

**Reaction Water Wheels.**

*Mr. Editor:*—In your paper of the 27th of Nov., I noticed a report of the Committee on Sciences of the Franklin Institute, Philadelphia, in answer to a series of questions by Z. Parker, of Ohio, in relation to reaction water wheels. If I rightly understand them, I differ somewhat from them in their definition of what does, and what does not constitute a reaction wheel. In their answer to the first interrogatory they say, "A reaction wheel is a wheel propelled by the pressure in the direction of the circular motion of the wheel developed by the discharge of the water in a contrary direction." Now I suppose this to mean that the fact of the water's discharging in a contrary direction to the wheel develops, "unravels and makes known what was hid before," (as Dr. Webster would have it,) that the wheel owed its motion to *reaction*. Now in my humble opinion this may be so, or may not be. It is admitted that the water invariably discharges from a reaction wheel in a contrary direction to the circular motion of the wheel. But there are other wheels which discharge the water the same way, and yet, are in no way propelled by reaction. In a well constructed tub wheel the water flows out at the bottom in a contrary direction to its motion, and is "propelled by the pressure in the direction of the circular motion of the wheel," yet it does not *develop* the fact of its being a reaction wheel.—The same may be said of the turbine, and many others of a similar construction. In an able article by Ellwood Morris, Esq., of Philadelphia, on reaction water wheels and turbines, published in the Journal of the Franklin Institute, Oct. 1842, he defines a reaction wheel to be, one "where the water has free entrance to the circular space within the wheel, and spouting out of the openings between curved vanes, impels the wheels round in a backward direction by its reaction against the vanes, issuing with velocity from the wheel." I think no better definition of a reaction wheel could be given in so many words than this. In order to constitute a purely reaction water wheel, a number of things are necessary. First, the water should discharge in a contrary direction to the circular motion of the wheel. Second, the water should have free entrance to the centre of the wheel, without being turned out of its course, so that it can press with the full weight of its head towards (not in another direction) the openings in the wheel, with its full velocity. It is the case with every wheel now in use worth using that the water is conducted by spouts or scrolls so as to impinge, or press against inclined planes or angles whose bases are the radius of the wheel, with a velocity acquired by the head above, and is thus made to move the wheel forward until it acquires the greatest velocity, that portion of the water then falls nearly inert from the wheel. Where wheels are driven alone by reaction, the wheel represents a circular cistern containing the water, the issues, portions of the walls taken away, the water rushing out of these openings reacts upon the remaining portion of the walls (the buckets or curved vanes) with the same power and velocity, that it would spout against the surface, if the cistern or wheel stood still. The co-efficient effect of a wheel driven by impulse or percussion, is known to be but about .4 of the whole power of water, and the maximum motion of such wheels one half the velocity of the water under a given head, spouting in vacuity. Now it is clear, that the action and reaction are equal, and no greater power can be obtained by the same agent by reaction than by action; therefore, the mechanical effect of a reaction, and a percussion wheel (rightly constructed) must be the same: but the co-efficient, or power of many wheels supposed to be driven by reaction is from .6 to .8 of the whole power of the water, yielding double the amount of power to a percussion wheel. And again, water under six feet head will spout in vacuity only about 1200 feet per minute, yet many wheels supposed to be reaction wheels that I have seen, will move at the point of impact, with once and a half that velocity, and yet the water "propels the wheel in a contrary direction to its discharge." I consider most of the wheels of this class, driven by the water pressing

upon inclined planes, or angles, deriving much of their power from the force of the water coming into the wheel, and not (as in reaction) going out. I would here remark, that the motion of these wheels are, as the inclination of those angles or planes to the radius of the wheel, or in other words a wheel whose buckets or tubes lie nearer parallel with the circumference of the wheel, will move faster and with less power than one with the buckets lying nearer parallel with the radius of the wheel.

(To be concluded.)

**Extraordinary Phenomena.**

The Rev. James Whitman, a respectable Unitarian clergyman, lately deceased, at Portland, Maine, and the circumstances attending his death were the subject of much curiosity. His body underwent a post mortem examination and in laying open the breast and exposing the heart and lungs to view, the physicians were astounded at finding the heart located upon the right side and the liver upon the left. The spleen was also found upon the right side, presenting a *luxus nature* of remarkable interest to the naturalist and physiologist. But this reversing of the organs had nothing to do with the disease which terminated his useful life. Until pleurisy set in, the heart, lungs and spleen performed their functions with perfect regularity, and the reversed order of their location did not injure his health in the least degree: for the heart performed its office just as well upon the right side as it would upon the left, and the lungs suffered not by being located in an unusual place. This was a congenital malformation, and this good man has lived half a century with his heart upon the right side and his lungs upon the left side of his frame.

