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Contents.

(Illustrated articles are marked with an asterisk.)

BURNING WATER AS FUEL.

It is astonishing how prevalent the notion is that water can be advantageously burned as fuel. All that can be said and written on the subject appears to have no effect, and easily deluded capitalists are always ready to invest in the newest contrivance that comes along for the above purpose. There has recently been a tedious suit in reference to the invention of Moses Thompson for burning wet tan, during which a ponderous volume of testimony was taken and a tangle of scientific evidence elicited that might well stagger the judge on the bench and the practical tanner in his yard, provided any of them have that faith in a long life which must precede the perusal of such an amount of worthless matter. There is the usual array of high sounding names of witnesses who testify as experts, and he must be an exceedingly expert angler after truth who can make out what they are driving at. It is clear that Judge Blatchford did not allow himself to be deluded by these experts, for he knocks the whole crowd off their feet and fires a round shot through the enemy's camp by the following conclusive sentence: "It is apparent from the evidence that Thompson was the first to discover and put in practice the true method of economically burning wet fuels, and obtaining from them better results than from equal quantities of dry fuels," which goes to show that the Judge believed the following claim put forth by Thompson: "The water in the fuel, in the presence of carbonaceous substances in the furnace, will be decomposed, giving its oxygen to the carbonaceous matter, dispensing with the draft and its cooling and wasteful influence, and rendering combustion so perfect that no smoke is visible." We hardly know whether the inventor proposes to shut the water and carbonaceous matter up in a strong box to "dispense with the draft," and, by the decomposition of the water and the re-combustion of the hydrogen, create a perpetual motion for affording heat such as the world never before saw, or not. The science of the proposition is too deep for us, and we cannot blame the Judge for being captivated by it. People will always believe in the perpetual motion whether in mechanics or in combustion, and it is better to join them to their idols and leave them alone. As our readers, however, do not belong to this class, it may be well to let in a little outside "draft" on the laws of combustion by way of ventilating the subject.

The heat required to elevate a given quantity of water one degree is employed as the unit of measurement. The results obtained are called heat units; and as experiments have been tried upon all combustibles and gases and the products have been tabulated, there is no difficulty in obtaining all the information that any one may require on the subject. When it is desig ed to burn water as fuel, it must not be forgotten that it is necessary to convert the water into vapor by the absorption of heat, then to decompose it and burn the hydrogen at the expense of oxygen over again, thus reproducing vapor, which when it escapes, after having passed through all of these stages, must carry away heat as irrecoverable as that blown off through the safety valve of a boiler. There is, therefore, no possible theoretical gain of heat in attempting to pass water through these circuitous processes.

Air-dried wood contains at best a large quantity of the elements of water, and most people prefer to burn the dry article. If the advocates for consuming wet wood were honest in their belief, they ought to keep the wood pile in soak all the time to prevent the disadvantages likely to accrue from the loss of water. During the last fifty years, something like sixty patents have been taken out in the United States relating to water gas in one form or another. The list affords a curious collection of attempts to accomplish impossible results, and it would be a real service to the country if they could be posted up as warnings to ambitious inventors. Sometimes the hydrogen of the water was carburetted by being passed over tar or oil; that is the favorite method with this class of gas inventors. The water must first be converted into steam, then decomposed by the glowing coals, and the resulting hydrogen brought in contact with turpentine or other hydrocarbons, when it is carburetted and ready to burn for both light and heat. Other inventors decompose the water by passing it through iron grates on which are placed the live coals; on closer examination it was discovered that they obtained their hydrogen at the expense of the iron of the grates, and this was pronounced to be decidedly too expensive for practical use. Another apparatus introduced steam through an iron tube; but finding the tube disappear, they substituted a fire clay mouthpiece and were disgusted to find the operation no longer successful. As long as there was any red hot iron to decompose the water, they got enough hydrogen; but when that was removed, the decomposition ceased. In general, the sixty patents were founded upon the principle of burning up some valuable substance, including the furnaces themselves, in order to obtain an apparent gain. They robbed Peter to pay Paul, and had to pay the penalty for such unscientific conduct. In 1850, the world was astonished by the famous water gas patent of Paine, who converted water into hydrogen or oxygen at will, without leaving a trace behind, and whose fame has not yet died out in connection with more recent efforts in the same direction.

