 68</td>
</tr>
</tbody>
</table>

One hundred and eighty-eight pounds of iron cramps, at five cents, 9 40
Mortar, Coal, 17 00
Total cost of setting sixteen hundred cubic feet, $264 08

And two hundred sixty-four dollars and eight cents, divided by one thousand six hundred, gives 16 1-2 cents as the cost per foot.