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Improvements in Steam Navigation.

During the past week, we have been led to examine a new system of steam propulsion, devised by Capt. H. Whittaker, of Buffalo, N. Y., which is at once bold and original. It consists in applying one or more screw propellers to both sides of vessels, and driving them with short stroke, high pressure engines, with direct application to the cranks on the shafts of the screws. The models which we examined were mounted with locomotive cylinders, set inclined, and transversely to the length of the propeller shafts, to which their rods were connected by straps exactly as those of locomotives are connected to their driving wheels. By employing strong and capacious cylinders of short stroke, and connecting their piston rods directly to the cranks of the propeller shafts, a high velocity can thus be obtained,without intermediate gearing. Two or more cylinders may be yoked to one propeller shaft, and the number of engines and propellers (three or four sometimes on one side) are designed to be increased according to the size of the vessel. The plan is simply the applying to steam propellers in water, the same principle that is now employed on railroads. No one will dispute the simplicity of the method over that of the complex and massive marine engines in common use. That the machinery can be made strong and solid enough to accomplish the object, no one will dispute. Capt. Whittaker also designs to exhaust his steam into a large fresh water tank in the lower part of the vessel, which will thus be converted into a huge surface condenser. The object sought to be accomplished by this, is to use fresh water for ocean navigation, and to save as much heat as possible; there is, no doubt, a great loss of heat in common marine boilers, caused by repeated blowing out of the brine water, also by scale accumulating on the plates.—Any safe plan for obviating such losses deserves attention. Capt. Whittaker is an old and experienced commander on our upper lakes, and during the past year his improvements have been applied, on Lake Erie, to the steamboat *Baltic*, which had run for six years previously with paddle wheels. The old engines were taken out, and two short stroke, high pressure engines put in, and the screw propellers placed where the paddle wheels had been—the shafts and upper lobes of the propellers being above the water.—This new plan of propulsion enabled the *Baltic* to carry two hundred tuns more cargo, and to run with an increased speed of four miles an hour, and all this with a great saving of fuel. As the only way of proving the economy of any invention is by fair and continued trials, here we have this new plan of steam propulsion already submitted to this test,and with success. It has always appeared to us that the stern of a vessel was the wrong place for the screw. No good reason can be given why it should be placed there any more than a paddle wheel, and we cannot but believe, that a screw placed on each side of a vessel, with the same power applied, will propel a vessel with greater steadiness, and much faster than with one screw in the stern,—the common method of serew propulsion. We are aware that it is no new proposition to apply screw propellers to the sides of vessels, but this in combination with the method of driving them, as has been done by Capt. Whittaker, is original. It would be a strange thing if a revolution in ocean propulsion were effected by our inland navigators. We understand that semi-submerged propellers, on account of their economy and speed, have driven off, within the past four years, nearly all the paddle wheel steamers from our upper lakes. This is something which should arrest the attention of our marine engineers, and they should investigate the causes.

We are among the number of those who believe that we are far from having arrived at perfection in steam navigation, and this new plan, we must say, has made a favorable impression on our mind. We, however, dislike the noisy, puffing, high pressure engine, on a steamboat, and have a partiality for the low pressure condensing engine for ocean navigation. The simplicity of the former, however, as applied by this new method of steam navigation, has much to recommend it, and we would really like to see it, as proposed, applied to some of our steamships.

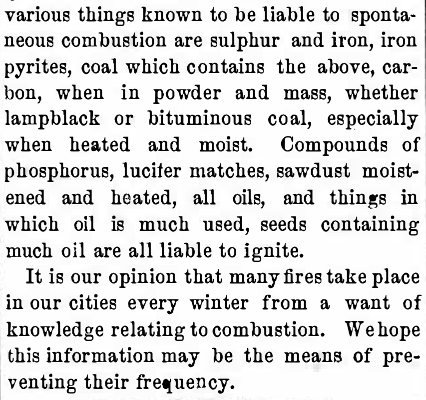
Combustion and Fires.

