(For the Scientific American.)

Hydrodynamics---Water Wheels.

On page 171, present volume, James Sloan propounds some questions, premised, however, with the assertion "that the science of hydrodynamics is not understood." The science may not be understood by some who make pretensions to it; but others are vain enough to suppose that some do understand it, and imagine that the structure rests on a few plain and simple principles, which govern matter while under the influence of force, and are well known to all mechanicians.

All the phenomena of water motors arise from two well-known principles, viz., when force acts on matter. if not obstructed, it will move in a direct line forever, with a velocity proportional to the force, and inversely as the mass, and will take a force to arrest its motion equal to that which gave it. From these two principles flow all that is known in mechanics. The heavenly bodies —planets, satelites, comets, and all—are governed by the same laws that regulate the motion of the water wheel. Mechanicians, however, consider that the friction arising from the passing of water through the complicated structures, of all the various water wheels. is as much out of their province as the calculation of friction in any other complicated machine—the steam passing from the boiler to the cylinder, and the piston, for instance. This branch belongs to experimenters. Astronomers have, for convenience, applied the term centrifugal force to the tendency that projectiles have to continue in a direct line, which has induced many to suppose that it was a real force, and that it, in some mysterious way, affected the action of water on wheels. But to the questions :—

First, By the following formula, the upward pressure may be determined, viz.,

$$w = d\ h\ (v^2 - y^2) \times 49{\cdot}088\ ;$$

in which w=the upward pressure; d=the diameter of the helical sluice where it is in contact with the wheel, or the wheel itself, where the sluice that directs the water on it joins it; h= the highth of head, measured from the point where the water escapes, or if an air tight wheel case be used, from the top of the tail water to the top of the head; v= the quantity of water discharged in a given time by the helical sluice, with the wheel removed, considered as unity; and y= the proportional quantity discharged by the wheel when in operation, working at a speed to produce a maximum effect. 49·088= cylindrical feet of water.

EXAMPLE—A water wheel, with a helical sluice, 2·86 feet diameter, working under a head of 14·75 feet, discharges when at work 17·42 cubic feet of water per second; but when the wheel is removed the helical sluice discharges 24·6 feet in the same time. What is the upward pressure against the wheel?

Here, v=24·6, v^2=605·16.

y=17·42, y^2=302·76

$v^2 - y^2$=302·40=4997

And, 2·86×14·76×·4997×49.088=1034·+lb. =the necessary weight of the wheel and shaft to balance the upward pressure of the water.

The function, $(v^2 - y^2)$ is based on the principle that the velocity, and consequently the quantity of water discharged is proportional to the square root of the head necessary to generate the velocity. v= the velocity from under the whole head, consequently, v^2= the whole pressure, and $v^2 - y^2$= the pressure after passing through the sluice. v and y may be obtained, approximately, by measuring the area of the inlet and outlet—sluice and issues—and making y= area of the issues of the wheel, and $v = \sqrt{y^2 + \text{area of the sluice}^2}$.

But the experienced millwright will, if he understands "hydrodynamics," so construct his machine that $v^2 - y^2 = 5$, or very nearly so; in which case it will produce a maximum effect, but in no other. Any variation in the velocity of the wheel will affect the relations between v and y, and consequently the pressure, and the effect of the machine.

The second question is not clearly presented.

What is meant by "a line parallel with a secant." A tangent may be parallel with a secant, if removed 90° from it.

The third is answered negatively, by the solution of the first. J. B. CONGER.

Jackson, Tenn., Feb. 19, 1855.

[Mr. Sloan is a practical millwright, and has long been engaged in putting up wheels and erecting mills. Mr. Conger is an experienced millwright also, and has expressed our views exactly in relation to the science of hydrodynamics.

Proposed Amendment in Patent Law.

MESSRS. EDITORS—In the first place permit me to express my thanks for your faithful discharge of duty as sentinel on the watch-tower of liberty and equal rights.

Your last number apprises us of a new attack of the aristocracy upon the privileges of the people. If a rich dealer in patents should wish to make a monopoly of invention, and exclude all genius from competition, except among a privileged few, he could not devise a more effectual scheme than that proposed by Senator James. With his motives I have nothing to do, but such is the character of his bill. I have named *aristocracy* as the principle of that bill, and I would remark, that if this country is to be degraded, it may not improbably be through that evil principle. There is, indeed, danger on the other hand from relaxation of salutary law. There may be unprincipled democracy as well as unprincipled aristocracy. But is it too much to expect of our well-paid legislators that they should protect us from both these upper and nether mill-stones.

