

THE LARGEST WATER-WHEEL IN THE WORLD.

Messrs. Editors:—In the course of a very interesting article entitled "India-rubber and its Manufactures," published in No. 11 of the present volume of the SCIENTIFIC AMERICAN, mention is made of a water-wheel at the works of the "New York Belting and Packing Co.," on Potatook river, and you state that this wheel is "50 feet in diameter, and is said to be the largest in the world." There is at least one larger. In "Quiggan's Illustrated Guide to the Isle of Man" (Douglas, 1858), page 168, will be found a description of the village of Laxey and its neighborhood, and we read as follows:—

"About half-way up the glen is the Laxey mine; the vein, running nearly north and south, contains copper ore, lead ore rich in silver, varying from 80 to 120 ounces in the ton of lead, and a great body of black-jack or blende. Of late years the mine has been worked with great vigor, and very extensive machinery erected. A water-wheel, believed to be the largest in the world, was started (in 1855) by Hon. Charles Hope, the lieutenant-governor, and named after his lady, who assisted in the ceremony, the 'Lady Isabella.' This wheel is a great object of attraction, and is certainly a proud triumph of engineering science. Situated towards the northern extremity of the valley, on a lofty elevation, it arrests immediate attention on entering the glen. It is supported in its bearings by a massive, yet elegant structure of masonry and iron, arranged in open arches and galleries. The first gallery admits of an inspection of the under portion of the wheel, and the second is on a level with and supports the bearings of the shaft. At the extremity of the second gallery, in front of the masonry, is a colossal entablature of the familiar armorial bearings of the Isle of Man. The ascent from the first gallery to the other points of elevation is effected by winding staircases round a massive white pillar. Up the center of this pillar the water rises, and is carried by a duct under a projecting balcony and over the very summit of the wheel, which there receives it. This arrangement is effected by having the reservoirs of water at a considerable elevation above the wheel on the neighboring hills, and the water is conveyed from thence in pipes two feet in diameter, underground, to the pillar. The staircases conduct to the balcony, which is surrounded by iron railings, from whence a magnificent view of the valley is obtained; but to those unaccustomed to great elevations, it has for a time a dizzy and confusing effect. The wheel is properly an 'overshot,' though moving in the reverse direction to the stream of water, which, so to say, enters the wheel at that portion of the circle indicated by 'twelve o'clock.' The water is stopped at pleasure by a neatly constructed hydrant on the second gallery; and the connecting rods for working the pumps at the mine are carried on a long viaduct of arches from the wheel to the mine shaft, which is about 200 yards distant. This great wheel is of the following dimensions:—Diameter, 72 feet, 6 inches; circumference, 217½ feet; breadth, 6 feet; length of shaft (malleable or wrought iron), 17 feet; diameter, 21 inches; weight, 10 tons; length of crank, 5 feet; stroke, 10 feet; stroke of beam at the mine pump, 8 feet; revolutions per minute, 2 (can be increased to 4½); estimated horse-power, 200. It pumps 250 gallons per minute from a depth of 400 yards, but its capacity in this respect can be materially increased."

A. M. G.

Albany, N. Y., Sept. 8, 1859.

[At Burden's Nail Works, near Troy, N. Y., there is one of the most peculiar and majestic water-wheels in the world. It is 50 feet in diameter, 22 feet in breadth, has 30 buckets, and is built on what is called the "suspension principle;" that is, the shaft is carried by the soling through suspension rods. It will repay a long journey to witness this wheel in operation. Its great mass in revolution excites the same feelings in the mind as the sight of a huge steamboat in motion, or a large body of water flowing over a high fall.—Eds.]

WORK OF WATER-WHEELS BY NIGHT AND DAY.