This whole business of burning water as fuel is an imposition, fostered by ignorance and encouraged by dishonesty; and it is high time that it should be suppressed.

THE METROPOLITAN MUSEUM OF ART.

The Metropolitan Museum of Art in this city has rented a large and splendid building on Fourteenth street, and will immediately proceed to prepare it for the reception and exhibition of the many rare objects now in possession of the society. The present lease is for eight years, the premises being only intended as a temporary place of deposit and exhibition. The large and splendid permanent Museum is to be erected in Central Park, and will be finished by the time the present lease expires. This temporary opening of the Museum in the lower part of the city is an excellent idea, as it will be conveniently accessible to all classes of our citizens, who will learn to understand and appreciate its importance. Among other curiosities that are to be soon placed on exhibition is the remarkable collection of Chaldean, Assyrian Phœnician and Grecian antiquities, more than ten thousand in number, recently discovered and exhumed in the island of Cyprus by the United States Consul, General Di Cesnola. This is one of the most valuable collections in the world, embracing ancient sculptures, vases, coins and ornaments, of the most elaborate workmanship and rare beauty.

ARE THE PLANETS INHABITED?

The *Evening Mail* contains, under the above head, an argument tending to an affirmative answer to this question; but it is founded more on poetical imagination than on sober truth. The writer says: "Reasoning from analogy, it is hardly possible that such magnificent worlds as are within telescopic inspection, far surpassing our own in magnitude and celestial beauty, are solitary globes, destitute of living forms organized for enjoying as much as we," etc., and he ends with the statement that the spectroscope has demonstrated that the composition of these worlds as to their metallic resources is essentially like that of the earth; and he asks, finally, "why not in all other respects?"

The answer to this question is that in all other respects the conditions required for organic life are exceedingly complex. One of them is a temperature between 32° and 100° Fah., and this condition prevails only on two of the planets, the Earth and Mars; all the others are too hot, and their moons are too cold; at least, it is probable that the moons of Jupiter, Saturn, and Uranus are as thoroughly cooled off as our own moon, which is as totally unfit for the existence of organic life as the tops of our Himalayas. If the spectroscope had not demonstrated that the celestial bodies were compounded of the same elements as our earth, we might perhaps argue that, for other elements unknown to us, another range of temperature might be required for organic life, but the revelations which this admirable instrument has given exclude such a supposition; and as, in connection with the telescope and photometer, it has also taught us that a temperature of 1000° Fah. and upward prevails on all the planets except Mars, the idea that they are all inhabited *at the same time*, is fallacious.

We say *at the same time*; the moon may have been inhabited millions of years ago, when the surface of the earth was as red hot as that of Jupiter is now; and when by further cooling during thousands of centuries our earth will have become desolate, it may be the turn for Jupiter and other planets to become the scene of the most luxurious organic life.

A German saying is: "God works slowly, because He is eternal." No doubt the universe was not created in a hurry; planets have been revolving around central suns for millions of centuries, and according to unalterable laws have their periods of preparation, disturbance, evolution, organization, then their period of full organic development, and finally of decay; it is already, *a priori*, very unlikely that these different periods of their history should exactly coincide, as the planets differ individually and are placed in different conditions; the larger ones must cool slower than the smaller, and those further from the sun faster than those nearer to that orb. Each has its own individuality, its own history, and will go through the different periods of its destiny in its own time, a time so long that our longest historical period is comparatively a mere instant; while it sweeps in its course through spaces so large that all the empires of our earth are comparatively a mere handfull.

THE NEW YORK STATE REWARD FOR IMPROVEMENTS IN CANAL NAVIGATION.

