

ticularly in periodicals devoted to such and kindred subjects; but as these, in consequence of the restrictions upon the purchase of books, are only occasionally accessible, and then through private sources, nothing is positively known as to the fact.

The objection to screw-piles for founding a work at New South Shoal does not apply—except as to giving them their true relative position—to pneumatic piles, which, being sunk into the bottom by atmospheric pressure caused by exhausting the air from the hollow shaft, the erection of a fixed structure, such as that required to apply the mechanical power to drive the former, is dispensed with, and the objection to the great length of the pile through which this power must be exerted, at the same time got rid of. But it must not be supposed, that because a fixed structure is not indispensable, a floating body is deemed sufficient for the successful application of atmospheric piles in the present instance. This is not the case. That these piles may be planted singly in favourable weather at so exposed a point as New South Shoal, by well-devised measures fully matured, from so unstable a footing as a floating body, the sinking of the cylinder on the Goodwin Sands is of itself abundantly sufficient to prove; but that the number of piles required to constitute a foundation for a light-house or beacon may, under the circumstances, be made to receive their proper relative positions, so far at least, as to render them properly available for the intended purpose, is not believed. The manner in which it is proposed to provide against this objection in the use of the atmospheric pile in the present case, or at other points of equal exposure, will be explained in the project now submitted.

Having premised that though a solid structure at New South Shoal, were it possible to erect one at that exposed point, might withstand the direct assaults of the sea, it nevertheless would be overthrown by the wasting of the sands on which it stands, through the insidious workings of the waves acting on the mass, and that to meet the case, it would be necessary to adopt a foundation; which, while it afforded the necessary area and strength to support the required superstructure, would offer no impediment, practically considered, to the motion of the currents or the waves; having also expressed the opinion that works combining these pre-requisites may be founded on submerged soils by means of Mitchell's screw-pile and Pott's pneumatic-pile—and further, that for reasons which it is conceived are indisputable, the former cannot be applied to that use at New South Shoal—the bureau will already be prepared to learn that, as the practical application of the latter is not open to the same objections, it is recommended for the present design.

The instructions of the bureau calling for a plan and estimate for a beacon on New South Shoal are predicated on so much of the "Act making appropriations for light-houses, light-boats, buoys," &c., approved March 3, 1849, as is contained in the following words, to wit: "For a screw-pile beacon or other practicable structure on New South Shoal, off Nantucket, discovered by the survey of the coast, \$25,000, to be expended under the direction of the Bureau of Topographical Engineers." A plan and estimate for a beacon are accordingly herewith submitted. Considering, however, that a beacon would mark the shoal during the day only, and that the risks and dangers of navigation are more imminent and numerous at night, and especially during the boisterous season, when the nights are longest, it has been deemed advisable, in anticipation of the approval of the bureau, to prepare also a plan and

estimate for a light-house for the same point. In doing this, less hesitation has been felt, because, in the erection of any work at a position so exposed as the one under consideration, the only real difficulty consists in establishing the foundation; and because the greater cost of a lighthouse, although certainly considerably more than for a beacon, bears no sort of reasonable comparison when the superior and continuous usefulness of the lighthouse is considered. It was also conceived that the plan might be so arranged, that in case the beacon structure should be adopted, and should, when raised, be found competent to resist the shocks of the ocean, the project of a light-house might be finally executed. In contemplation, therefore, of that ultimate object, the dimensions of the proposed beacon, in general and in detail, have been enlarged beyond what might be otherwise considered sufficient; but whatever may be the excess thus caused in the estimate for the beacon, it is confined almost wholly to the foundry cost of the structure. In other respects, unless the size of the work should be greatly reduced, the expenses, excepting those in which time enters, would remain nearly, if not quite, the same.

As the two structures, as already stated, are in part common to each other, a description of the lighthouse, as the larger of the two, will, with occasional reference to the beacon, be sufficient for both.

The foundation is composed of iron piles, so grouped together as to form an octagonal prism 50 feet in diameter, and about 42 feet in height. From this prism, as a base, rises a truncated pyramid, composed also of iron piles, which inclining inward 6 on 1, for a further height of 120 feet, fall within the diameter of 10 feet, and are received and secured in a great ring-piece, which, in turn, is surmounted by the watch-room and lantern, making the whole height 185 feet. The piles, one at each angle, and one at the centre of the octagonal prism, are of 12 inches; those of the truncated pyramid in three lengths of 12 inches, tapering to 6 inches. The entire structure including the prism for the length of the piles, is braced horizontally in seven planes, and diagonally between every consecutive two of these planes, except where the dwelling of the light or cage of the beacon, as the case may be, interferes, when these are in part omitted. The dwelling stands 40 feet above the highest tides, is composed of three stories of nine feet each, and communicates with the watch-room and lantern above by a spiral stairway in a column of wrought-iron 8 feet in diameter. The two lower stories are 30 feet, and the upper story 20 feet in diameter; the first and third stories, as well as the roof of the dwelling, and the watch-room and lantern being surrounded by galleries. The watch-room and the lantern are 12 feet in diameter; the former 6 ft. 9 in. in height, the latter about 12 feet, with the roof and ventilator, &c., 20 feet in height. The beacon occupies but two of the three lengths of piles forming the pyramidal frustrum of the larger structure. The cage, the bottom of which is elevated 60 feet, and the extreme top 108 feet above the level of the highest water, is composed of columns arranged in the form of a cylinder, 24 feet in diameter and 24 feet in height, surmounted by a canopy giving it a further height of 24 feet.

These are the outline or main features of the two structures. The details will be better understood from the drawings communicated herewith, than from the most lengthened and minute description. They consist of an elevation and vertical section of each work on a scale of 4 feet to an inch (1-48), and sixteen sheets of details on the same, and double the scale; and will show, not only the manner of bracing pro-