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Cannel Coal of Virginia.

We have now before us a beautiful specimen of the Cannel Coal of Kanawha, Va., and as our acquaintance with this kind of fuel is not inconsiderable, we have no hesitation in saying we believe it to be equal to any coal of the same kind in the world, and far superior to any other coal whatever for a great number of purposes. Cannel Coal breaks with a dull fracture, but is capable of receiving a polish like marble, and it can be worked with a knife or chisel into any form. We have seen beautiful ornaments made of it, and in a foreign paper, we recently noticed that a sofa had been made by a Scottish miner, for the Great Exhibition, out of this material. But beautiful though this fuel is, with its clean and hard, yet pliable grain, its value consists in its usefulness and superiority, as an article of fuel and a producer of light and heat. No coal can equal it for producing gas, either in quantity or quality, and this is a fact to which we hope some attention will be paid by our gas companies. It is stated to be better than the Cumberland coal of Maryland for raising steam, and is free from any liability to spontaneous combustion. Those bituminous coals which are liable to spontaneous combustion, contain a considerable portion of sulphur; this is the reason why they generate so much heat when packed together, and made wet with water.

If one part of water is added to six parts of strong sulphuric acid in a glass vessel, the liquid will be raised to nearly the boiling point. This generates the carbonic and hydrogen gases in the coal, and a spark will do the rest to set the whole on fire. It is not long since we gave an account of three vessels being burned by the spontaneous combustion of the coals which formed part of their cargoes. It is the absence of sulphur in cannel coal, which makes it so valuable for good gas. We would like to see more of this coal in our city, and hope that we may induce some to use it for domestic purposes. It burns in a grate like a candle, with a fine white flame, and leaves only a few white ashes behind. The coal fields of America are of greater extent than those of all the world beside. We have anthracite, bituminous, and cannel coals in abundance. Our people in New York know what the Liverpool and Pennsylvania coals are—bituminous and anthracite, but few, very few of them know anything about the beautiful cannel coal; not one in a thousand, we believe, has ever seen a sample of it. We trust that what we have said may be the means of bringing it more prominently into public notice.

Anhydrous Steam---"Stame."

It is well known to our readers that Mr. James Frost, engineer, of Brooklyn, has published a pamphlet wherein it is stated—and the method of performing the experiment is illustrated—that when steam is heated apart from water, it is doubled in volume by an addition of 4° of heat. This new property he denominates *stame*. All the chemists and engineers, from Black to Watt, Gay Lussac, and Dalton, assert "it requires 480° to double the volume of steam." It will be observed, if 4° of heat doubles the volume of steam, this is the great discovery of the age. Mr. Frost submitted his pamphlet to the *savans* of Cambridge, Mass., who, through Prof. Horsford, reported against its correctness, and Mr. Frost replied through our columns, as we had published the said report. We have always had a great respect for the statements of Prof. Horsford, as he is exceedingly precise in all he puts forth, but Mr. Frost is also a man of great scientific and practical knowledge. Thus the matter rested for more than a year, although we had many inquiries about "the correctness or incorrectness" of Mr. Frost's experiments.

The only person who seems to have given this subject his profound attention is Dr. Haycraft, of Greenwich, England, who has published his views in the London Mechanics' Magazine, in reply to Mr. Frost's pamphlet, which was also published in that periodical. He speaks with great respect of Mr. Frost's experiments, but he does not coincide with his ideas of the doubling of the volume of steam by an increase of 4°.

