

THE OBELISK IN CENTRAL PARK.

The venerable monument, late of Alexandria, Egypt, and popularly misnamed Cleopatra's Needle, has been successfully transplanted to Central Park.

From time to time, from the first inception of the enterprise which has brought to our shores one of the most famous legacies of ancient civilization, down to the landing of the obelisk at the foot of West 96th street, last fall, the successive stages of the great undertaking have been described in this paper. With the completion of the work a brief review of the chief facts in the history of the obelisk and its voyage hither may properly be given before taking up the final chapter.

The material of the monolith, a reddish granite (syenite), shows that the stone must have come, as Egyptologists declare, from the ancient quarries of Syene, now Assouan, near the northern boundary of Nubia. From this point it was probably loaded, as Pliny says all the obelisks were, on huge rafts or flat-bottomed boats to the sacred city of On, known to the later Greeks as the City of the Sun, or Heliopolis, a distance of about 450 miles. At Heliopolis, which was situated about eight miles from the site of the modern city of Cairo, our obelisk with its companion shaft now in London was set up before the entrance of the Temple of the Sun. Doubtless its position there was substantially like that of the remaining obelisk before the ruined Temple of Luxor, as shown in Fig. 1. The fallen mate of the Luxor obelisk was removed, it will be remembered, to the Place de la Concorde, in Paris, where it now stands.

The first erection of our obelisk at Heliopolis took place not less than 3,500 years ago, the precise date being fixed by some students of Egyptian history at B.C. 1640. Others give an earlier date as probable. It is certain, from the central columns of inscriptions on the stone, that the obelisk dates from the reign of Ptolemy III., who ruled over Egypt when the Empire was at the height of its power and glory, and covered not only Northern Africa as far as Abyssinia, but Western Asia as far as Kurdistan and Armenia, south of the Caspian Sea, and all of Arabia.

For more than 1,600 years our obelisk stood at Heliopolis, and saw the glory depart from upper Egypt. It was then transferred to the newer seat of power and commerce, ancient Alexandria, 120 miles down the Nile, to adorn a majestic temple, probably begun by the great queen Cleopatra, but not completed until some years after her death. The fragmentary inscriptions on the copper crabs on which the obelisk rested at Alexandria make it certain that its erection there occurred during the eighth year of the reign of Augustus Cæsar, or B.C. 22.

While standing at Heliopolis, says Consul-General Farman, in one of his communications to the State Department, "it had passed the whole of the golden period of ancient Egyptian history. It had in all probability looked down upon the boy Moses as with the noble youths of the land he daily went to receive instruction from the priests of the Temple of the Sun, and also beheld on his part with admiration the then golden hieroglyphs that so long puzzled the wise men of modern times, but which he read as a student reads his Latin. It had beheld the chosen people of God in the days of their oppression and witnessed their exodus and the excitement that resulted therefrom, the hurrying to and fro of the priests of the temple, and the groups of people in the public places of the city discussing the great event. It had afterward watched the passing generations during the reigns of the Pharaohs for eight centuries, and had not only actually looked down upon those monarchs, but also upon all the long line of scholars who came to seek knowledge in this famous city of learning. It had then witnessed the conquests of the Persians, and mutely seen the City of On and its temples and many of its companion obelisks destroyed by the sacrilegious soldiers of Cambyses; and afterwards in a period of tranquillity it had seen Plato in his daily walks while sojourning in that city pursuing the study of philosophy and astronomy. Still later, amid the surrounding ruin and desolation, but ever looking further out upon the green fields of the valley of the Nile, it had seen the coming of Alexander the Great and his warm reception by the people as their deliverer from the yoke of the Persians, and afterward witnessed the three hundred years' reign of the Ptolemies, and finally, at the coming of the Cæsars, it had left the decay and ruin of its inland town and been transferred to the busy seaport of Alexandria. Here it has stood upon the seashore, a beacon for the mariners, for nineteen hundred years, and watched the rolling waves and the coming and going of the ships on the one side and the kaleidoscope of human events on the other.

Rebellions and insurrections, invasions and conquests, the struggles between Paganism and Christianity, between Christianity and Mohammedanism, between the different dynasties of the Arabs and the Turks, the successive rules of Sultans, Caliphs, and Mamelukes, and finally the conquest of Napoleon and the battles between the English and French on the waters and soil of Egypt, have all since its removal been witnessed by this sole surviving monument of the ancient City of Alexandria."

During the later ages of its sojourn in the modern city of Alexandria, the obelisk stood, as shown in Fig. 2, in a neglected quarter, its foundation, its unsuspected pedestal, and nine feet of its shaft buried in sand and rubbish, at last bereft even of its fallen companion, which had long lain half buried in sand.

