Motion.

BY B. F. STICKNEY.

No. 4.

We have endeavored to show in former numbers, that there is a universal fluid, first among created things—placed by the Author as a main-spring and regulator, to the whole. We have learned to apply it to our uses in a few cases. The navigator and land surveyor use it to guide them on their course; and Morse and others use it to converse at a distance, calling it magnetism. We make use of common light and heat in various ways, calling it solar light, and solar heat. We have got the art of bringing this fluid into action in the form of combustion; and apply it to our ordinary domestic uses. And under the names of Electricity and Galvanism, the general philosopher and physician make use of it; and some venture to call it nervous fluid. The old philosophers made a machine, that by giving a circular motion to a glass cylinder, they produce a friction by which they put this fluid in motion, upon a very small scale. But it served to show a very important principle of its action—it showed that by friction this fluid could be put in motion, and conducted into glass jars; that by such means miniature thunder and lightning can be produced. Physicians in their practice, make use of friction in a very moderate degree, and some report favorable; but not tracing back from effect to cause, and not understanding the cause, or mode of operation, they rarely if ever, do it in a proper manner, or to a sufficient extent. Although physicians will tell you, that if a young person sleeps in the same bed with a very old one, that the young one is injured in health and strength, to the benefit of the old one; without making much inquiry into the cause. They do not appear to to be aware that the nervous or universal, and invisible fluid, is passing continually from one person to the other. Now, suppose we apply this principle. Suppose a very common case—we will suppose a very highly inflamatory case. The physician uses depletion and sedatives to allay the fever. Of a sudden the inflamatory is changed to a typhoid case—a congestion has taken place. Now what should be done? I answer, that I would apply the principle above mentioned, that the fluid is always passing from the stronger, to supply the weaker, or always pasing from a body positively charged, to one negatively charged, when in contact, or nearly so. If I had it in my power, I would select the strongest men, or in other words, those having the most positive charge of the fluid, and as many as could act upon the patient, with most violent friction, And I would use a stimulating liquid, to the surface so far as to avoid abrasion to the skin (common pepper-sauce and brandy) and I would use very freely tonics and stimulants, by the mouth. I have applied this mode of practice, from thirty to forty years since, with unvarying success. There are witnesses living in this neighborhood, who have seen the success of my practice in this manner.

The foundation of our theory, in this respect, is, that all inflamation or fever, arises from such a derangement of the animal economy, as to prevent a proper motion or circulation of this vital fluid. And a cause behind this, may be, an unfavorable proportion of the elements composing the atmosphere; the most unfavorable of which, probably is, the carbonic acid gas; there being a great affinity between this gas and hydrogen gas; and the former being the heaviest of the gases, and the latter the lightest. Both of the gases, being present, the hydrogen gas will take on a considerable load of the carbon, and yet maintain a sufficient levity, to be raised an hundred or more feet. We conceive that when carbon considerably prevails, Cholera asphyxia, will be the consequence, and when hydrogen prevails, it is what is commonly called malaria; and produces the ordinary inflamatory diseases.

[This concludes the articles of B. F. Stickney Esq. of Toledo, Ohio, on the nature, causes and effects of motion. The articles have no doubt been very interesting to many of our readers, as they are very practical and display a great amount of keen observation and personal experience.

Water Wheels.

MATTEAWAN, June 28, 1849.

MR. EDITOR.—The present calculations are on the large overshot water wheel now building at Paterson, N. J. The object is to show the power that would be lost if the site was divided into two falls, that is, having two wheels, each about half the diameter of the present one.

The wheel being 66 feet in diameter, the whole fall must be 69 feet. The circumference of the wheel is calculated to run 6½ feet per second. The buckets are 6 feet long, and 13 inches deep. The wheel will produce its maximum effect where the water is 5 inches deep in the buckets (on the top of the wheel.)

In this case the power of the wheel will be 124 14-100 horse, which appears from the following formula.

$$H = \frac{v \times a \times F \times w}{c}$$

The letters represent the initials of the several elements involved in the formula (v) equals the velocity of the water at the centre or magnitude. The theoretical power due to the quantity of water which the wheel will receive per minute is 124 14-100 horse and the per cent of which this wheel is capable of transmitting will appear in the following calculation.

The whole fall is 69 feet or 828 inches.