Twenty years ago he entertained nearly the same views as Mr. Frost, and had a small steam engine constructed of a 4 inch cylinder, tubular condenser, and steam jacket. The jacket was furnished with steam from a high pressure boiler. On working the engine with common steam, it required 85 revolutions to fill a given measure with condensed steam, but on applying steam of 500 lbs. pressure to the steam jacket, it required 920 revolutions to fill the same measure—a very great saving, as any of our readers will see, for the engine in both cases carried the same weight. From this experiment he was induced to believe that anhydrous steam—the *stame* of Mr. Frost—was ten times more economical than common moist steam. He afterwards had a large engine built with a fire around the cylinder, but the parts soon gave way; however, it confirmed him for a time in his former opinions. It occurred to him, one day, to make a calculation of the actual working of his engine, when he was astonished to find that his *stame* was just about equal to what it should be, supposing it to have the rarity of Watt—1728 times greater than water. On examining this he recollected a remarkable admission of that greatest of engineers, (Watt) that, in his best engines, there was a consumption of steam double of what was required by calculation. To prove whether there was a loss by escape of steam in a well-constructed engine, or a great increase of volume by super-heating it, Dr. Haycraft filled a graduated tube with mercury, closing one end and introducing into a part of it oxygen and hydrogen, in the same proportions in which they form water. These gases he detonated by wires and reduced them to water. The whole was placed in an oil bath, which was gradually heated to 210°, when steam was formed, filling the tube to a marked point. On this a calculation was made, which proved it to be increased in volume about 1728. Having ascertained this point, he began to increase the temperature of the oil to test the theory of Dalton, viz., that it required 480° of extra heat to double the volume of steam. He increased the temperature to 360°, all that his tube could bear, when he found that it made no sensible increase in the volume of steam. This experiment was repeated several times with the same result. This is at variance with Mr. Frost's experiments. He believes that Mr. Frost's tubes were moist on the interior surface, and that this moisture was not taken into account in calculating the quantity of experimental common steam.

Dr. Haycraft believes that the loss in common engines is attributable to a cooling in the interior of the cylinder every stroke of exhaustion; James Watt had a glimpse of this idea himself, when he applied the steam jacket, and according to Mr. Frost the steam engine has even retrograded since Watt's day. The Cornish engine, as it exhausts only every alternate stroke, consequently has less cooling inside, therefore it is easy to account for the great economy of fuel in those engines. Dr. Haycraft recommends a steam jacket to be applied to all locomotives especially.

One great drawback on the effective powers of engines is priming—the carrying up of a great deal of moist particles into the cylinders along with the steam. Dr. Haycraft recommends the strictest attention being paid to contrivances for preventing moisture being carried into the cylinder.

We must say, along with him, that this subject is not weighed with a sufficient estimate of its importance by our engineers, although the fact of its necessity is well known to all. Some locomotives, with the same pressure on the *balance* are 30 per cent. more effective than others. Why? "They shed their water better." Dr. Haycraft and Mr. Frost do not differ about the practical results, they only differ in theory. Mr. Frost believes that steam, subjected to a higher temperature is converted into *stame*. Dr. Haycroft believes that *stame* is only what is known by the name of anhydrous steam (steam free from watery molecules).

In the last number, (April 12th) of the London Mechanics' Magazine, Mr. Frost has a reply to Dr. Haycraft, but it does not touch the main points of this new theory, viz., that 4° of heat doubles the volume of steam and changes it into "stame." We have been informed that Prof. Stevens of the New York University, purchased the patent of Mr. Frost for the principal kingdoms of Europe, and that Mr. Collins purchased part of the English, if not the whole of it, and has stated that the reason why he did not apply Mr. Frost's discovery to his fine new steamers, was not owing to his disbelief in its merits, but because, he said, (as we have been told, but we do not give it as on our own authority), "if it were applied, it would enable small capitalists to compete with large ones in steam navigation." This opinion is contrary to what we would expect. and we are inclined to believe that there must be some mistake about it.

Paving Streets by Torch Light.

Why don't our Street Commissioners get the cobble stone pavements repaired by torch light? Let a section be taken up and completely laid down by morning, and do not let a single stone be touched during the hours between 10 A. M. and 6 P. M. It is confusion confounded in our streets whilst being repaired, (and when are they not) for whole lines of stages, like moving caravans, have to turn abrupt angles, and deploy out of line hundreds of times in one day, all owing to twenty or thirty men digging and driving away at the repairing of some small piece of pavement. The streets never need be obstructed on this account, and thus thousands, by tear and wear, in making long circuits and losing time, would be saved to the citizens every year. It may be said that this would be more expensive to the city. It would not; it would be a great saving, for every mile a carriage is saved in travelling so is there less wear of pavement, and who can doubt but 10,000 vehicles have to travel, every day, more than one mile each out of their direct routes, by obstructions in the repairing of streets. This amounts to the astonishing number of 3,650,000 in a year. If we take the half of this, we have nearly two millions of miles of unnecessary travel, and the time lost is incalculable. Plenty of men can be found who will work at night, if paid fair wages; and we venture to say that they will do more work in the same time, by torch-light, than they can by sun light. Why? because they have to be continually on the look-out for horses prancing up to the flanks of their barricades. Their work is generally hurried and miserably done—it certainly could not be performed worse blindfolded. Let the Common Council try an experiment—a fair experiment, and with perseverance they would soon come to the conclusion that our streets can be kept in better repair, never be obstructed, and city funds will be saved by adopting the plan of paving our streets (for repairs only, we mean,) by torch-light.

