

For the Scientific American.

Useful Information about Water Wheels.

I have made several to me very interesting experiments on Water Wheels, and came to the conclusion that I had made some discoveries on Hydrodynamics, and used the following rule for re-action wheels to find the velocity of the water per minute, under the head I wished to erect the wheel—(I used the rules laid down by Smeaton)—from which subtract one-third for the velocity of the wheel at the centre of issue, then use 1500 lbs. of water per second for each bushel of wheat the stones were required to grind per hour; this gave me the volume passing through the wheel; I then found the amount of issue it required to receive the water. I then found the diameter of the wheel that would receive the proper number of buckets, to form these issues; I then made a disc or head of plank two inches thick, doubled at right angles, of a diameter of two inches more than the circle of the buckets. To strengthen the wheel I then made an annular rim of the same diameter of the disc, through the centre of which I cut a circular opening of five times the area of the whole of the issues of the wheel; the rim was of sufficient width to just cover the inner end of the buckets, and was worked off to a thin edge at the heel, so as to pass through the water with the least possible friction. The buckets would be about 3 inches thick, so as to pin and bolt through. I used from 8 to 12 buckets—being less than any other workman I then knew of; some 3 or 4 inches of the issue end I made of iron, about one-quarter inch thick, to prevent the wood of the bucket from splitting. This was the most approved method previous to Parker's improvement.

Seventeen years ago last spring I heard of Mr. Z. Parker, I went to see him, and found he had covered all my improvements by his patent—knowing nothing of me nor I of him. He had united percussion with re-action. I was unable to find any improvements in advance of Mr. Parker, and I set myself to study his theory and erecting his wheels. His theory clashed with all others I read of, or heard of, but so far as I had experimented I thought him correct. I had found that a wheel at its periphery could outrun the water that propelled it, which was denied by all authors, who asserted that "no wheel could be made to run at its periphery as fast as the stream which drives it."

In unison with Mr. Parker, after seventeen years' experience, I do assert that his wheel at its periphery, run 107 per cent. of the velocity of the water that propels it, at its maximum; also that his tables are correct. I have used them ever since he had them printed; previous to the printing we used the following rule:—Divide the velocity per minute by the number of revolutions of the wheel we wish the stones to make or the saw to cut, and it will give the circumference of the wheel, from which get the radii; then use 1000 lbs. of water per second for each bushel of wheat per hour we wish the stones to grind, or for each square foot of soft wood we wish the saw to cut per minute, gives the area of inlet to the wheel; also the area of the issue of the wheel,—these two being the same, is at present much controverted and condemned by many experts. At the recent trial for an infringement at Columbus, Ohio, by which I find many good operatives are to this day in the dark in the neighborhood of the seat of this great improvement. We have erected some twenty wheels within thirty miles of where I now write, that seldom draws a full gate; the wheels all perform well. It is our usual practice to make the inlet to the wheel, precisely the same as the area of the issue of the wheel, under all heads. We sawed a log eleven feet long, which was slabbed off to two feet, and turned down in one minute, with eight feet five and a half inches head; we run back, set and sawed for 18 minutes, and sawed 108 feet of boards half an inch thick, with 27.6 cubic feet of water per second; we also ground 35 bushels of corn into meal in one hour, with a four feet French stone, of the blueish cast, rather of a hard close order, manufactured by Herbert & Wright, of Louisville, Ky., with 15.5 cubic feet of water per second, which proves the accuracy of Mr.

Parker's tables, and that he has rated them on the safe side. Millwrights who erect his wheels and do not come up to the tables, had better learn to do it right before they condemn them. I often hear millwrights and others exclaim against them to their own condemnation. We have put in operation mills that will do more than the above, but the co-efficient of the mills is about the same.

Before I close this already lengthy subject, permit me to lay before your readers a very important item, which is, that in many situations the banks are so high as to render the pitman useless by its length; but in such cases we erect the wheel high in the head, as in the case of Maj. Kightley's mill, near Ballardsville, which has eight feet head; we put his wheel at centre four feet above the tail water, and four feet below the head water; it will run until the water runs down some inches below the covering of the wheel, so that the water rises several inches higher than its head, and drives the saw with the same power the wheel would at 4½ feet head. In this mill we made the pitman three feet shorter than otherwise could be done without gears; we use no gears for saw mills or grinding mills, we always couple the spindle of the stones to the shaft for all kinds of grinding mills. We run some of the stones up to 225 revolutions per minute, smaller ones more for corn; we run four feet wheat stones 160 revolutions per minute.