**Health of Factories.**

In a very able report on the sanitary condition of the borough of Sheffield in England, by James Haywood, a professional chemist, and Wm. Lee, civil engineer, the health of the work people employed is very carefully considered. In the process of grinding, minute particles of metal and stone are thrown into the air, and are inhaled by the workmen, producing disease to a fearful amount—and especially the malady known as the "grinder's asthma," of which at one time, nearly fifty per cent of the work people died under forty years of age. But the mortality from this cause has been greatly reduced by the employment of the *Ventilating Fan*, which is placed in a round box, and turned by means of the drum which causes the grindstone to revolve; a strong current of air is thus produced, drawing the particles of steel and grit-stone from its face, and conveying them away either to the top of the building, through the sides, or into a vessel of water below. The report makes honorable mention of Dr. Holland, by whose recommendation, at a time when the subject was little understood, the importance of these fans was urged upon the workmen and their employers. In one establishment, where the fans are employed, dry grinding has been carried on for twenty years without producing the least injurious effect. The cost of the instrument complete is *forty two shillings*, and yet a great number of the dry grinders are without it, although the most ignorant of them acknowledge that if it were used as extensively as it ought to be, the fatal disease called the grinder's asthma would be unknown to the next generation. If working men fully estimated the importance of these matters as affecting their best interests, they would all be earnest sanitary reformers.—*Jerrol's Newspaper.*

[This invention should be used in all our axe factories. There is no excuse for the saving of a little expense where health is concerned. Now we know that no means are used in a number of our axe factories where all is done by dry grinding, to prevent the dust being thrown in the air and inhaled in the lungs. This is also true in regard to numerous other occupations.]

**Great Times.**

The papers of Rutherford county Tenn., are boasting of the great times they had there during the Christmas holidays. Among other causes of rejoicing and merry-making there were thirty-eight marriages.

**Ventilation of the Capitol at Albany.**

A special Committee presented an able and useful report to the Assembly, on the 21st. ult., on ventilation. After explaining the following plan and the extent of the injury sustained by members in their health, by the present inefficient system, the Committee estimated the cost at \$3,000, the time necessary for having the apparatus ready for action at two or three weeks, the saving of fuel more than half, beside a much less risk from fire.

A steam engine is provided of sufficient power to drive a revolving fan of suitable dimensions to move with force and velocity a quantity of air sufficient to supply the inmates of the apartment to be warmed and ventilated. The atmosphere thus put in motion is conducted through the tubes enveloped in steam of a temperature not exceeding 212 degrees Fahrenheit, by which means it will imbibe a genial heat, and will not, as by the existing mode, become burned or decomposed. When thus heated, it is proposed to conduct the air into a mixing chamber of brick-work, say 20 feet square, to accomplish which, and to set the engine, there is ample unoccupied room in the basement, and thence conduct it by tubes into the various apartments of the building to be heated and ventilated.—By this mode the quantity, the degree of heat, and the amount of moisture with which the air should be softened will be entirely under control of the engineer, and not in the slightest degree mixed with any of the deleterious gases, that in different ways escape into the apartment in the use of any of the ordinary modes of burning coal, while at the same time it will diffuse heat and comfort equally in every part of the room. From the force with which the atmospheric air will be pressed by the revolving fan, there cannot as now, arise an exhausted and highly rarified state of the air in the room, by which means our present ventilators perform a doubtful duty, it being quite uncertain whether our ventilators do not let in more cold air than they let out of that which is vitiated and heated. Instead of admitting the rush of cold air when a door is open the pressure of the air from within will cause a rush of warm air out, and change the direction of the air, that usually comes freighted with chills and catarrhs, through the casements of the windows and crevices in the ceiling. Under the force of this pressure, it is believed, with slight enlargement the present ventilators will faithfully perform their appropriate office, by which means so rapid changes of the air will constantly be going on as to avoid all the evil effects of a stagnant and foul atmosphere.