Messrs. Editors:—In the course of my business of building and putting in the "Blake" wheel (of which there are about 900 built, all giving full satisfaction), I have often heard it asserted, by mill-owners and others, that water-wheels will do more work in the night than

in the day-time. To demonstrate the fallacy of such an assertion by actual and scientific experiments, I have, with great care and with the use of very perfect apparatus for testing water-wheels, observed their performance in several successive days and nights, namely, five experiments in the middle of the day and three in the middle of the night, on a wheel of 18 inches diameter, running without resistance under a fall (H) of eight and more feet; running the wheel for 2,000 revolutions at each experiment; and the time being calculated by noting the seconds for every 100 revolutions, by the bell-hammer attached to the wheel-shaft, which is a good time-keeper.

I give below the results of each experiment opposite the fall (H) which actuated the wheel, in revolutions per second; and I then reduce the revolutions to what they would have been had the fall (H) been the same in every experiment, having one in each series, night and day, equal to 8.41 feet. I reduce R to that H by the formula as $\sqrt{H}:R = \sqrt{h}:r$.

DAY EXPERIMENTS.			
H	Revolutions.	H'	R'
8.410 feet,	4.901950	8.41 feet,	4.90196
8.515 "	4.932230	"	4.93154
8.290 "	4.889075	"	4.93524
8.423 "	4.926108	"	4.92250
8.4216 "	4.950544	"	4.94713

Mean revolution, 4.92569; mean temperature of water, 70.7°; barometer (mean height), 29.98 inches.

NIGHT EXPERIMENTS.			
H	Revolutions.	H'	R'
8.41 feet,	4.88907	8.41 feet,	4.88907
8.51 "	4.95763	"	4.93949
8.43 "	4.93227	"	4.93553

Mean revolution, 4.93159; mean temperature of water, 70.7°; barometer (mean height), 29.91 inches.

On comparing the results of the two series of experiments, it will be seen that there was a difference of 0.00410 in favor of the wheel's revolution during day-time.

L. W. B.

East Pepperell, Mass., Sept. 5, 1859.

MODEL TURBINE WHEELS FOR PHILADELPHIA.

Some time since the Committee on Water, of Councils, invited the inventors and constructors of turbine water wheels to compete for the erection of two at the new wheel-house in course of erection at Fairmount, stating that working models would be required to be sent to this city for trial before any contract would be given out. Letters were received from engineers in various parts of the country of their intention to send models as soon as they could be constructed, and two have already been sent on, one from Reading, Pa., and the other from New Jersey. Each will weigh about 1,500 pounds, and are capable of passing 200 cubic feet of water per minute. As soon as the other models arrive, the trial will take place at Fairmount, works having been already constructed for this purpose. The coffer-dam, so as to allow of the construction of the foundation for the new wheel-house, is now completed, and a direct-acting steam-pump, built by Mr. Rich, at Sixteenth and Hamilton streets, to work for the purpose of keeping it clear of water. Mr. Rich has also one of his pumps in operation at the big culvert, now building in Twenty-fourth-street, and with its aid the workmen are enabled to continue their operations without interruption.—*Philadelphia Ledger*.

[This notice refers to the experiments to be undertaken in Philadelphia, as mentioned in the letter of Chief Engineer H. P. M. Birkenbine, on page 67 of the present volume of the SCIENTIFIC AMERICAN.—Eds.]

SEALING-WAX FOR FRUIT-CANS.—Don't buy any sealing-wax for your bottles of fruit, or fruit juice called wine, or anything else that you want to seal up for future use. Make it yourself. "How?" We will tell you. The sear ingredients. Beeswax, ½ oz; English vermilion, 1½ oz; gum shellac, 2½; rosin, 8 oz. Take some cheap iron vessel that you can always keep for the purpose, and put in the rosin and melt it, and stir in the vermilion. Then add the shellac, slowly, and stir that in, and afterward the beeswax. When wanted for use at any after time, set it upon a slow fire and melt it so you can dip bottle-nozzles in. Recollect that the vermilion is only put in for the looks of the thing, and if you want to use it for any purpose where color is no object, as for instance sealing over wounds upon trees, you may leave the color out. The ingredients for the above, bought in this city, cost only 25 cents, for which and a little trouble you can have three quarters of a pound of good sealing-wax for any common use. For any purpose, such as an application to trees, where you want it tougher than the above preparation will make it, add a little more beeswax, and leave out the vermilion. *N. Y. Tribune*.