Our readers will remember that in 1871 the Legislature of the State of New York passed a law offering a reward of one hundred thousand dollars to the introducer of a plan, for navigating the Erie canal in this State, which should prove on actual trial, to be better and more economical than the existing method of towage by horses. The following were the chief requirements of the law:

A Board of Commissioners were appointed, consisting of George B. McClellan, Horatio Seymour, Erastus S. Prosser, David Dows, George Geddes, Van R. Richmond, Willis S. Nelson, George W. Chapman, William W. Wright, and John D. Fay, whose duty it was to practically test and examine all inventions that might be submitted to them, by which steam, caloric, electricity, or any motor other than animal power could be practically and profitably applied to the propulsion of boats upon the canals. Such tests and examinations were to be confined to the seasons of canal navigation in the years 1871 and 1872, and the Commissioners were required to demand that the competing inventions should be tried practically upon the canals at the expense of the applicants; that the boat should, in addition to its weight of machinery and fuel, be able to transport at least 200 tuns of cargo, be able to run at a speed of not less than three miles per hour, be easily stopped and backed by its own machinery, which should be simple, economical, and durable, and readily adapted to the present canal boats. Lastly, the law requires before an award is made that "*the Commissioners shall be fully satisfied that the invention or device will lessen the cost of canal transportation, and increase the capacity of the canal.*"

The limit of time for competition for the reward expired with the close of canal navigation last fall, and it may not be uninteresting to make a cursory review of the operations of the various competitors, give an outline of the construction of the boats, and see if we can determine who among them, if any one, is likely to carry off the hundred thousand dollar prize.

We do not intend to give the particular numerical order in which the boats were put upon the canals, but for convenience of reference will designate each exhibit at random. If from this list any exhibitors have been omitted, we shall be glad to be informed, so that correction may be made.

Exhibit 1. Steamer Dawson. Inventor, Thomas Main. This was a common canal boat altered for the purposes of the trial, which alteration consisted in making a concave recess in the bow of the boat, in which a common propelling screw was set. About 20 horses power were employed, 200 tuns of freight were carried, and a speed in excess of three miles an hour, on an average, was obtained, except when detained by lockage. The average running time through the canal was 2·02 miles per hour.

Exhibit 2. Steamer Baxter. An ordinary canal boat fitted with two stern propellers of the ordinary construction, driven by one of William Baxter's patent compound engines. The only peculiarity claimed for this boat was that she was simple, and could be run on less coal than any other boat; and such indeed proved to be the fact. She made two or three successful trips through the canal, and proved to be a useful and economical boat.

Exhibit 3. Steamer Montana. An ordinary canal boat fitted with a single 9 foot feathering wheel encased in a box in her stern. A. H. Brown, inventor. Forty horse tubular boiler, 2 engines 9 × 18, direct action. Burns less than one tun coal in 24 hours. Speed 3½ miles an hour loaded, and 5½ miles light. Ran very well.

Exhibit 4. Steamer Hemje. Charles Hemje, inventor. This was a well modeled boat, provided with an ordinary stern screw propeller, and the chief peculiarity consisted of a cylinder in which the screw was enclosed. This cylinder was movable and served as a rudder, and was used to steer the vessel. By turning the cylinder, the column of water ejected from it by the screw was deflected, which assisted steerage. This boat made good time, carried over 200 tuns of cargo, and worked extremely well.

Exhibit 5. Steamer Eureka. Hiram Niles, inventor. This boat was propelled by means of two conical shaped screw propellers, arranged on the outside of the bow, upon the same angle as the bow. The points of the two screws converged, like the two lines of a triangle. This boat ran faster than any of the experimental vessels on the canal, and performed extremely well. But she proved rather heavy, and, in order to carry 200 tuns of cargo, required 7 feet of water, which the canal did not, on an average, afford. Built by Niles, Buffalo.

Exhibit 6. Steamer Port Byron. Inventor, F. M. Mahan. Through the hull of this boat, from bow to stern, runs a trunk or water way, and in the after part of the boat a common paddle wheel is set within a chamber, which forms a part of the trunk. The motion of the wheel draws in water at the bow, and discharges it at the stern. This boat made successful trips, and operated very well.

Exhibit 7. Steamer Forest City. Built at Russel and Eads yard, Buffalo, An ordinary canal boat fitted with two vertical propellers, placed one on each side of the stern. These propellers are on Dr. Hunter's plan, the blades feathering, and so made as to be feathered from the deck so as to act on the water at any desired angle. This facilitates