Proper drainage and ventilation should be carried out in all Municipalities.

**Fast Color.**

A lady a short time since sent an elegant dress to a dyer's with instructions that he should dye it in handsome colors, warranted not to run: and she was somewhat surprised when the garment was sent home ornamented all over with beautiful little American flags, accompanied by the following explanatory note:—

"My Dear Lady:—The colors I have selected and used for your dress, have been tried by the English the French, and more recently by the Mexicans, and as they are convinced, no doubt, that these colors always stand, I have no hesitation myself in warranting them not to run."

**Exposure to the Sun.**

There are few points which seem less generally understood, or more clearly proved, than the fact that an exposure to the sun, without exercise sufficient to create free perspiration, will produce illness; and that the same exposure to the sun, with sufficient exercise, will not produce illness. Let any man sleep in the sun, he will awake perspiring, and very ill; perhaps he will die. Let the same man dig in the sun for the same length of time, and he will perspire ten times as much, and be quite well. The fact is, that not only the direct rays of the sun, but the heat of the atmosphere produce abundance of bile, and powerful exercise alone will carry off that bile.—*Popular errors explained.*

**Beware of Gold Forgeries.**

In relation to the counterfeit of gold coins, the following letter was written to the New Orleans Mint by the Director of the Philadelphia Mint.

MINT OF THE UNITED STATES, }  
Philadelphia. }

Sir.—The counterfeit half eagle which you have sent to me is a very remarkable and very dangerous imitation of the true coin.

It is a curious coincidence that while you were examining the counterfeit half eagle, we had our attention engaged by a quarter-eagle, dated 1843, equally well imitated, and composed in the same manner. This, however, bears the O, which marks it as an imitation of the New Orleans coinage. I send you a part of it enclosed for your examination, but beg that you will return it to me. There are no dies missing of those sent to you from here as is evidenced by your reports; nor are any missing here; so that the original dies cannot have been used by the counterfeiters. We must suppose either that the counterfeiters have the services of a most skillful engraver, or that they have possessed themselves of a dangerous process, recently discovered in England, for making very perfect dies of cast iron, which are facsimiles of the original medal or coin.

Very respectfully, your faithful servant  
[Signed] K. M. PATTERSON, Director.

**Wealth of England.**

The London Times admits that "the annual saving of the nation over and above its expenses, or, in other words, its accretion of capital, is not less than fifty million pounds (\$240,000,000) annually;" and the London Daily News states that "the banking deposits and lodgments on current account in Great Britain alone cannot be estimated at less than three hundred millions," or the enormous sum of one billion and five hundred millions of dollars.

Alas then for the scientific intelligence of Britain, and the philanthropy of its wealthy men, when millions pour into their groaning coffers, and the poor languish and die from destitution in their cellars and garrets.

**Respect does not follow Extravagance.**

The man who takes care of his earnings is far more respected than he who squanders all in "riotous living." So with the young lady. Although she may spend her last dollar in the purchase of a new dress or a costly shawl, and follow the whims of fashion as closely as does the fashionable belle who has thousands at her disposal, she cannot make people believe she really is; and is more likely to incur suspicion as to her rectitude of character, and to keep away such good men as make good husbands, from her society, than if she lived prudently and dressed plainly.

**TO CORRESPONDENTS.**

"A. L. of N. Y."—We shall probably be able to present an engraving of Mr. Webber's machine for turning irregular surfaces, in some future number. We could not give a description without it.

"H. B. A. of N. Y."—Your communication has just come to hand. We will give it due attention.

W. C. G. of Philadelphia.—We hope to receive your model soon, and an order for the engraving of your useful invention. The direct action of steam has not been applied, so far as we can learn, to the purpose you have written about.

"E. B. of N. Y."—Much obliged to you for your kindness. Accept friend Mac's respects. The information requested is still desirable.

"J. L. G. of Ohio."—There is a kind of repulsion between melted and solid iron, which explains the phenomena of the solid being borne up by the melted in size one-sixth of its bulk. A needle will float in water from the same cause. Take a fine needle, wipe it perfectly dry with a silk handkerchief, and lay it carefully on the top of a saucer full of water and it will float.

"J. W. R. of Md."—The mercury gauge is old and in common use.

"S. R. J. of Conn."—We have heard many fine spun theories regarding the arrangement of colors, but there is scarcely a practical work on the art of dyeing that can be