RIGHTING A CAPSIZED LIGHTHOUSE CAISSON.

BY STUART STEVENS SCOTT.

There is now in progress off the mouth of the Magothy River, in the Chesapeake Bay, 20 miles from Baltimore, an engineering feat that has attracted much attention in the engineering world. The work consists of the righting of a gigantic caisson that is intended to be the foundation for a lighthouse, to be known as the "Baltimore" light, which is to stand at the entrance of the Craighill Channel, that leads from the Chesapeake Bay to the Patapsco River, but which, shortly after having been placed in position, capsized. The method employed in getting the great wooden box to its correct position is novel and interesting.

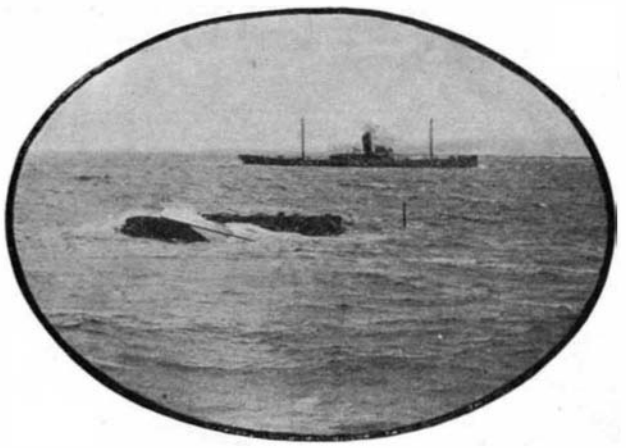
As will be seen by the line illustration, the caisson is designed to rest upon the bottom of the bay, 85 feet beneath the surface of the water and to be sunk through mud and sand to the required depth. Even after the caisson is righted the sinking of it to this depth will in itself be no mean task. It will be the first time that any attempt has been made to go to that depth for the foundation of a lighthouse, and the first attempt to sink a caisson of any kind to such a depth so far from shore, as the site of the structure is two miles from the nearest land.

In order to stand the strain and the great weight that is to rest upon it, for it is estimated that the completed structure will be a concrete monolith weighing nearly 10,000 tons, it was necessary to have the caisson of great size and strength, and it ranks as the largest of its kind ever built. The plans were prepared by the United States Lighthouse Department, and in the spring of 1904 the contract was awarded to a New York firm, the price for the structure complete being $150,000.

The caisson was built in the harbor of Baltimore, and it is 48 feet square and 23 feet high. The first 7 feet is entirely of wood, the smallest timber being 12 feet long and 12 inches square, while the largest is 48 feet long and 12 inches by 24 inches. There was considerable difficulty experienced in procuring the large timbers, and when they arrived in Baltimore they were the largest single sticks that had ever been seen in that port. The timbers in the caisson were laid in alternate layers, lengthwise and crosswise, each course being laid in pitch and the seams firmly calked. As the line drawing shows, the structure is a bottomless box. It contains 1,100,000 feet of lumber, and it is bolted together with 26,000 spikes, ranging in length from 21 inches to 90 inches. On the lower lip of the caisson was placed a cutting edge of half-inch iron to assist it in biting its way through the bottom.