The greatest enemies of our patent laws are a few purse-proud patentees, or assignees of patentees. Their policy is exactly that of the celebrated devil, who, having mounted the ladder himself, devised the plan of kicking it over.

If Senator James' bill becomes a law, every man in moderate circumstances must at once abandon all hopes of profiting by his inventive genius. That gift of God becomes to him of no value, but rather a curse.

EQUAL RIGHTS.

Brunswick, Me.

Circular Saws.

MESSRS. EDITORS—Very many saws are permanently injured by the heating of the arbor; the middle of the saw becomes expanded by the heat, and working it in this state inevitably strains it. This is a very common error, and as it generally occurs a little at a time, often escapes observation.—The mere heating of the saw, even to blueing it, does not start the temper as many suppose, but makes it spring temper; it should therefore be heated all over or not at all. Saws of a uniform thickness are less liable to strain. The thin places of saws are those parts that buckle first, and from the first are the cause of vibration; however well a circular saw may be made in other respects, it must be ground even to work well. The collars on the arbor should be concaved a little, because a well-ground saw gradually thickens from the teeth to the hole.

A SAW MAKER.

Boston, Mass.

Petrifactions.

MESSRS. EDITORS—In glancing over an old file of the *Marshall* (Mich.) *Statesman*, my eye caught a paragraph headed "Petrified Corpse in Wisconsin." I take the liberty of transcribing it for your benefit, inasmuch as it supports a remark of yours in an article upon that subject in No. 24. The cool and reckless positiveness with which some scientific men will assert periods of forty thousand, and a hundred thousand, or even a million of years to account for certain changes, is as amusing as it is alarming.

The paragraph in question appeared in the *Statesman* of May 7, 1851, credited to the Detroit *Advertiser*, whose authority was the Fond Du Lac *Journal*, and is as follows, viz: "On the 20th of August, 1847, Mrs. Phelps, wife of our informant, Abner P. Phelps, died, and was buried at Oak Grove, in Dodge Co. On the 11th of April inst., she was taken up to be removed to Strong's Landing. The coffin was found to be very heavy, and the body to retain its features and proportions. After its removal to Strong's Landing, a distance of some 45 miles, the body was examined, and found to be wholly petrified, converted to a substance resembling a light colored stone. Upon trial, edge tools made no more impression upon it than upon marble. In striking upon the body with metal, a hollow singing sound was produced. The disease by which she came to her death was chill fever and dropsy. When the body was buried it was very much swollen. The ground in which she had been buried was a yellowish loam, and the body lay about three feet above the lime rock."

The above particulars are so explicit that the facts could be easily verified if called in question. J. W. BANCROFT.

Elmira, Eric Co., N. Y., March 7th, 1855.

MESSRS. EDITORS—In No. 25, SCIENTIFIC AMERICAN, there is an article on the subject of petrifaction, wherein is noticed the case of several petrified bodies, and you say "you have heard of such cases before;" let me give you a case of my own personal knowledge:

A few years ago a lady died in the neighborhood of Felicity, in this County, and was buried in the orchard on the farm. About four years, after she was disintered, for the purpose of removal to a public graveyard, and was found to be completely petrified, being as solid as stone and fully as heavy. Every feature was distinct and perfect. Facts like this are enough to disprove the false theory of Gliddon and Newton. The name of this lady was Carley. Her family are living in the same neighborhood yet, and can testify as to the truth of these statements.

JAS. M. GOODWIN.

Bethel, Clermont Co., Ohio.

Materials in their Invisible State.

