A FACTORY CHIMNEY STRUCK BY LIGHTNING.

The sugar manufactory of Kojanka is situated in the government of Kiew (Russia), upon the railway line from Kiew to Odessa.

During the season 1893-94, the sugar works of Kojanka treated 21,887 tons of beets in 54 days, which gives a mean work of 405 tons per 24 hours. The quantity of sugar produced during the season 1893-94 was 5 770,530 pounds, corresponding to an output of 12 pounds of white crystallized sugar to 100 pounds of beets. The boiler house contained 10 steam generators of a total heating surface of 12,300 square feet, and was provided with two chimneys, one of iron plate 5 feet in diameter and 95 feet in height, and one of masonry, of 2½ feet square section and 105 feet in height.

As the draught was inadequate, and as the addition of new boilers was rendered necessary in consequence of the extension of the works, it was decided to construct a single chimney of large dimensions. In the first place, a well was driven in order to ascertain the nature of the ground. At a depth of 8 feet a stratum of water derived from a neighboring pond was reached, and as the subsoil consisting of argillaceous earth did not appear sufficiently solid, piles were driven down in order to strengthen it. Solid earth was found at a depth of 22 feet beneath the bottom of the well.

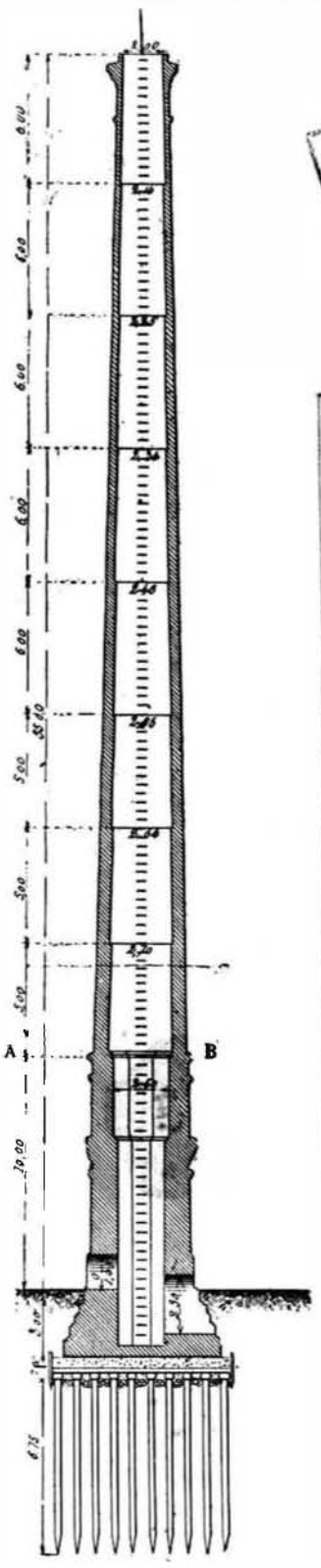

Fig. 2.—VERTICAL SECTION OF THE CHIMNEY.

The chimney, Figs. 1 and 2, rests upon 100 piles from 22 to 25 feet in length, spaced 2½ feet apart and distributed over an area of 640 square feet. The piles are of oak and are not shod with iron at their point. Two pile drivers actuated by horse power and one actuated by manual power were used in driving these piles. The work of excavating the earth and driving the piles was carried on day and night without interruption and lasted 120 hours.

The heads of the piles were connected by a framework of oak, and the whole was covered with a bed of concrete three feet in thickness composed of two parts of cement to three of sand and four of broken granite.

The foundation, which is ten feet in height, and the pedestal, whose height is thirty feet, are constructed of common Kiew brick.

The shaft of the chimney, of a height of 148 feet, is constructed of special perforated bricks from Chemnitz. The thickness of the masonry at the base is 20 inches, which is reduced at the summit to 9.

The total weight of the masonry is 1,870,000 pounds. The load upon the heads of the piles is 160 pounds to the square inch.

The work, which was begun on the 23d of May last, was finished on the 30th of June, and thus lasted but 75 days; but the fate of this structure so rapidly finished was ephemeral. In fact, during the night between the first and second of July, a fearful storm let itself loose over the country, and at half past eleven o'clock a thunderbolt struck the chimney and produced an immense rent about four feet in width and extending throughout its entire length, as shown in Fig. 1. Fragments of bricks, and even whole bricks, were thrown to a distance of eighty yards. No serious accident happened to any one. A night watchman, stunned by the noise, fell to the ground and was picked up unconscious, but free from wounds.

