For the Scientific American.

Reaction Water Wheels.

Mr. Editor :—I have noticed several articles in your paper relative to Reaction Water Wheels. As this wheel is so universally applicable and extensively used in the Western country, the subject is of vast importance and is susceptible of an extensive discussion, which the public have a right to demand, not only to enable them to discriminate between the good and bad of the extensive variety which are being vended as new improvements, but to protect those who desire to use such wheels, from impositions which are of daily occurrence, and the result of patentees' conflicting claims.

For the purpose of throwing some light on the subject I will suggest some objections to the arguments of Mr. E. Bishop, in his communication published in your papers of the 18th and 26th of February 1848 and designed to overturn a report of the Committee on Science of the Franklin Institute, in answer to some queries by Z. Parker, of Ohio, published in your paper of the 27th Nov. 1847.

I must differ with Mr B. in the project of his arguments, which if I correctly understand them will not tully enlighten the public. From an experience of many years, as a practical millwright and machinist I am satisfied, the definition given to the term Reaction Wheel by said committee is clearly correct, and establishes the fact which appears to have been sought by Mr. Parker, that is, that the Reaction Wheel so called, is a " Reaction Wheel," although it may assume an hundred variations in its peculiar form and as many names as the cupidity of inventors may suggest and the fact that a mere alteration of form cannot take it out of the definition.

Fournyron of France calls his invention a " Turbine Wheel." Mr. B. also speaks of this as a Turbine wheel, conveying the impression that it is not a reaction wheel, but this wheel is propelled by a pressure in the direction of the circular motion of the wheel, developed by the discharge in a contrary direction. This turbine is as clearly a reaction wheel as any in existence. The same may be said of the spiral vent, the mitre vent, and the centre vent and a host of others of similm character.

I have noticed a paragraph in your paper which states that 26 patents have been granted by the United States for reaction wheels.—Now it is probable there has as many more patents been granted for wheels bearing other cognomens, which are wholly or in part reaction wheels. There are also a great variety of reaction wheels in use for which there has been no patent at all. In a recent travelling excursion in northern Illinois, I saw with my own eyes within as many days, forty three different models of the reaction wheel, a majority of these were not patented wheels I have also seen a great many varieties not included in the above forty three, and in all of these I have failed to discover any real improvement to the first patent taken out in the United States for a reaction wheel.

It has been a matter of much surprise to me, that in the vast varieties of this wheel there could be found sufficient novelty to justify the granting of a patent, as that novelty exists only in some peculiarity in the form without the least aid from utility. Patents which embrace nothing new or useful are obnoxious to the good order of society, particularly to those who purchase a wheel or other machinery which they have no right to use until different patentees' claims have been satisfied. A radical change should be made in our patent laws, granting patents for real improvements and not for mere alterations; such a change is necessary to protect the public from imposition

Mr Bishop says " 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." Now it is true that the principle of applying water by spouts or *scrolls*, producing a circular motion of the water into reaction wheels and by this means combining *percussion with reaction* power has become universal, and is used by the patentees of all recent patents for reaction water wheels, and it is by this principle alone that they derive any advantage over the old reaction wheel. Mr. Bishop may not be aware by whom this valuable principle was invented, or that a patent exists which secures to the inventor the exclusive right to its use. There cannot be any valid consideration in Mr. B.'s argument until this principle shall have become public property. Any wheel which would be a reaction wheel, when applied in the old way of placing the wheel under an aperture in the floor of the penstock and the water applied by supplying a square open penstock above the wheel, must be considered a reaction wheel, at least until the public become possessed of the right to combine percussion with its reaction power.

(*To be concluded.*)

For the Scientific American.

Giants.

