THE SUBSIDENCE OF A CONCRETE BUILDING.

Since the establishment of the French protectorate over the Beytik of Tunis, its capital, of the same name, has never ceased to grow in extent, population, and wealth. While the Arab city occupied and still occupies the higher and firmer ground, the new French extension spreads from this in the direction of the Bahira or Lake of Tunis to the modern port, which by means of a canal, built at a cost of many millions of French money, traverses the shallow and silting lake, and discharges into the sea at Halg-el-Oued (La Goulette), the former port.

The flat stretch of land, some miles broad, on which the French town is built, is extremely marshy and unstable, a terror to architects and builders. Wonderful are the deviations from the perpendicular and the horizontal which many of the constructions, for the most part temporary, exhibit, collapsing into the shape of the letter X or bulging into O-like forms.

Extreme Displacement from the Vertical.

The Structure After Being Raised to Its Normal Position.

THE SUBSIDENCE OF A CONCRETE BUILDING.

A recent example, however, far exceeding in magnitude and importance any of the numerous previous instances on the above-described marshy ground, and which presented a modern pendant to the well-known leaning tower of Pisa or that of Saragossa, deserves record.

The Société des Minoteries Tunisiennes has had under construction for many months past three large concrete buildings for the storage of wheat and flour, which Tunis now, as did Carthage of old, ships in abundance to Europe. The buildings include a central and two lateral structures which are somewhat separated from the central one. One of the latter was observed to be gradually deviating from the perpendicular, leaning toward the central block, without, however, losing its rigidity, and this movement of the whole structure continued for several hours until an angle of apparently about 25 degrees was attained. The mass gradually displaced itself as a whole, monolithically, as it were, but the collapse of the building was pronounced imminent by all hands. The engineer and contractor, however, took heart, and confident in the cohesion of concrete, set about restoring the immense mass to the vertical.

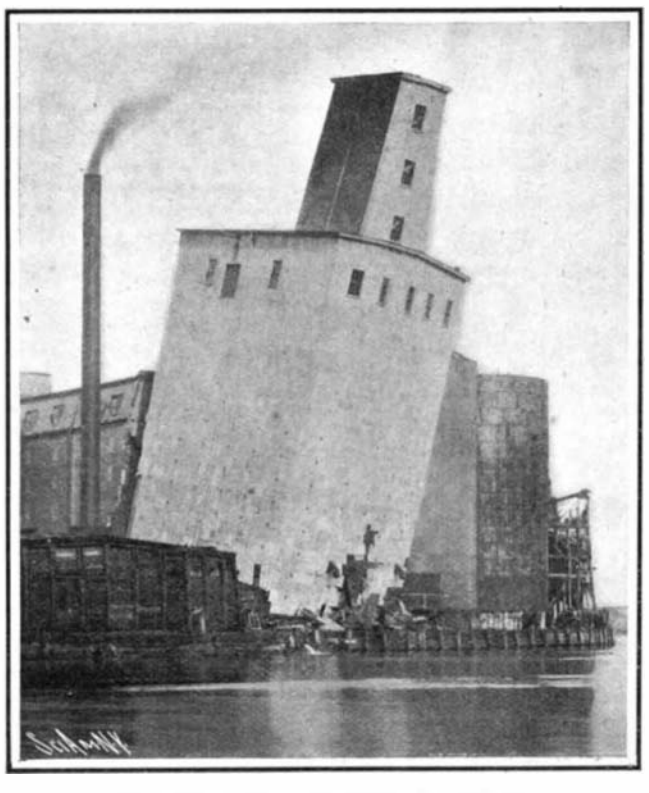
This was duly effected in less than a fortnight. The floors on the elevated side of the building were weighted; this counterpoise consisted of some 4,000 tons of sand in bags on each of the ground or underground floors and 2,000 tons on the upper stories. Excavations were also made alongside the foundations on the same side in order to allow the soil to give way more easily.

The result was all that could be desired under the circumstances. The edifice returned to the vertical in a few days, and was then complete. The construction work proceeded during the summer as if nothing had happened until the 28th of August, which brought another disagreeable surprise to those interested in this important enterprise. The first building had started from the perpendicular in April; the other lateral structure, August 28. The central one remained steady, it may well be, owing to the compression of the ground beneath and around it by the weight of the two side buildings. A few days previous to the latter date, the building had been finished and the engineer decided to load it with 3,000 tons of ballast, for the purpose of testing its stability, and, particularly, of letting it settle definitively. The first and ground floors had been loaded to the extent of about 15,000 tons, and this operation was still going on when the theodolite indicated a slight movement on the side farthest from the central structure. The indicated movements were: 7 A. M., 0.79 inch; 2 P. M., 3 inches; 6 P. M., 9.5 feet; 7 P. M., 11.8 feet; 9 P. M., 13.1 feet; midnight, 16 feet.