We have just finished a merchant mill for E. F. Wade, Esq., Attorney at law, a gentleman of science, who asserts that he can grind more grain and saw more lumber with a given quantity of water, with the Parker wheels, than he could with the over-shot wheels we took out. Two of them were 13 feet diameter, one nearly new, of excellent workmanship, of the common construction of this country.

These are stubborn facts, and may be seen by calling at the mills three miles from Westport, Oldham Co., Ky.

Yours respectfully, J. S. Floydsburgh, Va., 1850.

Natural History of the Sabbath.

The Creator has given us a natural restorative—sleep; and a moral restorative—Sabbath-keeping; and it is ruin to dispense with either. Under the pressure of high excitement, individuals have passed weeks together with little sleep or none; but when the process is long continued, the over-driven powers rebel, and fever, delirium and death come on; nor can the natural amount be systematically curtailed, without corresponding mischief. The Sabbath does not arrive like sleep. The day of rest does not steal over us, like the hour of slumber. It does not entrance us almost whether we will or not; but addressing us as intelligent beings, our Creator assures us that we need it, and bids us notice its return, and court its renovation. And if, going in the face of the Creator's kindness, we force ourselves to work all days alike, it is not long till we pay the forfeit.

The mental worker—the man of business, or the man of letters—finds his ideas becoming torpid and slow; the equipose of his faculties is upset, grows moody, fitful, and with his mental elasticity broken, should any disaster occur, he subsides into habitual melancholy, or in self-destruction speeds his guilty exit from a gloomy world. And the manual worker—the artisan, the engineer—toiling on from day to day, and week to week, the bright intuition of his eyes gets blunted, and forgetful of their cunning, his fingers no longer perform the feats of twinkling agility, nor by a plastic and tuneful touch, mould dead matter, or wield mechanic power; but mingling his life's blood in his daily drudgery, his locks are prematurely gray, his genial humors sour, and slaving it till he has become a morose or reckless man, for an extra effort or any blink of balmy feeling he must stand indebted to opium or alcohol.

[The above is from the North British Review, which is perhaps the most able Review in the world, at least it is second to none. We commend the subject to the attention of every mental and physical worker. Nature has given us seasons of sleep, and we might well ask, "why were we not made to live on without them." We cannot tell, but knowing what

exists, we should follow the laws of nature; and one day in the seven, as a day of rest, is as essential to health as regular sleep. It has a moral influence also, but this is a question which belongs to a religious paper to discuss, we look only to the physical laws with which it is connected, and view it in the light of a scientific subject.

Survey of Great Britain.

The whole of England and Wales, with the exception of the six northern counties, has been surveyed, and the maps published, on the scale of one inch to a mile. This scale, however, was found to be too limited and defective to be of value for local engineering purposes, and for the improvement of the country; and the remainder of the survey was accordingly ordered to be finished on a scale of six inches to a mile, as regards the country; but as regardstowns, they are to be laid down upon a scale of five feet to a mile, in all cases where the number of inhabitants amounted to 4000. The six northern counties of England, namely, Lancashire, Yorkshire, Northumberland, Durham, Cumberland and Westmoreland, have all to be surveyed on this larger scale; and already the whole of Lancashire, and five-eighths of Yorkshire have been completed. The expense of the one inch scale, as compared with the six inch scale, is represented to be as one to four. It will consequently take four times as long to execute the survey with the grant continued at the rate it now is of £60,000 a year; the delay, or acceleration of the work, being altogether a question of money.

Look at this enormous expense of \$300,000 per annum for mere surveying, yet we believe, that in a scientific point of view it could not be spent to a better purpose.

Blowing up Wrecks by Electricity.

The wreck of the Illinois steamer near the wharf at New Orleans has been removed by blasting, using the galvanic battery. A tin cylinder containing a large quantity of powder was let down on the side of the bow, and drawn toward the other, until it was deemed far enough placed beneath the bottom of the wreck to produce, by its explosion, a powerful and immediate effect. As the means before adopted to fire the powder, when thus placed, had proved insufficient, the attention of the gentlemen superintending the work was drawn to the use that might be made of a galvanic battery, and wires attached, to effect the desired object. A battery of eighteen or twenty jars was brought to the spot, the cylinders with the wires from the battery being attached to it, filled and sent down, and soon, upon a slight gesture from the operator, the electric fluid darted down the metal, sped on its destructive errand, a dull heavy sound stunned the ears of those standing near, a volume of water, like a column, rose twenty feet in the air, and when it fell, the workmen sprang on the floating staging the diving bell plunged into the foaming current, and in a short time all hands were busily engaged in hauling up large pieces of the shattered wreck.