Thayer's Bridge.

Mr. George W. Thayer, of Springfield, Mass., called upon us last week, on his way to North Carolina, to erect one of the Bridges which bear his name, with a span of 200 feet, on the line of the Wilmington and Weldon Railroad. Mr. Thayer has put up one of his bridges on the Georgia Railroad, and it gives universal satisfaction to the engineers. We published an illustrated description of Mr. Thayer's bridge on page 190, Vol. 2, Scientific American. Since that period many improvements have been added by the inventor, and it is not too much to say he has built some of the best railroad bridges in our country.

When we take a retrospective view of the inventions which have either been illustrated or noticed in our columns, since the commencement of the Scientific American, it gives us no small satisfaction to know that so many of them are now in successful operation. It is not possible for any man to keep up with the progress of improvements in the arts unless he takes a paper devoted to the propagation and discussion of science and art. There is scarcely a day passes over our heads but we have to refer to the back pages of our paper, to show that such and such a thing has been described by us before. We have, in a number of cases, had to refer to Mr. Thayer's bridge, as embracing the principle of what an inventor considered something new. One man, after he had spent about two years on an improvement in boiler feeders, came on to New York with his model, and after showing it to us, we pointed out its homologue in Vol, 2 of our paper. He declared it would have saved him $400 if he had been a subscriber to it from its origin.

Light Locomotives.

We learn by the "South Boston Gazette" that Mr. Seth Wilmarth, of the Union Works, in that place, has built a locomotive which only weighs eight tons, for the Cumberland Valley Railroad. The boiler is 9 5-12 feet in length, and 2 3-12 feet in diameter. The cylinder is 8½ inches in diameter with a stroke of 14 inches. The heating surface of the fire-box is 13 square feet, the heating surface of the tubes is 190 square feet. There are 64 tubes, each 7 feet in length, and 1¾ inches in diameter. The locomotive and tender form a part of the same frame, the tank being capable of holding 400 gallons, the boiler, 168 gallons. The whole length of the locomotive is 18 feet, which is placed upon a pair of leading wheels 30 inches in diameter, a pair of trail wheels of the same dimensions, and a pair of driving wheels 4½ feet in diameter. It has been used on the Brookline branch of the Worcester Railroad, much to the satisfaction, it is stated, of the engineers, and Mr. Wilmarth has entered into contracts to build two more of the same size. For branch railroads, on which there are but light trains, it is folly to employ heavy engines, but the grand point is to hit the weight suitable for the work to be done. Engineers in America and Europe are now giving this part of engineering great attention, but certainly no more than it deserves.

Electrotyping---Our New Heading.

The heading of the "Scientific American," this week, is a specimen of the progress of science. Hitherto types were either cast or carved, but the "heading" spoken of was performed by the same element as the lightning which cleaves the oak of the forest, and shatters the mast of many a gallant ship. The characters are of copper done by the electrotype process, by Mr. J. W. Wilcox, of Boston, who has been engaged in the business for the last five years, and has perfected the art so that it is no longer an experiment, but one of the "fixed facts" of science. Duplicates of wood-cuts, copper plates, type, &c., are warranted perfect, and copies of wood-cuts print as well as the wood itself, while they last ten times longer than either wood or types. It is a splendid art for the stamps used in cotton factories and bleaching establishments.

This is an art of very extensive application. It is very useful but it requires great skill and practice to be master of it. Those who desire copies of figures in hard enduring metal, Mr. Wilcox is the man to perform the work desired n the very best manner.

Banvard, the American Artist.

John Banvard, the artist, whose Panorama of the Mississippi excited so much attention both at home and in England, is now in the Holy Land. He was wrecked on the Nile by a real African Simoon. He lost his gold watch and all his money, but luckily, he says, his sketch-book and drawings were saved, and this made him forget all the rest. A number of Americans were along with him, and were very kind. The Rev. Dr. Scott, of New Orleans, and Capt. McCallum, of the West Point Military Academy, were very attentive and kind to him, they being one mile ahead and in a place of safety, came to the rescue with great dispatch.

Banvard will bring home some rare specimens of oriental scenery—true to nature in every respect. He paints no imaginary scenes, like Gliddon's Nile, and some other panoramic nonsense.