[If the vermilion is left out in the above, the wax will be all the better for it, as this is a sulphur of mercury and is merely used for coloring purposes.]

A COLUMN OF INTERESTING VARIETIES.

A Californian walking along the streets of New York, and seeing thrown out from a cellar-excavation some of the red gravel which is so common in this city, is always tempted to stop and "prospect" it by washing out a pan-full of dirt; it resembles so closely the gravel among which a large portion of the gold of California is found. The gold-bearing rocks all over the world are of the same geologic formation as the gneiss (pronounced *nise*) or stratified granite of Manhattan Island. These are the metamorphic rocks which were deposited in layers in water, and were afterwards crystallized by heat; they exhibit both the crystalline and the stratified structure.

.....The aurora of the 23th ult. was seen as far south as Galveston, Texas, where it was visible at 8½ o'clock in the evening. It lasted about 15 minutes. This phenomenon is rarely seen in that locality, and it was at first quite generally attributed to fires on the prairies.

.....The Saxons first introduced archery, in the time of Voltigeur. It was dropped immediately after the conquest, but revived by the Crusaders, they having felt the effects of it from the Parthians. Bows and arrows, as weapons of war, were in use, with stone cannon-ball, as late as 1640. It is singular that all the statutes for the encouragement of archery were framed after the invention of gunpowder and fire-arms. Yew trees were encouraged in church-yards, for the purpose of making bows, in 1742. Hence their generality in church-yards in England at the present time..... Geological formations are going on at the present day, the same as in ages past. Large swamps of vegetable matter are changing into peat, peat is hardening into lignite, and lignite is being transformed into coal. In some places, rocks are being formed by deposits at the bottom of the ocean; in other places rocks are being slowly raised above the level of the sea..... There are 245 gas-light companies in the United States, with an aggregate capital of \$40,000,000. The price of gas ranges from \$2.50 to \$7 per thousand feet. There are but comparatively few instances, however, where the price exceeds \$4..... The Russian empire contains 7,906,397 square miles; the British empire contains 7,568,821 square miles; the United States (before the purchase of Arizona) contained 2,963,460 square miles. The population of the Russian empire is 65,331,568; that of the British empire, 161,501,034; and that of the United States (census of 1850), 23,363,327..... Twenty and one-fourth pounds of sulphurous acid consist of 10½ pounds of sulphur, and 10 pounds of oxygen..... Among the sovereigns of Europe to whom Columbus applied for aid in his enterprise, was Henry VII., of England. This is a convenient fact to connect in the memory the dates of English and American history..... The invention of bells is attributed to Polonius, Bishop of Nola, Campania, about the year 400. They were first introduced into churches as a defence against thunder and lightning; they were first put up at Croyland Abby, Lincolnshire, in 945. In the 11th century, and later, it was the custom to baptize them in the churches before they were used. The curfew bell was established in 1078. It was rung at eight in the evening, when people were obliged to put out their fires and candles. The custom was abolished in 1100. Bellmen were appointed in London in 1556, to ring the bells at night and cry out, "Take care of your fire and candle; be charitable to the poor, and pray for the dead!"..... It is the opinion of persons acquainted with the character and circumstances of Louis Napoleon's mother, that there is not a drop of the Bonaparte blood in his veins. The marriage of Josephine's daughter, Hortense Beauharnais, with Napoleon's brother, Louis Bonaparte, was contracted for state purposes; and was intensely repugnant to the feelings of the beautiful girl, who was in love at the time with another man..... In our revolution around the sun, we are not carried by the earth, but revolve by the direct attraction of the sun upon ourselves. If the earth could be annihilated, with everything upon it except one man, he would, of course, immediately die for want of air; the body, in the course of half an hour, would be frozen solid by the intense cold which prevails in space, and would continue its flight with a velocity 60 times that of a cannon-ball, in its long, curved track around the sun, and would thus revolve forever..... Forty pounds of sulphuric acid consist of sixteen pounds of sulphur and 24 pounds of oxygen.