The history of the removal of the obelisk from Alexandria to New York will doubtless be told at length by Lieut.

tenant-Commander H. H. Gorringe, U. S. N., under whose direction its last migration has been brought to successful conclusion. The more salient facts of the history can be summed up in few words.

A little more than three years ago Mr. John Dixon, the engineer employed to convey the original and fallen companion of our obelisk to London, informed the *World* through Mr. Louis Sterne, an American engineer, that Ismail Pasha, then Khedive of Egypt, desired to present the remaining obelisk to the United States. The cooperation of Mr. Henry G. Stebbins, then a member of the Park Commission of New York, was enlisted by the editor of the *World*, and the possibility of securing the obelisk for our city was publicly announced. Within a few days a wealthy citizen of the city (understood to be Mr. Wm. H. Vanderbilt) agreed to defray the estimated expense of taking down the obelisk and bringing it to New York. The matter was thereupon laid before the State Department at Washington, and Mr. Farman, United States Consul-General in Egypt, was directed to take the necessary steps for the official transference of the obelisk from Egyptian to American ownership. French and English influence, then dominant in Alexandria, were strongly arrayed against the fulfillment of the Khedive's offer. About this time the Khedive was compelled to abdicate. Consul-General Farman at once obtained a written confirmation of the gift at the hands of Mohammed Tewfik Pasha, the son and successor of Ismail Pasha, the writing bearing date May 18, 1879.

Meantime Mr. Dixon's unfortunate experience in the transportation of the London obelisk led him to decline the more serious undertaking of lowering and transporting across the Atlantic the companion of the stone he had had such bad luck with. At this juncture Lieutenant-Commander Gorringe returned from a surveying cruise in the Mediterranean in command of the U. S. steamer Gettysburgh. He had made a study of the standing obelisk at Alexandria with reference to the conditions of its possible removal, and now submitted to the Secretary of State a proposition to undertake the task. His plans were approved; and having seen to the construction (at the Phoenix Iron Works, at Trenton, N. J.) of the machinery he had devised for taking down and shipping the monolith, he sailed for Alexandria by way of Liverpool, August 24. The completed machinery followed some weeks after. The ensuing winter and spring were spent by Commander Gorringe in the double task of overcoming the material difficulties and the more annoying political difficulties attending the lowering of the obelisk, its removal to the water, and its stowage in a vessel, the steamer Dessoug, which he had purchased for its conveyance to New York. The magnitude of the task will be appreciated when account is taken of the enormous size and weight of the stone. The obelisk proper is 69 ft. 2 in. long, 7 feet 7 inches by 8 feet 2 inches at the base, tapering to about 5 feet square at the foot of the pyramidion. The weight of the stone is 196½ tons. The pedestal is 9 feet square, 7 feet high, and weighs 43 tons. The weight of the other stones of the foundation is given at 87 tons. The summit of the obelisk was something over 81 feet above the lower step of the marble platform which formed the base of the monument.

A description of the engineering operations at Alexandria, as given by Lieutenant-Commander Gorringe before a recent meeting of the New York branch of the United States Naval Institute, was printed two weeks ago in the *SCIENTIFIC AMERICAN* of January 22.

The Dessoug sailed with her precious cargo June 12, 1880, and arrived at Gibraltar ten days later. The voyage from Gibraltar to New York occupied nearly a month, owing to a delay caused by a broken crank shaft. After her arrival, July 20, the Dessoug lay at anchor in North River for some weeks while the final disposition of the obelisk was under discussion. She was then taken to Clifton, Staten Island, hauled out of the water on the marine railway there, and opened at the bow for the discharge of the stone, which was run out on a massive platform supported by two rows of piles in such a way that the stone could be floated off on pontoons at high tide. A proper conjunction of weather and tide did not occur until September 22, when the stone was floated to the pier provided for it at the foot of West 96th street.

The method of disembarking the obelisk is shown in Fig. 3. Owing to the necessary narrowness of the opening in the bow of the Dessoug, the means by which the stone was to be moved had to combine the greatest strength with the least bulk. There was but 8 inches to spare, and the usual device for handling such heavy bodies would require at least four times that space. Accordingly, Commander Gorringe adopted a sort of railway formed of 6-inch channel iron and 5½ inch cannon balls, one set of channel irons forming a trough for the cannon balls, the other set (inverted) riding above and carrying the stone. This device, Commander Gorringe is careful to state, was not original with himself, as has been reported. It was first employed, so far as he can discover, in the handling of the gigantic boulder on which stands the statue of Peter the Great in St. Petersburg.