If a piece of silver be put into nitric acid, a clear and colorless liquid, it is rapidly dissolved, and vanishes from the sight. The solution of silver may be mixed with water, and to appearance, no effect whatever is produced; thus in a pail of water we dissolve and render invisible more than ten pounds worth of silver, not a particle of which can be seen. Not only silver, lead, and iron, but every other metal can be treated in the same way, with similar results. When charcoal is burned, when candles are burned, when paper is burned, these substances all disappear, and become invisible. In fact, every material which is visible can, by certain treatment, be rendered invisible. Matter which in one condition is perfectly opaque, and will not admit the least ray of light to pass through it, will, in another form, become quite transparent. The cause of this wonderful effect of the condition of matter is utterly inexplicable. Philosophers do not even broach theories upon the subject, much less do they endeavor to explain it. The substances dissolved in water or burned in the air, are not, however, destroyed or lost; by certain well-known means they can be recovered, and again be rendered visible, some in exactly the same state as they were before their invisibility; others, though not in the same state, can be shown in their elementary condition; and thus it can be proved, that matter having once existed, never ceases to exist, although it can change its condition like the caterpillar, which becomes a chrysalis, and then a gorgeous butterfly. If a pail-full of the solution of silver be cast into the sea, it is apparently lost by its dispersion in the mighty ocean; but it nevertheless continues to exist. So when a bushel of charcoal is burned in a stove it disappears in consequence of the gas produced being mixed with the vast atmosphere; but yet the charcoal is still in the air. On the brightest and sunniest day, when every object can be distinctly seen above the horizon, hundreds of tuns of charcoal in an invisible condition pervade the air. Glass is a beautiful illustration of the transparency of a componnd, which in truth is nothing but a mixture of the rust of three metals. This power of matter to change its conditions from solid opacity to limpid transparency, causes some rather puzzling phenomena. Substances increase in weight without any apparent cause; for instance, a plant goes on increasing in weight a hundred-fold for every atom that is missing from the earth in which it is growing. Now the simple explanation of this is that the leaves of plants have the power of withdrawing the invisible charcoal from the atmosphere, and restoring it to its visible state in some shape or other. The lungs of animals and a smokeless furnace change matter from its visible to its invisible state. The gills of fishes and the leaves of plants reverse this operation, rendering invisible or gaseous matter visible. Thus the balance in nature is maintained, although the continual change has been going on long prior to the creation of the "extinct animals."

SEPTIMUS PIESSE.

Transporting Eggs of Fishes.

In the last sitting of the French Societe Zoologique d'Acclimation, M. Millet detailed a series of experiments he had lately made in conveying fecundated eggs. The result was, he said, that the eggs, when wrapped up in wet cloths and placed in boxes with moss, to prevent them from becoming dry and being jolted, may safely be conveyed not only during twenty or thirty, but for even more than sixty days, either by water, railway, or diligence. He added, that he had now in his possession eggs about to be hatched, which have been brought from the most distant parts of Scotland and Germany, and even from America. M. Millet stated a fact which was much more curious—namely, that fecundated eggs of different descriptions of salmon and trout do not perish, even when the cloths and moss in which they are wrapped become frozen. "He had even been able," he said, "to observe, by means of a microscope, that a fish just issuing from the egg, and of which the heart was seen to beat, was not inconvenienced by being completely frozen up. This he explained by the fact that the animal heat of the fish, even in the embryo state, is sufficient to preserve around it a certain quantity of moisture."

This is a very important addition to the science of zoology.

Patent Sawing Machinery.

In reference to the improved sawing machinery of Piney Youngs, on another page, we would inform our readers that there are three of these machines in operation in Wisconsin. Each has cut 15,000 feet—superficial measure—of siding in ten hours. One of them has sawed six boards fourteen feet long and six inches wide in one minute, without extra exertion. They operate well, and—as we have been told—give great satisfaction.

Color of the Eyes.

That the color of the eyes should affect their strength may seem strange; yet that such is the case need not at this time of day to be proved; and those whose eyes are brown or dark colored should be informed that they are weaker and more susceptible of injury, from various causes, than gray or blue eyes. Light blue eyes are *cæteris paribus*, generally the most powerful, and next to those are gray. The lighter the pupil the greater and longer-continued is the degree of tension the eye can sustain.—[Hall's Journal of Health.

Morse's telegraph is the one which is to be used in the Crimea, to connect with the present European lines. They will find it to be the most simple.

Goater, the London lock-picker, has been fined £30 for picking a lock unfairly, and circulating reports injurious to Messrs. Parnell & Puckridge.

115,300 tuns of iron were imported to the United States from Scotland, last year. Canada imported from the same place 31,200 tuns.

A great lithographic work is about to be done in Berlin, Prussia, for a London house. It will take 40 different stones with their combined impressions to complete the work, viz., the ceiling of the Cistine Chapel, by Michael Angelo.