Allow 10 inches for clearance below the wheel, then 10 inches of the whole fall will be lost or $\frac{10}{828}$ of the whole fall, or : .012

Allow two feet for the head which acts on the wheel by percussion, hence 2-3 of the effect is lost, or 16 inches lost, or $\frac{16}{828}$: : : : : .019

The water will begin to empty from the buckets at about 6 feet from the bottom of the wheel, which gives a medium loss of nearly 36 inches or $\frac{36}{328}$ or : .043

The depth of the water in the buckets on the top of the wheel will be 5 inches, the buckets are 13 inches deep; then 5 from 13 leaves 8, half of 5 is 2½, which gives 10½ inches lost or $\frac{10\frac{1}{2}}{828}$ or .012

The velocity of the wheel is 6½ feet per second (or water) nearly, the theoretical velocity due to 69 feet head is 66 feet per second nearly, hence $\frac{6\frac{1}{2}}{66}$ loss by velocity of wheel, or : : .110

Showing a loss of nearly 20 per cent, .196

Now if the site should be divided in two falls each 34½ feet they would require wheels 31½ feet in diameter It can be shown by a calculation similar to the foregoing, that each of these wheels would suffer a loss of 30 per cent—all the elements being the same in both cases, hence the large wheel gains 20 per cent over the two.

It was shown that the theoretical power was 124 14-100 horse; deducting 20 per cent gives 99 horse power nearly, which the large wheel transmits. The theoretical power of each of the small wheels is 62 horse, nearly,—deducting 30 per cent gives 43½ horse power nearly, or both wheels transmit 87 horse power, showing a difference of 12 horse in favor of the large wheel. It can be shown by a calculation that if the buckets were 14 feet long and the wheel ran 3 feet per second, it would transmit 92 per cent of the whole power, All the various kinds of turbine wheels, are subject to the same kind of investigation, many of which involve numerous radical errors.

C. E. L.

Nitrogen and Some of its Applications.

The nitrous oxide, or laughing gas, is best obtained by the decomposition of nitrate of ammonia by a spirit lamp. The nitrate is put into a retort or flask; the heat is then applied so as to raise its temperature to about 400° Fah., but never above 420° for above this heat nitric oxide would be evolved. The gas if it be intended for inhalation, ought to be quite pure; but as the nitrate of ammonia is sometimes adulterated with hydrochlorate of ammonia, the gas obtained from such adulterated nitrate would contain chlorine. It is, therefore, absolutely necessary to purify the gas before it is inhaled, by passing it, first through a bottle containing a weak solution of nitrate of silver, which will absorb the chlorine, then, collecting the gas over water containing protosulphate of iron in solution which will absorb any nitric oxide that may have been formed by the application of too great a heat. The decomposition that takes place, during the above process is a beautiful illustration of the power which heat possesses (in some cases) of resolving certain compounds.

Nitric Oxide is a gas which is evolved when certain metals—copper for instance—are being subjected to the action of nitric acid. This gas is colourless and not acid; but on coming in contact with the atmosphere, it unites with one or two more atoms of oxygen and forms hyponitrous or nitrouse acid in proportion to the facility with which it meets with oxygen. Both the above compounds are extremely injurious when taken into the lungs: thus, it is necessary that in all cases where any considerable quantity of nitric acid is being employed for dissolving metals, &c., the gases evolved should not be allowed to escape into the laboratory or workshop. Nitric acid is a most important compound on account of the facility with which it imparts oxygen. It acts on most animal and vegetable substances, and mutual decompositions ensue; oxalic malic, and carbonic acids are the most common products of these decompositions; and the nitric acid is at the same time reduced to the state of nitric oxide, by the abstraction of its oxygen. Fatty matter, ammonia, and hydrocianic acid are also sometimes formed.—From the remarkable property of tinging animal matter yellow, nitric acid is employed in the production of yellow patterns upon coloured woolen goods. It is used in fumigations to destroy contagious and infectious matter, in those cases where chlorine would injure if used for the same purpose. When employed for this object, nitrate of potass and sulpuric acid are mixed in a saucer; and sulphuric acid decomposes the nitrate of potass, and nitric acid is evolved: this decomposition may be aided by the application of a gentle heat. It is not, however, generally so effective as chlorine. In pharmacy, and a variety of other processes, it is susceptible of many interesting applications. It is used for etching on copper and steel: in this process, the steel or copper plate previously burnished, is covered with a varnish compound of virgin wax, 4 parts—asphaltum, in powder, 4 parts—black pitch, 1 part—Burgundy pitch, 1 part. The wax and pitch are first melted, and the powder asphaltum added by degrees; the whole is to be boiled gently till all the ingredients are thoroughly incorporated. When sufficiently boiled, the varnish must be allowed to cool until it has almost acquired solidity, then poured into warm water, when it may be moulded with the hands into any required shape. The varnish is thus applied;—the plate is heated over charcoal, a stick of the varnish is then applied until a sufficient quantity has been melted on the plate, then by inclining the plate in different directions, the varnish may be made to flow evenly over the surface; should too much heat, however, have been employed, the varnish will become filled with air bubbles—In this case, the varnish must be dissolved and another coat applied until it assumes, when cold, a bright and smooth surface. The thick lines of the intended picture are traced through this varnish, the plate is dipped for a few seconds in dilute nitric acid, which eats into the plate only where the varnish has been scratched off, then washed in water; and the next in order of the thick lines are etched out through the wax—the dipping in the acid, and the washing are again repeated, and thus the work proceeds until the finest lines are arrived at. Thus those lines which were first traced out, having been so many more times subjected to the action of the nitric acid, will be as many times deeper etched into the plate than the fine lines; and thus the proper effect is ultimately imparted to the picture or engraving. Nitric acid is the solvent most frequently used for dissolving metallic compounds in the process of analysis. In medicine it is prescribed in doses of a few drops in a glass of water as a tonic; and in surgery as an energetic caustic. In the event of a bite from a rabid animal, if immediately applied to the wound, there is every reason to believe that it will destroy the poison, and prevent those fatal consequences otherwise likely to ensue.