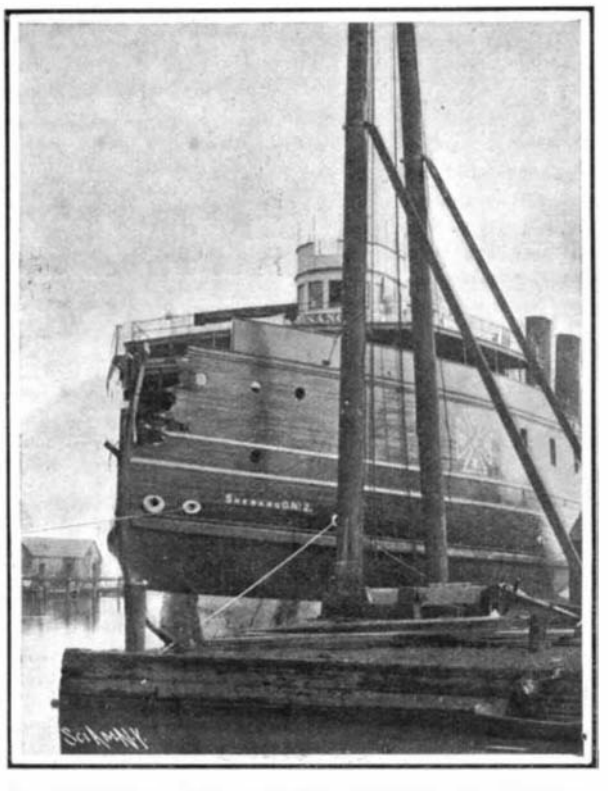
It appears that the center of gravity, around which as a pivot the building turned, was on a line passing through the center of the block. The efforts of the engineer were accordingly directed toward maintaining this center of movement stationary, and the floor of the building on the upheaved side was elevated about three yards above its normal height. The method adopted in April was again employed in August, and with equal success. The material already in the building was transferred to the elevated side. In the case of both buildings the subsidence has been considerable, for both now stand five to six yards below their intended level. The site is responsible for these accidents, which have been a source of no little expense, delay, and vexation. The ground was, however, declared solid enough by an Italian engineer, whose plans were followed. The displaced and replaced buildings remained uninjured and their parts were undisturbed, a wonderful testimony to the cohesion and tenacity of these concrete structures. The armored concrete construction is now, in consequence, lauded to the skies. There are those however who maintain that in such situations, the better course regardless of expense, would be to adopt the Dutch system of building upon a foundation of piles.

A REMARKABLE ACCIDENT.

The accompanying illustrations are from photographs of a strange accident which recently took place at Milwaukee, Wis. One of the elevators of the American Malting Company is located on the bank of the Milwaukee River, upon which considerable heavy traffic is constantly being carried on. A large railroad transfer vessel used for moving loaded railroad cars ran into the bank, owing to a misunderstanding of signals by the engineer. Through this misunderstanding the boat was sent ahead at full speed instead of backing, with the result that it plowed through six or eight feet of piling and concrete and thrust the elevator from its foundations, which extended about four feet above the ground. The force of the impact was such that the elevator was shoved into an adjoining brick malt house, and forced about ten feet into the latter building. The tremendous energy with which the vessel crashed into the elevator is clearly to be seen from the condition of the latter as well as that of the malt house. Incredible as it may seem, the transfer vessel was damaged to a slight extent only, the woodwork of the upper part of the bow being shattered for a few feet, while the lower part of the stem was not even dented. This remarkable fact is surely a strong recommendation for the solid construction of the boat, which was probably intended for heavy work in broken ice.



The Grain Elevator After the Impact.



The Transfer Steamer Which Ran Into the Elevator.

A REMARKABLE ACCIDENT.

New Railway Signal Devices.

In discussing the recent block signal systems for electric railways, Engineering News states that the North Shore Railway, Sausalito, Cal., is equipped with alternating-current signals. Semaphores are operated by small storage batteries contained in the pedestals. These are charged through high resistances by current from the third rail. Thus power is available when the electric service is shut down for part of the night. Two wires carry alternating current at 2,300 volts for the track circuits and for lighting the signal lamps at night. Upon one of the line-wire poles at the advance end of each block section is a transformer, the primaries of which are connected across the wires above mentioned, while the secondaries are connected with the ends of the track current. Across the rails at the other ends of the track circuit is connected the track relay which operates inductively to close the local circuit controlling the signal. When a car or train enters the block section, this relay is shunted, opening the signal circuit and causing the signal to go to the "stop" position. The Boston and Worcester Railway, operated by trolley, and running through hilly country, has adopted, to avoid rear collisions (the track is double) electrically-worked semaphore arms with illuminated spectacles. The signal works positively at any speed of the cars without throwing the trolley off the wire. The United States Electric Signal Company use lamp signals, in combination with which there may be inclosed disks. Each disk revolves on a horizontal transverse axis passing through its center, for signaling purposes. These, as well as the lamps, are worked by automatic trolley switches and relays. Where cars pass the turnouts at speeds of over 15 m. p. h., a special form of switch, subject to the upward pressure of the wheel, is used, and avoids displacement of the latter. For single tracks this company employs a box at each end of the block section having a large lens with a red disk revolving behind it, the disk having a red bull's eye in the center. In the upper part of the box a green light appears when the "stop" signal is displayed at the opposite end of the block. A car entering a block causes the red target to show at the far end of the section and sets green light at the box just passed. White lights show that the section is clear, and appear automatically when the last car passes out.

The deposits of both lead and zinc ore, whether in association or alone, form most readily in connection with a dolomite or limestone country rock.