

**A VERY HIGH WINDMILL.**

One of the highest windmill towers in this country, if not the highest in the world, has recently been erected at St. James, L. I., by Mr. Andrew J. Corcoran, the designer, engineer, and constructor, of New York City, who has attained a world-wide reputation in the building of windmills. The tower is 150 feet high, and is declared by Mr. Corcoran to be "the highest and the strongest windmill tower in the world." The great height of the tower was made necessary from the fact that the spring from which a supply of water was to be pumped was hemmed in by bluffs, and the bottom of the wheel had to be sufficiently elevated to be above all obstructions within a radius of about one thousand feet.

The windmill is on the estate of Mr. Prescott Hall Butler, and the reservoir which the pump supplies is more than a mile distant. There are 6,000 feet of pipe between the pump and the reservoir, and the water has to be elevated to a height of 223 feet. The reservoir has a capacity of 65,000 gallons, and the windmill has frequently pumped this quantity into the reservoir in two days' time.

The spring is on a little sand bar, overflowed at high tide, and the 4 inch flowing well had to be protected from the salt water. The foundation is 46 feet square, and consists of eight piers, one at each corner and one under the center of each side. The corner piers were started on a cribwork of locust logs, 10 inches in diameter, covered with a 3 inch hemlock planking, forming a support for a mass of well-puddled sand and gravel. On this comes a 6 inch concrete foundation for a 5 foot brick pier, to which the iron plates are attached by three rods running through to the locust cribwork. The base plates are special castings inclined so as to give the proper batter to the columns, and provided with sockets in which the timbers are given a firm seat. The remaining piers are somewhat lighter. The framework of the first 125 feet of the tower is built of the heaviest yellow pine framing, three struts 6 inches square for each corner post and 6 x 10 inch struts for the center columns, all braced together by heavy diagonal timbers. The bolts and other iron work in the tower weighed about six tons. The tower is divided vertically into a number of flights or stories, from 12 to 15 feet high, connected by stairways affording easy access to the top, which forms an excellent observatory 20 feet square, provided with a strong railing. The top 25 feet of the tower forms the base proper of the wheel, which is 22½ feet in diameter and of the Corcoran type. The construction of the joints in a wooden tower of this height was a matter of some difficulty, owing to the wind strains, but the trouble was overcome by gusset plates, heavy bolting, and re-enforcing plates, so that the spring from base to platform is practically uniform.

Since 1858 the manufacture of windmills has been a specialty with Mr. Corcoran, who now makes his standard mills in fourteen sizes, and pumps adapted to raise water to a height of 2,000 feet if necessary. Mr. Corcoran has built many other high towers for windmills of large capacity, including one for Mr. Stanley Mortimer, of Roslyn, 103 feet high, one for Mr. J. F. D. Lanier, at Wheatley Hills, 106 feet high, and one for Mr. W. P. Douglas, at Little Neck, 125 feet high; but the one for Mr. Butler, shown in our picture, overtops them all, and forms the most prominent landmark on the Long Island side of the Sound.

**Repairing Foundations.**

*The American Architect* says: An ingenious method of repairing foundation work injured by springs was recently employed on the North Sea Canal, the great waterway which connects Amsterdam with the North Sea. Of late years, the commerce of Amsterdam has rapidly increased, and the locks at the entrance of the

canal, which protect it against the influence of the tides, are no longer capacious enough to accommodate the traffic, or large enough to admit the immense steamers which would make Amsterdam their port if they could. Two years ago, it was resolved to build a new lock, of the requisite size, and the work has since been going on. The foundation of the immense lock walls is of concrete. All precautions were taken in laying the concrete, and the bed was inclosed with sheet piling, and pumped nearly dry before the foundation was laid; but, before beginning the excavation, several borings had been made, which pierced the stratum of clay underlying the basin; and, on pumping out the excavation, the water rushed in great jets through these holes, as it would from an artesian well. The concrete was laid over these jets, but the cement was washed out of it by the water to such an extent that the skillful engineers in charge of the work, MM. Van Meren and Bekaar, resolved not to leave such