The lightning had followed the vertical line of the iron ladders placed in the interior of the chimney, and which were all torn out and broken or bent. These damages are easily explained by the fact that the chimney had not as yet been provided with a lightning rod.

The repairs, which were at once begun, consumed twenty days, and on the 24th of July the lightning rod, consisting of a 3½×4 inch flat iron, was put in place.

It seems that in order to prevent the possibility of such accidents in the construction of the large chimneys of manufactories, it would perhaps be necessary at the beginning of the work to install upon the summit of the masonry in the course of execution a lightning rod provided with a conductor that could be elongated in measure as the needs of construction demanded.—Le Genie Civil.

Diatoms.

Writing to the Microscopical Journal, Mr. William A. Terry, of Bristol, Conn., says: At low tide at Shell Beach there is a broad expanse of soft mud laid bare below the sands; this mud just before the return of the tide was covered with a brown film that I recognized at once as being composed of living diatoms. On

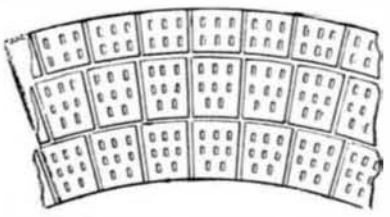

Fig. 3.—HORIZONTAL SECTION THROUGH A B.

examination the microscope showed that these were chiefly three different sizes of naviculoid diatoms aggregated into separate colonies, the smallest form being so minute that a power of 500 diameters was needed to definitely show their outlines; the next size being about double their linear dimensions, and the third considerably larger and showing the crossband of a Stauroneis.

I took a small fragment of the film about 1-10 of an inch in diameter and separated and mixed it with a few drops of salt water; then took one drop of this and placed it on a slip and covered with an inch square cover glass. Under the microscope, this showed the film broken into minute pieces in which the diatoms were packed in solid masses, each kind separately, and were motionless; but thousands of each variety were diffused through the water and these were very active, showing their characteristic motions and their usual color. On counting the diatoms in the field of view in various parts of the slide, I estimated that this drop contained over 250,000 individual diatoms; and as this was less than 1-5 of the fragment of film under examination, I thought it safe to conclude that each square inch of this film contained over one hundred million diatoms. As the area covered by this sheet of living diatoms was about 20 rods in width and some 80 rods long, the number of individuals composing it may well be reckoned inconceivable.