Dr. Franklin.

It is related of Dr. Franklin, that once while in France he had a dispute with a nobleman upon the question whether the majority ought to rule in State affairs, or whether the educated and well informed few should govern. The nobleman advocated the latter proposition, and Dr. Franklin defended the former. After some debate, the nobleman proposed to let the matter be decided by the company present, and being surrounded by his own friends, they all rose at once on his side and left the Doctor alone. "Well," said he, "according to your own principles, I have gained my cause: you represent the ignorant majority, and I, the wise minority, decide that you are wrong and must yield."

Discoveries in Ancient Nineveh.

Letters have been received from Dr. Layard, dated Mosul, October 15, at which place he arrived on the last day September. Dr. Layard intended to recommence his excavations, on the scene of his former labors, as soon as he should be able to assemble his Nestorian diggers from the mountains. At present the country is in a very unsettled state; it is scarce-

ly safe to venture out of the city gates. At the date of his letters he had about sixty workmen exploring the ruins; and many bas-reliefs—of which the store seems inexhaustible—were discovered. But all had suffered from the effects of fire,—and they will scarcely bear removal. Of these accurate drawings will be made by Mr. Cooper the artist attached to the expedition. Amongst the bas-reliefs most recently discovered by Dr. Layard is a representation of the removal of one of the gigantic bulls,—showing that they were sometimes, if not always, removed to the palace after being carved. An immense number of men draw a sledge which runs upon rollers; impetus being given to it behind by an enormous lever worked by cords. A cast will be made of this curious subject in the event of its being impossible to remove it. It is probably that the fine pair of colossal lions still standing at Nimrud will be moved during the present expedition. Dr. Layard paid a second visit to the periodical festival of the Yezidi, or Devil worshippers,—and was admitted to all their ceremonies. On this occasion he also saw the celebrated Melék Teou, the bronze bird, the existence of which has been a matter of speculation to travellers, and which he described as a very curious relic. Of these and other matters we may, it is to be hoped, expect full particulars in a second series of "Nineveh and its remains."

British Mechanics Association.

In an article in the Literary World by J. B. Bartlett, it is stated that mechanics Institutes prevail to a considerable extent in Birmingham, Manchester, and other large towns. Although professedly formed for working people, but few of this class are able to join them in consequence of the expense, small as it is.—They are supported chiefly by the middle classes, and by the higher order of skilled artisans. Attached to the Institutions are libraries.—Some of them have lectures, debating clubs, and improvement classes besides. In Yorkshire they are all associated into a body called the "Yorkshire Union." This embraces seventy-nine institutions, and twelve more have asked for admission. The total number of members is about 16,000. The average number of books in each library is about 900. The Mechanics' Institute at Liverpool has 3,233 members; the two at Manchester together about 4000. It is believed that the total number of these Associations and Scientific Societies, large and small, in England and Wales, amounts to four hundred.

In Birmingham cheap subscription rooms have been opened, which are so crowded that all cannot gain admission who apply. In London no provision is made by which working men can get access to books, in the public libraries, as they are closed before the hour when they can read. If they want to read a particular book they must buy it, unless they can find it at one of the coffee-rooms.

The cultivation of a taste for reading soon creates a desire for better books, and the cheap trashy stuff is thrown aside. Some of the most intelligent and best read in Birmingham are working men. This class of people write a great deal of poetry (such as it is,) and contribute much solid matter to the newspapers. Three prize essays on the observance of the Sabbath were lately gained by working men in Birmingham.

The system of lectures which has been tried at the Mechanics' Institutes has had a beneficial effect upon the people, as well as upon the institutions."

[It seems that Birmingham, for some reason or other, is singled out as a model of genius and learning for working men. But it certainly would be mortifying to all Britain, if out of more than 1000 essays, the three prizes were taken by Birmingham men, but it was not so. The above is incorrect, without excuse, for one prize only was taken by a Birmingham man, a foreman printer; the second by a shoemaker in Roxburyshire, and the third by a Dundee machinist. England did not match the north, it seems, in this contest, although she did well—the essay of John Allan Quinton, (a good old Saxon name) of Birmingham—"The Workingman's Plea for the Sabbath," is a production of which any man might be proud.