STEAMSHIP PROPULSION.

A paper read before a late meeting of the Scottish Shipbuilders' Association, in Glasgow, by Orme Hamilton, contains some very useful practical information. He states that for ocean navigation the screw is the best propeller, but that its chief defect consists in a very wasteful expenditure of power when the vessel encounters head winds. In such cases the water appears to be screwed through the propeller instead of the ship being propelled through the water. In those winds, the paddle-wheel is the most economical propeller. In head seas, during adverse winds, screw engines churn away almost at their full velocity, and the consumption of coal is always in proportion to their speed. Mr. Hamilton first noticed this in an ocean steamer of 800 tuns, of which he was the engineer. On one occasion she encountered a gale dead-a-head; the engines continued for some time at full speed, when the headway was found almost nothing. They were then slowed a little, so as to hold the vessel, and thus it was kept in the same spot for about four days. The wind then veered a little, when the engines were increased in speed, and the vessel went forward, making very good time. "It, instead of trying to force a head wind," says Mr. Hamilton, "or holding our own merely until the wind veered, we had gone about two points off the wind, we should have been making a fair passage all the time, instead of wasting both time and coal." This is very usful information to every engineer in charge of screw engines.

In head seas the propeller is liable to be raised out of the water when in the trough of the sea. This causes the engines to *race* in the same manner as those of paddle-wheels, when the latter are raised out of the water. To remedy the evil of racing, Silver's Marine Governor is the most convenient and common instrument that has been applied, but a very simple expedient, in the absence of a governor, was adopted by Mr. Hamilton, which may be of great service to other engineers in like circumstances. While on duty in the south Pacific, in order to save harassing toil consequent upon attending the engines in a heavy head sea, he suspended a weight in a convenient part of the engine room, and confined it in guides, to oscilliate freely fore and aft, but not athwart ships. This weight was connected with the throttle valve lever, and when the ship pitched so as to throw the propeller out of water it operated the oscilliating weight, and throttled the steam. This device not only regulated the speed of the engines in a head sea, but also effected a saving of fuel.

The weight of the machinery in a steamer is of vital importance, and Mr. Hamilton suggests that efforts should be made to obtain lighter, more compact and stronger engines. The very best materials only should be employed; cast-iron should be discarded as far as practicable in all cases, and steel should be substituted for wrought-iron. The weight of marine screw engines may be reduced 25 per cent by using the best materials, and engines of equal or greater strength may be obtained. Taking a piston rod of steel and one of wrought iron of equal dimensions, the former is about 60 per cent stronger. If piston-rods, cranks, shafts, &c., were made of steel, instead of wrought iron, the weight of the machinery could be greatly reduced without impairing the strength. This is a subject which deserves the attention of all builders of machinery. There can be no doubt but a great reduction in the weight of most machinery may be effected by substituting steel for iron.

DOES THROWING WATER ON FIRE INCREASE THE HEAT?

This subject has been for some time attracting a good deal of attention throughout the world, as it has an important bearing on the burning of wet fuel, on the economy of water gas, and other industrial applications; while it possesses peculiar interest from its relations to one of the great laws of chemical physics.

We have received a letter from a scientific correspondent in Providence, requesting us to give our views of the subject, and this we will endeavor to do in a way to make them intelligible to the mass of our readers.

An atom of water is composed of one atom of oxygen, which we will represent thus, o, and one atom of hydrgen, twice as large, though only one-eighth as heavy, which may be represented by a large O; the atom of water combining the two, Oo.

Now, if water, heated to a certain high temperature, is brought in contact with charcoal (carbon) at the same temperature, it is decomposed; one atom of the oxogen, o, combining with one atom of carbon, ⁕, to form carbonic oxyd, ⁕o, and the hydrogen being set free. Both the carbonic oxyd and hydrogen take the gaseous form, and they are both highly combustible. If the hydrogen is brought in contact with oxygen—heat being present—it is burned back into water. Under the same conditions, carbonic oxyd is burned into carbonic acid; each of its atoms, ⁕o, taking on another atom of oxygen, o⁕o—CO becoming CO_2.

This burning of the gasses generates heat, and the question is whether more heat is generated through the decomposition of the water and its subsequent reformation, than would be generated by the simple combustion of the carbon, without the intervention of the water.

Prof. B. Silliman, Jr., in a paper on "the burning of wet fuel in Thmopson's furnace," read before the American Association for the Advancement of Science, at its last meeting, and since published in *Silliman's Journal*, takes the ground that a surplus of heat is thus produced. The last number of the London *Chemical News* also takes the same position. In an article on the recent great fire in London, the editor says: "Every chemist knows what takes place if a small quantity of water is projected into the midst of a large mass of red-hot combustible matter. It is decomposed in presence of the carbon into carbonic oxide and hydrogen, each highly combustible gasses, (we quote literally,) and thereby tending to increase the volume of flame. This, we are satisfied, was the case with a large proportion of the water which was thrown on during the first few days of this memorable fire."

We have seen numerous attempts to trace the loss and gain of heat through the several chemical changes, but they were inconclusive, from want of completeness in the data. The principal portion of the heat absorbed in the decomposition of water by charcoal is that which is expended in raising the substances to that degree of temperature at which the decomposition takes place. Now, what this degree of temperature is has never been ascertained. Mr. Seely, of this city, supposes that it is about 1800° Fahrenheit, and we see that the engineer of the gas works at Copenhagen, Denmark, after a long investigation of the subject, coincides in this opinion, but we have never seen any account of the temperature having been measured.