The same machinery was utilized in moving the obelisk across the tracks of the Hudson River Railroad at 96th street, as represented in Fig. 4. After that the plan of the ordinary marine railway was employed, as shown in Fig. 5, the movable track being carried forward as fast as the stone progressed. From the river the course of the stone was up 96th street to the Boulevard; thence to 86th street, through the transverse road to 5th avenue, and down to 81st street, from which point an incline of massive trestle work,

920 feet long and rising three-quarters of an inch to the foot, led to the site of the final resting place of the obelisk. The power required in hauling the stone up the stiff grade of 96th street was equal to a dead pull of 36 tons; on the incline the power required was 24 tons.

Meantime the foundation stones and the pedestal had been put in place and the towers or gallows frame erected for sustaining the obelisk during the last critical stage of the work. The towers were the same as were used in taking down the obelisk at Alexandria. The steel work of each tower was of six 12-inch heavy I-beams, spreading out at the base to a distance of 21 feet, and converging at the top to less than 5 feet. At their base the beams rested on four heavy I-beams, and were securely riveted to the platform by means of plates and knees. On top of the towers were caps 5 feet long and 30 inches wide, secured by plates and knees. The towers were braced from top to bottom by angles and channel irons, making them perfectly rigid. Placed on top of the caps and securely bolted to the towers were pillow-blocks weighing 3,700 pounds, and forming the bearings for the trunnions to turn in. The trunnions on which the obelisk turned while being swung into upright position were each 33 inches long and 18 inches in diameter, and were cast of the best quality of cannon metal. The trunnion plates, each 4 inches thick, 9 feet wide, and 6 feet high, were securely held in position, just above the center of gravity of the shaft, by strong connecting bolts. The two trunnions with their plates weighed 6 tons. The entire weight of metal employed in handling the stone was something like 60 tons.

As the monolith stood at Alexandria it was supported by copper crabs at the base, which left room for passing under it heel straps to be connected with the trunnion plates to prevent their slipping when the obelisk was lifted. In Central Park the stone rests squarely upon its base, the heel of the shaft, which was originally rounded, having been cut square off. This made it necessary to provide a substitute for the heel straps. For this purpose two massive friction plates of gun metal were cast at the Brooklyn Navy Yard to snugly fit the base of the stone, the hold being secured by pressure, by the penetration of the metal into the hieroglyphic incisions, and by overlapping the corners which had been cut away for the crabs. These base plates were strongly bolted together and connected with the trunnion plates with steel rods tightened by means of turn-buckles.

The copper crabs alluded to were originally four in number, but two of them had been stolen at some time, probably for their metal. The place of one had been supplied by a block of stone, wedged in with iron; the other corner was vacant. The bodies of the remaining crabs, which were genuinely crab-like in form, were about 8 inches thick, 12 inches long, and 16 inches broad, and weighed about 150 pounds each. They were much broken in lifting and turning the obelisk, and were replaced by other crabs of bronze made at the Brooklyn Navy Yard. Unlike the original, these do not bear the weight of the obelisk, which rests directly on the stone of the pedestal, but simply fill up and ornament the cut-way corners.

With the trunnions in exact line with their bearings as in Fig. 7, the ponderous stone was lifted by means of six powerful hydraulic jacks; the cradle was removed, and then the obelisk was slowly lowered by the jacks until its weight rested on the trunnions. Here, poised on its center of gravity between the towers, it awaited the final turn at noon Saturday January 22.

Not the least remarkable feature in the history of this unprecedented transportation of a great historical monument over a hundred degrees of longitude and across a great ocean, is the uniform success, celerity, and good fortune which attended every stage of the undertaking, a good fortune mainly due, all must admit, to the scientific and diplomatic skill of Lieut. Commander Gorringe. The practical wisdom of his prearranged plan of conducting the enterprise was justified by the fact that it was carried out without a single material alteration of mechanical or engineering detail, save that made necessary by the unexpected popular opposition stirred up by foreign influence in Alexandria against the carriage of the obelisk the nearest way to the ship through the streets of the city.

For our views of the several stages of the progress of the obelisk we are indebted chiefly to Messrs. Harroun and Bierstadt's admirable series of artotype views of the obelisk.

Erratum.

In article on "Expansion of Steam," by Prof. Thurston, January 8, 1881, for $\frac{P \times 37}{22}$ (Emery's formula) read

$$\frac{P + 37}{22}$$

WE are informed that many of our leading manufacturers who have heretofore been troubled with the formation of scale in boilers are now using the Eureka vegetable boiler scale eradicant with very satisfactory results. G. E. Brinkerhoff, 107 Liberty street, New York, is agent for this article.

A Large Gold Brick.

Recently there was cast in San Francisco a brick of gold measuring 12¾ inches in length, 7 inches in breadth, and 4½ inches in thickness. It was 950 fine, weighed 3,785-17 ounces troy, and was valued at \$76,000. It represented one month's product of the Spring Valley Hydraulic Mine, and was said to be the largest gold brick ever cast in California.