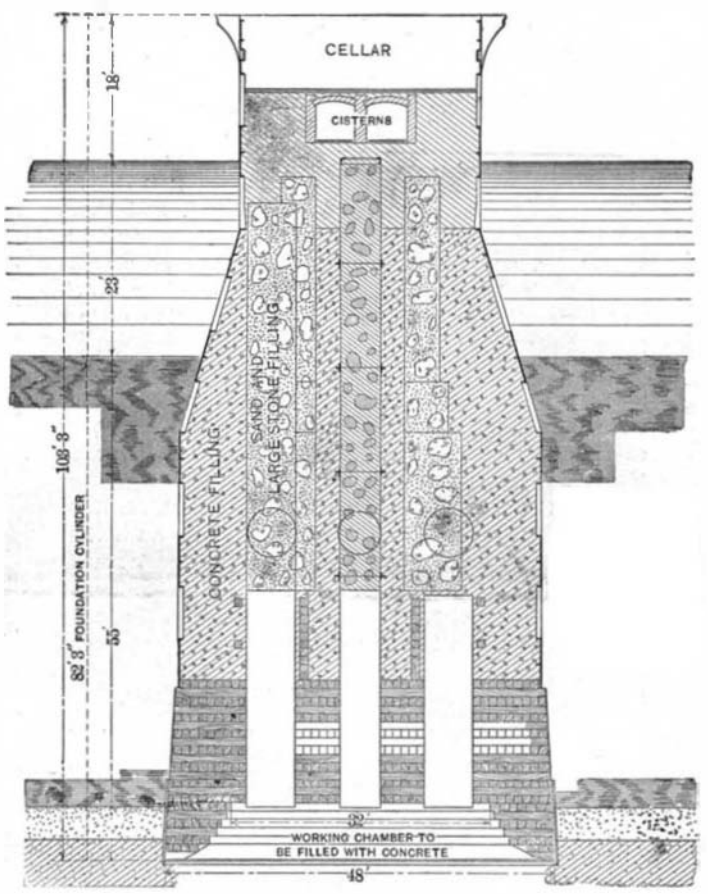
When the caisson was completed, with the first course of the iron plates placed in position the structure weighed 972 tons. Considerable difficulty was experienced in getting it into the water and it became necessary to dredge around it. When it floated it drew 20 feet, and in the first week in September, with two tugs towing the caisson, and a fleet of barges and scows bringing up the rear, the flotilla left Baltimore. The contractors were favored with beautiful weather; and when they reached the site of the lighthouse the bay was as smooth as glass. They placed the structure in the proper position and began to sink it by loading it with massive stones and cement. For several days the weather remained good, but during the second week a northeaster set in.

As the site is exposed to a sweep of 25 miles from the northeast, it was not long before the sea made up



The Capsized Caisson as Abandoned After the First Attempt to Right It.

so heavy that the fleet of barges and tugs had to seek harbor, and the caisson, after being anchored as firmly as possible, long lines being led in every direction, was abandoned. The next morning the contractors observed that the caisson listed heavily; and they braved the raging storm in an effort to check its further settling, but although they risked their barges and the lives of their men in a valiant effort, the great wooden mass slowly keeled over until it lay on its side. The government, which on October 1 was to have made the first payment of $50,000, declined to meet the obligation when it was learned that the caisson had capsized, and the contractors had to abandon the work.



Vertical Section of the Baltimore Lighthouse Caisson, Showing Depth to Which It Will be Sunk.

The United States Fidelity and Guaranty Company, which was responsible for the amount of the contractors' bond, instructed Messrs. Wood & Flannery, the present contractors, to go ahead and see what could be done. This was in the fall of last year. They found the structure just awash, as shown in the first photograph, and they decided upon the course that is now being carried out.

Early last spring, after the ice had gone, they began the erection of a pier on either side of the caisson. Owing to the formation of the bottom, which was of soft mud for a considerable depth, it was necessary to drive 100-foot piles, and by the first of August the piers, 40 feet wide and 120 feet long, were completed. There were then laid on the upper side ten 50-foot 12-inch square timbers, bolted securely. The ends of the timbers projected out over the iron cylinder, and the whole was firmly bound with wire cables. Then, on the after part of the caisson and resting on the foundation of timbers, an A frame was erected. The frame is 55 feet high, and from the base there projected ten 70-foot weight arms, and to each of the latter there were swung 20 tons of pig lead, making a total of 200 tons. It was estimated that, by using the lower lip of the caisson as a fulcrum, the actual weight to be lifted would not exceed 500 tons, and it was estimated that the weights could be supplemented by derricks.

In order to obtain for the derricks as much of a purchase as possible, there were built two "sticks," each 70 feet long and 24 inches square, which the divers put in place through the central shaft in the caisson. From the ends of the "sticks" wire cables led to two great derricks, one on either pier.

When everything was in readiness the derricks were started, and slowly the caisson was raised until it is now in the position shown. It has been found that the weights have lost their effectiveness and the caisson, hanging at an angle of about 45 degrees, will come over no farther, although the derricks prevent it slipping back.