it, so as to give an escape for the water; and air was then forced into the dome. As there was no escape for the air, the dome being firmly cemented to the sound part of the foundation, the flow of the spring was checked, and finally reversed, the water discharging through the pipe over the surface of the firm concrete outside. Meanwhile, the workmen under the dome dug out the washed and crumbling concrete, which was passed out through the air lock and fresh concrete put in its place. The new concrete, being no longer exposed to washing, soon became as hard as that around it, and capable of resisting perfectly the effect of the springs. In this way all the doubtful spots were repaired, and the stone walls of the lock are now being laid, on a foundation which *Le Genie Civil* calls "irreproachable."

**African Diamonds.**

The African diamond fields are in the Orange Free State, where there is one important mine at Jagersfontein, and in the British colony of Griqua Land West, where there are four. Of these, the best known are the Kimberley mine and the De Beers, the latter of which was so admirably illustrated in last summer's Columbian Exhibition.

It is but twenty-five years since the gems were discovered on the Dark Continent, and the value of the annual yield now exceeds \$20,000,000. It is interesting to note that notwithstanding these large quantities are mined and that diamonds have been so successfully imitated, their value has not declined more than a dollar a carat.

The South African mines have yielded larger stones than any found in Brazil or India. Some of them are of a yellow tint, and therefore of low value; but the De Beers diamond (428½ carats) and the Jagersfontein (969½ carats), the last found less than a year ago, are perfectly white. These weights are for the rough diamonds, but the Kohinoor weighed only 192 carats, and was reduced by cutting to 102¼ carats.

The Kimberley mine has been worked to a depth of 400 feet, and vertical shafts have now superseded the inclined ones formerly used as means of entrance.

The quantity and value of the African gems in the market have made great changes in the diamond trade. The Brazilian gravels are now worked very little, as are the fields in India and Borneo. London is the diamond market of the world.

**Decision on Pipe Cutters.**

In 1891 suit was brought in the United States Circuit Court for the Southern District of New York against James P. Allen, a clerk in the employ of the Armstrong Manufacturing Co., Bridgeport, Conn., for an infringement of the Saunders patent, No. 10,031, dated January 31, 1882. The Armstrong Manufacturing Co. at once stepped in and assumed the defense. After nearly two years occupied in the taking of testimony, the case came to final hearing before

Judge Wheeler, who, on November 29, 1892, handed down an opinion in favor of the Armstrong Co., holding that the Armstrong pipe cutter did not infringe the Saunders patent. The case was then appealed and heard in February, 1894, by a full bench, composed of Judges Wallace, Lacombe, and Shipman, who have just handed down an opinion written by Judge Lacombe in favor of the defendants, affirming Judge Wheeler's decision and sustaining every point raised by the Armstrong Manufacturing Co. The opinion holds that the pipe cutter claimed in the second claim of the Saunders patent did not cover the Armstrong pipe cutter, and that consequently the defendants are entitled to a decree dismissing the suit with costs. This ends a litigation which has been fought with uncommon vigor, the printed matter alone having run up to over five hundred pages. The result is a source of especial gratification to the Armstrong Manufacturing Co.



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doubtful spots in the foundation, but to strengthen them by some means. MM. Mortier and Thouvard, contractors, have the honor of suggesting to the government engineers the plan which was finally adopted, and which they were employed to carry out. Briefly, their proposition was to suppress the springs by means of compressed air, until the concrete put over them could harden sufficiently to be out of danger from them. In order to apply the compressed air, the contractors first moulded domes of concrete, about thirty feet in diameter, but varying according to the dimensions of the spot of imperfect foundation which it was desired to make good, and with a shell three or four feet thick. In the top of each of these, an air lock, consisting of an iron cylinder, with the necessary doors, was set, and through the air lock the workmen passed in and out, and materials were carried. A pipe was driven through the foundation, outside the dome, to the spring beneath