Some have an opinion that the race of man has degenerated in size and that the work of degeneration is still going on gradually from generation to generation. All barbarous nations have this belief. It is handed down to us in the songs and tales of old and not a few believe it now. The Scriptures make mention of Giants—" the sons of Anak," and " the mighty men of old." Both Homer and Ossian embellish their poems with the terrible size, appearance and strength of giants, but there can be no doubt that they did so to elevate their heroes who vanquished huge warriors as " tall as a pine," in personal conflict.—There can be no doubt too that in the ancient mode of warfare, that strong men had every advantage over those of less size and strength and therefore it is to be expected that they were always more conspicuous, hence the frequent allusion in heroic poetry to men of great strength—giants. It is our opinion, however, that there are just as many giants in the present day in the world as there were at any other age. If from the creation—or the fall of man—our race had been steadily degenerating in size, there would no men be found over five feet high at the present day. Any person who has seen an Egyptian mummy knows full well that a race of men who lived and were distinguished three thousand years ago, were not so powerful either in bone or muscle as the Anglo Saxon, neither were they so tall.—There can be no doubt but that strong, healthy parents will beget strong, healthy children, but we have sometimes seen the reverse, although the reverse was the exception to the constitutional law. And in regard to the Giants of olden time, they were the exception, not the rule of common generation. We do not believe all the old accounts of giants and the huge skeletons of men dug up here and there in various parts of the world. We have seen an account of two skeletons dug up in Sicily, one in 1516 and the other in 1548.—The one was thirty feet long with a head the size of a hogshead and each tooth weighing nearly half a pound. The other skeleton was thirty three feet long. In all likelihood these skeletons were those of animals of a species unknown to the Sicilians and they invested them with the pomp of a *deceased giant.*—We have seen two cases of the same kind dispelled, most disagreeably too, by a naturalist. In a rural district, parts of two skeletons had for a great number of years been looked upon as the frame work of mighty ancient men A friend of ours journeyed thither one day and discovered some of the bones of an antideluvian elephant.

In the last number of the Scientific American there was an account of a Mr. Hales of England, who is represented to be more than eight feet high We have no doubt there are hundreds of men in the world at the present moment of more than seven feet in height.—Yet it is no advantage to any man to be tall, in fact it is rather a detriment. We have never seen a man that weighed more than 300 pounds equal in strength to two men of 150 pounds each. Five feet nine inches is the best height for a man and we generally find that men of this height, if they labor at a healthy and laborious occupation, are more active, stronger and hardier than men of any other size, either above or below this measure. The writer of this has paid considerable attention to the subject and his own stature is very far from giving a biassed opinion, but he believes after much study and observation on this subject, that the last age of the world will find men " in stature and in soul as large" as was our first progenitor. G. R.

New York. May 3, 1848.

For the Scientific American.

The Atmosphere.

The atmosphere is an ambient mantle which wraps the earth in its soft embrace. Its direct height from the surface of the earth is calculated to be fifty miles, or the 166 proportional altitude to the diameter of the earth. The weight of the whole atmosphere which surrounds the earth, has been calculated by some one fond of curious comparisons, to be equal to a solid globe of lead sixty miles in diameter. The air can be weighed as well as solids and likewise measured. It is essential to the life of man, animals and vegetables. Without air no creature could breathe. Air is every where present upon the globe and bears upon every part of its surface with an enormous pressure. Every square inch of the human body continually supports a pressure of 15 lbs. A great number can scarcely credit this, as every step we take must displace an equal weight as that supported by our bodies. But we can scarcely say we support this weight, as we are supported by it ourselves equally on all sides, and we move through it as easily as the dolphin glides through the waters of the deep. Each gallon of air weighs about a quarter of an ounce.

Air is capable of being contracted or expanded in bulk both mechanically and chemically. It can be condensed by pressure and expanded by heat, and its latter quality is just beginning to be developed as a powerful propelling agent in the Air Engine. Although the atmosphere is such a beautiful and transparent substanoe, yet it is not a simple substance It is composed of two gases perfectly opposite in their natures singly. The one gas is named oxygen and the other nitrogen. The oxygen is positive in all its qualities, the nitrogen is negative. The heating and cooling of the atmosphere will not affect the quality of the air, but combustion will. Combustion withdraws the oxygen from the atmosphere and carbonic acid gas is liberated. The oxygen alone supports flame, the nitrogen is a non-supporter. The atmosphere is composed of 79 parts nitrogen and 21 parts oxygen, and although many gases have been discovered and combined, yet no other combination and no single gas will sustain life for any length of time but the air, and bountiful is our Creator who has supplied our earth with such a quantity of it.

The act of respiration is curious. By it a decomposition of the atmosphere is effected as thorough as by the most trying process. The human frame is like a great furnace, and the lungs the bellows which feed the fire. The great difference between the comparison is that the human frame is in the interior of the bellows. A man breathing consumes six hundred and forty pints of oxygen gas in twelve hours making fourteen thousand four hundred inspirations, and during the short time that elapses between an inspiration and an expiration the air is totally changed in its character —the oxygen is abstracted and united with the carbon and carbonic acid gas is formed and this is expelled from the lungs with the unaltered nitrogen. The air that is expelled from the lungs will not support flame. If we take a glass vessel with a tube fitted exactly to its top or bottom and in inspire and expire a few times by the tube, it will be found that a lighted taper introduced into the vessel will be immediately extinguished. This simple fact should arrest the attention of those who desire to see health attending the laboring classes. Well ventillated apartments are just as essential to health as food and drink.