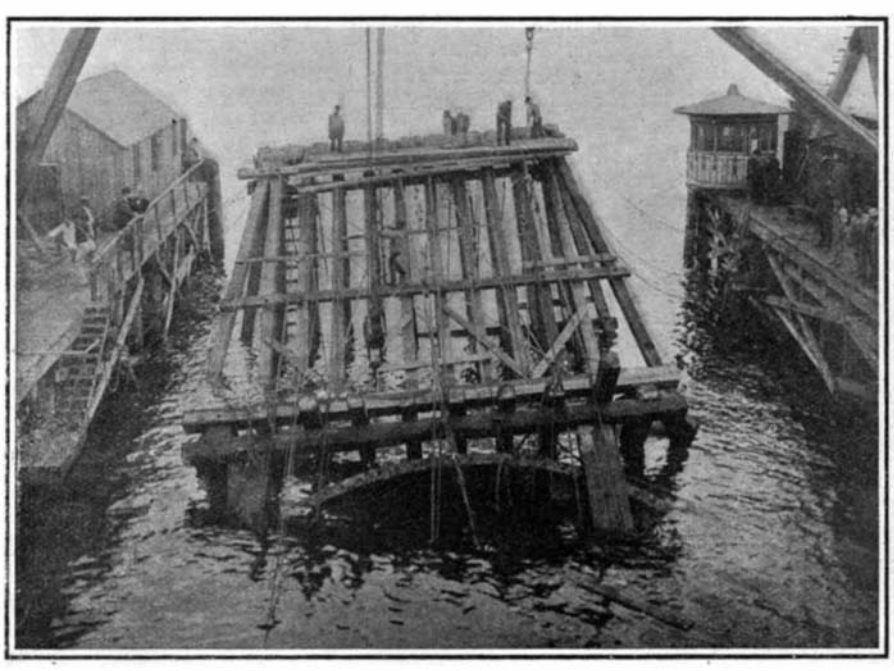
The contractors have rigged a powerful suction pump, and there is now in Baltimore a barge being fitted out with boilers and compressors, and the contractors are preparing to dredge away the mud from under the under lip and cause it to settle, keeping it in position by cables from the piers, and thus gradually bring it to an upright position. The caisson will then be sunk according to the original plans.

Cleaning and Taking Apart Machines.

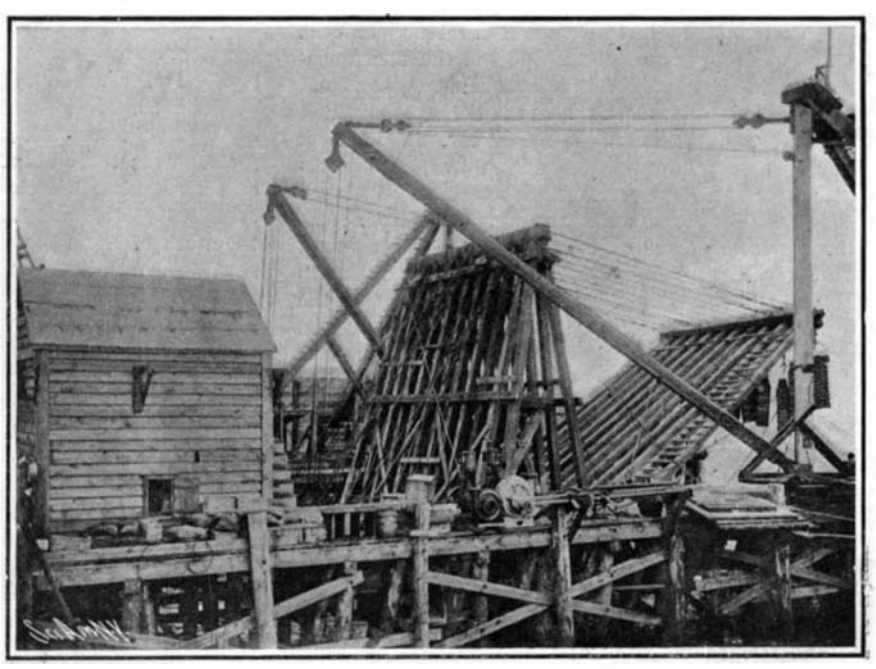
When one has to take apart a machine for the purpose of cleaning it and of making any repairs that may be found on inspection necessary, the proper way is not to take the whole thing apart, then to put it together and next to test it to see if anything is broken or out of place; but to test the machine *before* taking it apart, then to inspect each piece and mend or straighten it, and after that to clean the whole thing and assemble.

If, on the contrary, cleaning is done before repairing, all the repaired parts will have to be cleaned again, thus not only increasing the cost of the job, but prolonging the time of delivery—which latter is a very important element when we are dealing with typewriting machines.

It is reported that a scheme is on foot to construct a dam across the Rhône at Seyssel in order that electrical energy may be generated there and transmitted to Paris by an overhead line.



The Sunken Caisson After the First Stage of Righting.



View Showing the A-Frames, Booms, Weights, and Derricks for Pulling on the Caisson.

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