But the question is easily settled by reference to the law of the conservation of forces, by a process of reasoning analogous to that which condemns all machines that profess to produce perpetual motion.

The question has reference to two processes of burning charcoal. In one, the coal is burned by the oxygenof the atmosphere, each atom of carbon combining with two atoms of oxygen, and producing carbonic acid gas. In the other process, one of the atoms of oxygen is taken from the air and the other from the water, but then another atom is taken from the air to combine with the hydrogen set free from the water, and the quantity of water produced is the same as the quantity decomposed. In the two cases *the original substances are the same and the final products the same.* And they are *in the same physical condition*, provided the water gives up all of its heat, and returns to the temperature which it had before it was thrown upon the fire. In this case the amount of heat generated must be the same as would result from the simple combustion of coal by the oxygen of the air. But if the water goes away in the form of highly-heated vapor, or in the form of vapor at all, then there must be a loss of heat.

We suspect that both Prof. Silliman and the editor of the *Chemical News*, will change their opinion on a more thorough examination of the subject.

THE NEXT WORLD'S FAIR.—English papers state that the International Exhibition of Industry for 1862 promises to be greater than the first, which was held in 1851. The application now made for space by British manufacturers alone, if all were granted, would require a building three times the size of the one now in course of erection.

Water the Drink for Soldiers.

Mr. Henry Marshall, who was for a long period Deputy Inspector of Hospitals, in the British Army, says:—"By the daily custom of imbibing spirituous potations a new want is created, intemperance is established as a habit, and frequent intoxication is the consequence. The wretched drunkard must now have a large supply of liquor in the morning to recover from the effects of the quantity drank on the previous night. He perhaps has neither money nor credit, and his clothes are then sold at a small portion of their value. Some do not stop here; for, after having sold all their clothes, they will rob their comrades, and with the proceeds of their dishonesty provide the means of intoxication. Confinement follows upon confinement, court-martial upon court-martial, and punishment upon punishment, until the worn-out wretch dies in hospital of the 'horrors,' fever or dysentery; or if he should for a time resist the fatal attacks of disease, his constitution becomes broken down by the combined influence of the poison of spirits, an exhausting climate and repeated attack of illness, so that, in a few years, he is found unfit for further service in India."

The personal experience of Mr. Marshall was decidedly in favor of the superior sanitary effects of water drinking, in hot climates. He says:—"I have myself marched on foot with troops on actual service, in a tropical climate, where the mean temperature is considerably higher than that of Jamaica, without any other beverage than water, and occasionally a cup of coffee. So far from being calculated to assist the human body in enduring fatigue, I have always found that the strongest liquors were the most enervating; and this in whatever quantity they were consumed, for the daily use of spirits is an evil which retains its pernicious character through all its gradations. Indulged in at all, it can produce nothing better than a diluted or mitigated kind of mischief." Dr. Robert Jackson, who was at one time at the head of the medical staff in the West Indies, expresses his conviction that an English soldier, aided by temperance, may be rendered capable of going through the severest military duty in the hottest islands of the West Indies.

Whiskey was unknown among the iron soldiers of Rome, who were the conquerors of the world. Water was their common drink, sometimes modified by weak sour wine, almost resembling vinegar.

Educating the Army---A Good Suggestion.

The following is from a correspondent of the Philadelphia *Ledger*:—

When Freemasonry flourished, and every mason was a working builder or architect, it was a law among them that every ten men were placed under one of their members, who instructed them in the art of building, so that any mason could rise from one class to another, until he attained to the highest honors of his order.

Let it be so with the army. Let the officers and such of the men as are competent, instruct the others, two hours in each day, in the mathematics and such branches as are required in the military profession. This might be made an army regulation. The tone of the army would be elevated, a path opened to talent, and I feel confident that the sin of drunkenness would become one of rare occurrence, for the active mind of man would not drown the noble faculty of intellect in the oblivious draught of the grog shop, when it could find employment in the pleasant paths of knowledge.

Machine to Extinguish the Rebellion.

Our cotemporary, the Philadelphia *Enquirer*, contains the following comprehensive recommendation for putting a speedy termination to the rebellion:—

Our countrymen at large should be encouraged by the government to direct their attention forthwith to the improvement of all sorts of instrumentalities. The records of the Patent Office show that the inventive faculty of the country is in the Northern States. Let our Yankees go to work, and we doubt not but that they will soon be able to turn out some unheard of and undreamed of implement or missile which will sweep our enemies from the face of the earth. Take our word for it, these geniuses will yet produce some patent Secession-Excavator, some Traitor-Annihilator, some Rebel-Thrasher, some Confederate State Milling Machine, which will grind through, shell out, or slice up this war, as if it were a bushel of wheat or an ear of corn, or a big apple.

CANAL STEAM TOWING ABANDONED.—The Buffalo *Express* says that the Western Transportation Company have abandoned the experiment of towing by steam on the canal west from Rochester. It is found that tows of three or four boats are injured by collisions and that a less number does not make towing by steam profitable.