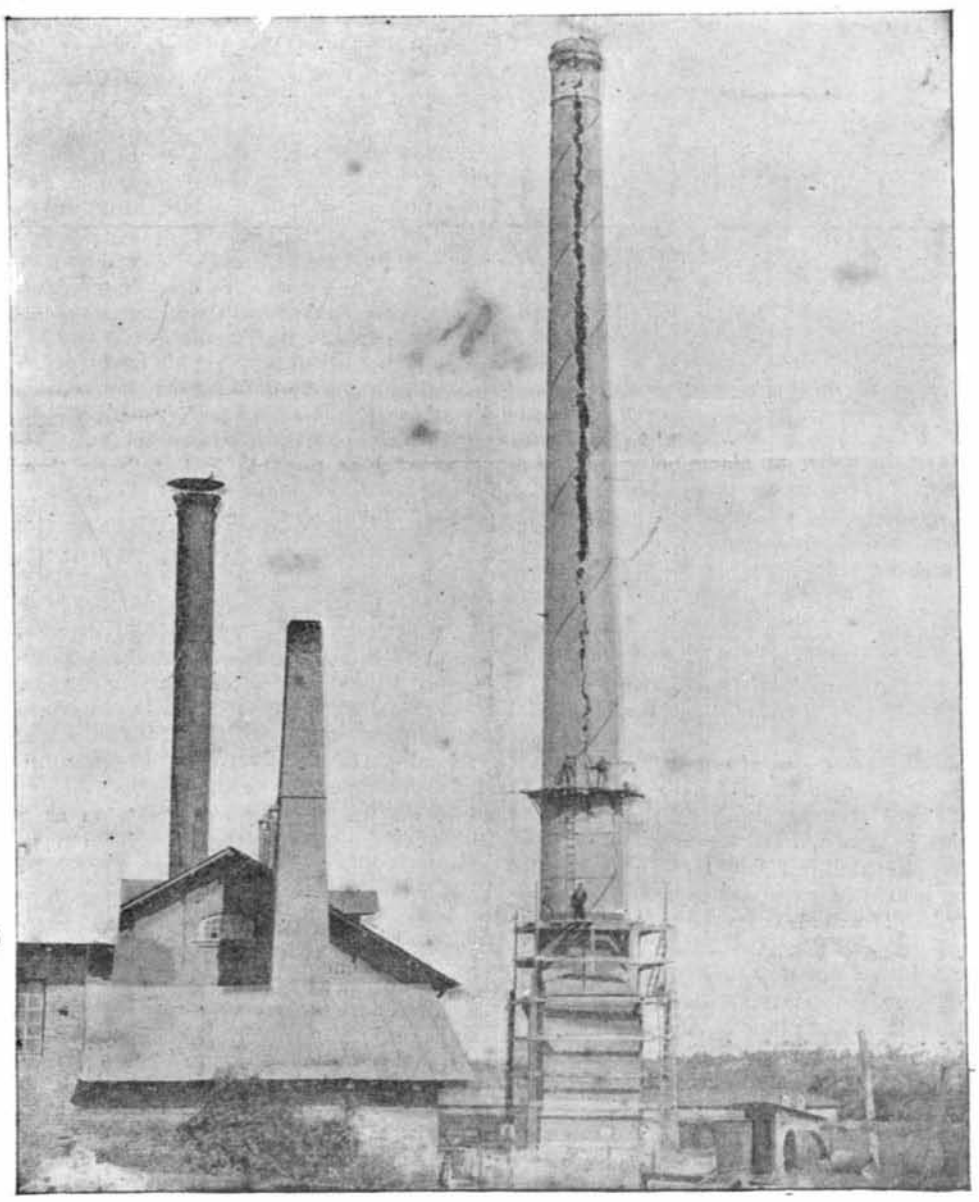

Fig. 1.—CHIMNEY OF THE KOJANKA SUGAR WORKS AFTER BEING STRUCK BY LIGHTNING.

The New Constituent of the Atmosphere.

Thursday, January 31, was an eventful day in the history of the Royal Society, as well as in scientific circles, inasmuch as it was the first occasion on which a meeting of the society had been devoted to the discussion of a single subject in presence of the general public. Moreover, the subject was one to which a good deal of attention has been directed since the meeting of the British Association in Oxford last year, when Lord Rayleigh startled the world by announcing the discovery of a new constituent of the atmosphere. It was to hear his lordship's colleague—Professor Ramsay—read a paper on this subject, communicated to the society by them conjointly, that a large audience assembled in the theater of the University of London on January 31. The new gas is called "argon;" and, so far as is at present known, it stands entirely unrelated to any other substance in nature. We are therefore warned that "every theory of its constitution must be accepted with extreme caution." As to its physical properties, its solubility in water is 2½ times as great as that of nitrogen. Examined by the spectroscope, it shows that it has two distinct spectra, like nitrogen itself; but while the nitrogen spectra are of different characters, those of "argon" are of the same type. According to Professor Olszewski, of Cracow, the critical point of the new gas is —121°; the critical pressure, 50·6 atmospheres; the boiling point, —187°; the melting point, —189·6°; and the density of the liquid, 1·5. The new nitrogen has been aptly characterized as a "strange substance, being as volatile as nitrogen or oxygen, and therefore not capable of separation by difference of boiling point."

Preservation of Wire Ropes and Cables.

A compound which any one can make, of tar, summer oil and mica axle grease, in varying proportions to suit the conditions, is suggested by John A. Roebling's Sons Co. The tar and oil must be free from acid. This combination thoroughly penetrates between the wires, prevents rust, and fills the cable. It sheds water successfully, and does not strip off. Cables which have been treated with this material, when taken apart show every wire bright and clean, the heart or hemp core being also in prime condition.

As soon as a wire rope has been well filled with this compound, the addition of a very little from time to time keeps it in good condition, so that it is economical.

The best manner of applying it is by means of a drip, which pours it on, in a fine stream, while the rope is in use, care being taken to put it on very slowly.

A SPECIAL mouthpiece for public telephones has been introduced in Germany with the object of avoiding the spread of diseases carried by the condensed moisture of the breath. A pad or a large number of disks of paper, with a hole in the middle, is inserted in the mouthpiece, and the upper disk of the paper is torn off after every conversation.—Electricity.