There is one mysterious view which we may take of this subject, viz. the renovation of the air after being breathed by myriads of animated beings who are continually consuming its vital principle. The plan which the Almighty has designed for this purpose (renovation) is unknown to man. We behold harmony and beauty in the whole system of the adaptation of man to the atmosphere and the atmosphere to man, and in the language of Holy Writ " it is very good."

Centre of Gravity.

The centre of gravity of a body, is that point, which if sustained, the body remains at rest; the particles of which it is composed being equipoised, and having their weights collected, as it were, into that point.

Bodies are reciprocal to each other as their distances from the centre of gravity. Suppose a rod 11 inches long, with a weight of 2 lbs. hung at the one end, and a weight of 20 lbs. hung at the other end, the centre of gravity, or the point on which this rod so loaded, will balance itself, is just 1 inch from the greater weight, and 10 inches from the less, because, 20 X 1 equals 20, and 2 X 10 equals 20; therefore their weights are inversely as their distances from the centre of gravity.—Hence, the method to find the common centre of gravity of any number of bodies, is, first find the centre between two bodies, then the centre between that centre and a third body, and so on for a fourth, fifth, &c.; the last centre found being the common centre of all the bodies.

From the foregoing it will easily be conceived, that if a homogeneous beam is balanced upon a point, that point will be the centre of gravity, and also the centre of the beam; but suppose the beam 10 feet long, each foot weighing 8 lbs , and a weight of 90 lbs. suspended from the one end, at what point of the beam will the centre of gravity be ?

10 feet, length of beam.—8 lbs. each foot in length. 90 lbs. weight suspended.

$$\frac{8 \times 10 + 2 \times 90}{8 \times 10 + 90} \times \frac{10}{2} = \frac{260}{170} \times 5 = 7.65$$

$+2.35 = 10$ feet length of beam,—that is, the centre of gravity is 2.35 feet from the end at which the weight of 90 lbs. is suspended, and will be 7.65 feet from the other end.

Suppose another homogeneous beam, 12 feet long, with a weight ot 100 lbs. fixed at one end, it is found that the whole is in equilibrio, when the beam is suspended 2 feet from the end next the weight; what is the weight of the beam?

100 lbs. weight suspended.

2 feet distance from the weight.

10 feet distance from the other end.

$$\frac{2 \times 100 \times 2}{100 - 4} = \frac{400}{96} = 4.166 \text{ lbs. the}$$

weight of 1 foot of beam, and $4.166 \times 12 = 49.992$ lbs., the weight of the beam.

It is well known to every practical Mechanic, that there are no homogeneous beams or bars :—that it is impossible to find the weight of a foot of length, in a piece of wood, iron, stone, &c., and that the exact centre of gravity of such materials cannot be found by any known theorem. To obviate this difficulty, and ascertain the true centre of gravity, the beams, bars, &c. are balanced over a prop; but there are many large unwieldly bodies that cannot be thus treated, and for this reason the following data are given, which ascertain nearly the centre required; the data being taken, which are nearest the form and distribution of weight over the body, of which the centre of gravity is required.

1. The centre of gravity of a triangle is in the straight line, drawn from any angle to the bisection of the opposite side, at the distance ot two-thirds of that line from the angle.

This rule is also true with regard to a pyramid of any number of sides; also to a cone.

2. The centre of gravity of a segment of a circle, is in the radius which bisects it; and its distance from the centre of the circle, is one-twelfth of the cube of its cord divided by the area of the segment.

3. The centre of gravity of a sector of a circle is in the radius which bisects it; and its distance from the centre of the circle, is a fourth proportional to the arc, its chord, and two-thirds of the radius.

The Journeyman mechanics of Philadelphia have formed an American Fraternization and Copartnership Association, the object of which seems to be the abolition of silver and gold currency, and the introduction of the Afridan and Asiatic system of barter.

A French surgeon has discovered that the bark of *Andansonia digi ata* is more efficacious for fevers than *quinine.*