The fire which burns in a grate or stove, and which spreads its cheerful and life-sustaining warmth around, affords a subject for deep reflection and scientific study.—It has been said by one philosopher that "a knowledge of fire—to generate and maintain it—makes all the differencc between man and brute." This thesis, curious though it be, contains a great deal of truth. Just let us ask the question, "what would man be without fire?" and we will at once perceive in searching for an answer, that it lies at the foundation of all art. Without it there would be no instruments forged, consequently no houses built, and man would be no better off than the wild beast of the jungle. With fire, metals are smelted, and instruments for agriculture, architecture, and the arts fabricated, and upon these are based all that is useful and ornamental in physical science. And what is fire? Simple though the question is, it is not so easy to answer it, and like all other propositions in philosophy, we must be content to describe its *operations*, for that is all which we call *laws*. Fire or combustion is produced by a change of state, or condition of two or more bodies, during which period heat is produced by the substances undergoing change. There are three kinds of combustion, viz., instantaneous, high, and low. The former is witnessed in explosions; the second in common fires, and the third in the human body, the oxydation of metals, &c. Everything capable of combining with oxygen is called combustible, and according to the rapidity with which it combines with oxygen, so is the combustion quick or slow. Common gas which we use in cities, burns with a high heat, but not very fast, and will not explode when a light is applied to it, but if a certain quantity of it be mixed with seven times its volume of the atmosphere, it will explode instantaneously when touched with a match. In gunpowder we have the same elements as gas—for instantaneous combustion—but in a solid state. Iron, when rusting,—oxydizing—developes heat, but this is not noticed, the action being slow, and the heat dissipated as fast as it is formed. But if *pure* iron be reduced to fine powder, and thrown into the atmosphere, it will fall down in sparks and burn at a glowing heat. If it were not for this quality of iron—its readiness to combine with oxygen, and thus burn slowly away, by the action called rusting—it would be more valuable in the arts. It is no doubt the most valuable of all metals as it is, but could it be improved as not to rust and still maintain its qualities of forging and tempering, its value would be greatly enhanced. The amount of heat produced in any body by combustion, depends on the relative quantity of oxygen absorbed in a given time. Boiled linseed oil absorbs oxygen with great rapidity—about eight times its bulk in twelve hours, hence articles saturated with this oil are liable to spontaneous combustion. A substance which, by its nature, is known to be combustible, that is, has a great affinity for oxygen, combines with it fast or slow according to the heat of one or both of the substances. Thus with anthracite coal, although it is a combustible substance, it will not produce combustion in contact with oxygen until it is exposed to a high heat, and every person knows that the higher the heat to which it is exposed, so much more rapidly does combustion go on. Ships containing bituminous coal have been consumed by spontaneous combustion in warm climates, but seldom, if ever, in cold. Cotton waste, saturated with boiled oil, will undergo spontaneous combustion at 120°, in about forty minutes, and from this cause, many factories have taken fire. Wood, in contact with hot water pipes, at 160°, has taken fire. Watchfulness against fires, therefore, is more imperative in warm than in cold apartments. A difference between 50° and 110°, trebles the tendency of painters' oil to ignite spontaneously. A piece of phosphorus, if placed on a plate of iron, will oxydize, without burning, because the iron conveys the heat away as fast as it is formed, while on the other hand, if it be put among some cotton wool, it will very soon ignite, because the cotton does not dissipate, but accumulates the heat, and produces an increasingly energetic action.

For spontaneous combustion, the following conditions are necessary:—1. A substance capable of uniting with oxygen with considerable vivacity, (or others capable of uniting together.) 2. A supply of oxygen. 3. A comparatively large absorbing surface. 4. Sufficient mass to prevent the heat formed from being readily dissipated; or a constantly sustained heat from 70° to 212°. The various things known to be liable to spontaneous combustion are sulphur and iron, iron pyrites, coal which contains the above, carbon, when in powder and mass, whether lampblack or bituminous coal, especially when heated and moist. Compounds of phosphorus, lucifer matches, sawdust moistened and heated, all oils, and things in which oil is much used, seeds containing much oil are all liable to ignite.

It is our opinion that many fires take place in our cities every winter from a want of knowledge relating to combustion. We hope this information may be the means of preventing their frequency.

Stereoscopic Medallion.