Animal Heat.

"Billing in his first Principles of Medicine' says that heat is extricated all over the frame—in the capillaries by the action of the nerves during the change of the blood, from scarlet to purple venous, and also while it is changing in the lungs from purple to scarlet.

There is a perpetual deposition by the capillary system, of new matter, and decomposition of the old, all over the frame, influenced by the nerves. In other words, the galvanoid or electroid influence of the nerves, which occasions these depositions and decompositions, keeps up a slow combustion. In this decomposition, there is a continual disengagement of carbon, which mixes with the blood, returning to the heart at the time it changes from scarlet to purple. This decomposition, being effected by agency of the nerves, produces constant extrication of caloric. Again, in the lungs, that carbon is thrown off and united with oxygen, during which operation the caloric is again set free; so that we have, in the lungs, a charcoal fire constantly burning, and, in the other parts, a wood fire,—the one producing carbonic acid gas, the other carbon the food supplying through the circulation, the vegetable or animal fuel from which the charcoal is prepared that is burned in the lungs. It is thus that the animal heat is kept up; while on the other hand, the evaporation of perspiration keeps the surface cool; but, in high fevers, where this is deficient, the body gets too hot, and in low grades of fevers, when the nervous influence is not sufficient to keep up the full fire, the surface gets cooler than the natural standard.

This is peculiarly evident in the beginning of eruptive fevers, as scarlatina, where there is a strong heat with the arterial color of the skin; but, if the same becomes malignant and low, with deficient arterialization, the the temperature sinks, and the diminution of the charcoal combustion in the lungs is evinced by the dusky color of the skin, showing that the carbon is not thrown off as it ought to be; and the same phenomena take place in typhoid fever.

Economy of Chemical Discovery.

For a considerable period, chlorine vapor was one of the greatest nuisances to the manufacturer and to the neighborhood, blighting vegetation for a great distance around the work. Enormous sums were spent in erecting gigantic chimney stacks, such as those of the Messrs. Tennant, near Glasgow, Scotland, where one of the largest rears its head fully one hundred feet higher than the top of St. Paul's Cathedral. Its occupation has gone, with the advance of chemical knowledge; and it now remains a huge monument to the ignorance of the past. In other cases the muriatic acid was let off into the common sewer, and glad where the manufactures to get rid of their acid and troublesome product in this quiet way. But now that muriatic acid has entered from its proper chemical relation with the arts, it is as carefully preserved and retained as it was formerly dismissed.—Various plans exist by means of which it is collected and reduced from the gaseous to the liquid form. The most common of these is, to conduct the vapours which rise from the decomposing salt into flues, which terminate at the bottom of a tower or chimney filled with flints or coke. A number of minute jets of water play on the coke at the top of the chimney, and the fluid gradually filters down meeting in its course the ascending noxious vapors. These become immediately condensed, and the liquid percolating to the bottom, there enters a tunnel and is conducted into a receptacle, now in the form of liquid hydrochloric or muriatic acid.

Here we have a case by which the People of Pittsburgh and those of other places where they burn bituminous coal, may profit. The smoke nuisance may get thus converted into a profitable manufacture.