The annexed figure is a perspective view of a very neat and ingenious application of the stereoscope to daguerreotype medallions. A patent for this improvement was granted on the 16th of last month, to J. F. Mascher, of Phila.—who is well known to the readers of the Scientific American—for a number of useful inventions. C is the main central rim of a locket; B B are two lids with daguerreotype pictures, E E, on them; these lids are hinged on each side of the rim, C. A A are two supplementary lids, each containing a lens, D D. These are also hinged to rim C, as shown, but are fitted to fold within the picture lids, B B, and are arranged in such relation to the same, that upon being opened and properly adjusted, the lenses, D D, will stand opposite to the pictures, and convert the medallion into a stereoscope, by which a person looking through the glasses, D D, will see but one picture, solid and life-like. The patentee has applied double convex lenses to these medallions—the sides of which are of unequal convexity (as one to six)—according to Brewster, so that the picture is rendered very clear. A medallion of this character can be used for a microscope and sun glass, and thus it can be carried around in the pocket, both as an ornamental and useful memento of affection.

More information may be obtained by letter addressed to J. F. Mascher, No. 408 North Second street, Philadelphia, Pa.

Manufacture of Stone.

We have seen during the last week a very fine sample of artificial stone, of an ornamental character, manufactured on Coney Island, near this city. The stone is made of sand clay, and common salt, cheap materials, and found in great abundance and purity where the factory has been established. The manufacture is the subject of a patent granted to J. Hornig & L. Seuss, on June 7th, 1853, the claims of which will be found on page 318, Vol. 8, Scientific American. Mr. Seuss, who showed to us the sample of artificial stone, stated that it had been tested by exposure to the atmosphere, in water, and to a crushing force, and had stood all these tests well. It has not only all the appearance of fine sand stone, but it is in reality such, and it appears to us that for ornamental architecture, it must come into extensive use, as it can be manufactured much cheaper than rock stone can be cut.

A Scientific Error Corrected.

In all recent works on comparative physiology, the dogma has been propagated that existing osseous fishes have heterocercal tails in their embryonic state (tails with the upper lobe longer than the lower one while young) which disappear as they are matured, their tails becoming homocercal—that is, the upper and lower lobe of the tail equally developed, the earlier fishes being heterocercal. Agassiz has pointed it out as a law, that the modern fishes, at one part of their existence, are heterocercal, but change in their mature state to the homocercal. This dogma has been seized upon by the developement theorists, and used with some effect. In the last number of the *Westminster Review*, the fallacy of this dogma is pointed out, and Agassiz is severely criticised for carelessness. It is there stated that this theory was adopted from the memoir of M. Vogt—a German physiologist—on the developement of one of the salmon tribe. He, along with Agassiz, jumped to the conclusion without an examination, that all homocercal fishes were developed like the salmon. The reviewer asserts that the anatomical structure of the tail of the perch and mackerel—homocercal fishes—is not the same as the salmonoid tribes, but that they are homocercal from the first, and always remain so. The reviewer also asserts, that the heterocercal tail in fishes is an advance in developement, therefore, as the earlier fishes have heterocercal tails, the argument is a strong one against the progressionists, who insist that the homocercal tail is a developement of the heterocercal.

The Polytechnic Journal Gone.

In the last number of the above named Journal, the editor, J. J. Greenough, Esq., informs his patrons that it will be no longer published. This Journal was commenced two years ago in this city, by J. J. Greenough, Dr. C. G. Page, and C. L. Fleischman. High hopes were entertained of its success when first published. Mr. Fleischman is now in Paris, Dr. Page in Washington, and Mr. Greenough has concluded to stop its publication. It is a very difficult task to manage and conduct a periodical devoted to science and the arts. The *Polytechnic Journal* contained much useful information, and we regret to see its light so early extinguished.

Electro-Plating Applied to Cutlery.

The improvements which have been made in the art of electrotyping, and the diversity of purposes to which it is now applied, almost surpass belief. It is used to make plates for printing bank notes, maps, common printing cuts, and type; also plated ware and many other things. One of the most useful applications that we have seen of it lately, is its application to table cutlery, by Joseph Hill, Electro-plater, No. 159 Atlantic street, Brooklyn. The utility of silver plating table cutlery, is the prevention of rust; the articles afterwards never require to be scoured, and have only to be wiped dry with a towel or buckskin after use, and always look bright and clear. We understand that a number of the leading hotels of our city have had their cutlery electro-plated, and have effected a great saving thereby.

Muntz Metal Tubes in Boilers.

In the last number of the London *Artisan*, a correspondent who had read R. Armstrong's letter on Muntz metal for bolts and sheathing, directs attention to their extensive use in steam boiler tubing. He confirms the statements respecting the brittleness of the brass bolts and sheathing.