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Contents:

(Illustrated articles are marked with an asterisk.)

EVAPORATIVE POWER OF BOILERS.

Engineers, accustomed to test the evaporative power of boilers, are aware of certain apparent variations, in steam generating capacity, unaccounted for by differences in construction. Two boilers exactly alike, or enough so to be called alike, will, under the same apparent circumstances, perform unequally.

This is not the only instance in mechanics where such unaccountable differences have been observed. Musicians have observed that, of two violins as nearly alike as human skill can make them, one may be a valuable and the other a comparatively worthless instrument. Those who have studied the art of violin making attribute the difference in tone to unexplained peculiarities in the wood from which these instruments are made.

Similarly Messrs. James D. Whelpley and Jacob I. Storer, whose communication upon this subject will be found in another column, attribute marked differences in the action of boilers to differences in the iron of which they are made, and the tabulated results of their experiments certainly seem to justify their opinion.

These gentlemen have long been known to the engineering public through their attempts to bring about more economical combustion of fuel and more efficient application of heat, to the production of steam, the operations of smelting, puddling, etc.; and their experiments will call attention to a point in boiler construction hitherto, in a great degree, overlooked.

But while we are willing to concede that the quality of boiler iron may greatly affect its power to transmit heat, we think the difference in quality which produces such a result will be found to be mechanical rather than chemical, as Messrs. Whelpley and Storer would seem to think in their remark on the effect of alloys and impurities. At least we have no doubt that molecular conditions, not dependent upon chemical affinity, do affect the conducting power of metals both for electricity and heat.

It is certain that in many substances molecular structure has much to do with conducting power. Wood conducts heat with far greater facility in the direction of the grain than across it. Crystals are well known to exhibit similar variations, in conducting power, relative to the direction of their axes. Conduction is also known to be affected by the conditions of homogeneity or non-homogeneity.

Now as iron is more or less crystalline in structure, according to the thoroughness with which it has been worked, and the presence or absence of foreign materials, we are of the opinion that some of the variations observed by Messrs. Whelpley and Storer may be referred to the arrangement of these imperfect crystals or fibers in the plate, and perhaps to certain approaches to lamellated structure, consequent upon defects in manufacture.

Whatever their cause, if the differences be thoroughly established, they are of the utmost practical importance, and we trust the investigation thus begun will lead to such a general examination and discussion as will throw more light upon the important subject of economical steam production.

THE OPEN POLAR SEA.

In our journal of November 4th, we announced the welcome news that a region, free from ice, of comparatively moderate temperature, had been discovered in the centre of the Arctic Circle. This open space, only to be reached by traversing an almost impenetrable barrier of winter bound country, has long been supposed to exist. The flattening of the earth, at the north and south poles, diminishes the radius of our globe, and brings the surface nearer the internal heat of the earth, by thirteen miles; and our readers will understand that the comparative proximity, of the open polar spaces, to the central fire, will make, unless diminished by other causes, an enormous increase in the surface temperature.

Putting the solar and atmospheric influences altogether out of the question, the heat of the earth increases, as we descend, at the considerable rate of about 27° Fahrenheit for every thousand feet; and the theory that the hightened temperature in the centre of the Arctic Circle is more than sufficient to overcome the cold induced by the feebleness and, at the actual poles, the absence, of the sun's direct rays, has always been regarded by physical geographers as eminently reasonable, and is now, by actual experiment, found to be true.

We need hardly recapitulate the various attempts that have been made to penetrate the ice barriers of the Arctic region, and the, in many instances, self sacrificing courage and bravery of the explorers. The names of Buchan, Franklin, Ross, Parry, Kane and others, are known, in connection with this subject, to all our readers; and the difficulties and privations they have endured, the wonderful scenes and countries they have visited, make a history, fuller of strange and romantic incident than the most improbable creations of fiction. Of the hardihood and endurance of the men who have devoted themselves to the investigation of this great subject, many instances might be cited; the following, however, gives a just idea of the nature of their task, and of the men who gave their labors, and in many instances their lives, to its accomplishment:

In September, 1819, an overland expedition left the western shore of Hudson's Bay. The party consisted of Lieutenant Sir John Franklin, Doctor Sir John Richardson, Midshipmen Hood and Back, and a seaman named Hepburn. It was calculated that this party would meet Sir John Parry, on his first exploring voyage, at some point on the coast. Sir John and his fellow travellers reached Chipewyan on March 26, 1820, having journeyed on foot nearly nine hundred miles, in a climate which froze the mercury in their thermometers. In July of the same year, they were at Fort Enterprise, five hundred miles further on, and arranged to winter there, dispatching Mr. Back to Fort Chipewyan, to forward supplies. Mr. Back reached Fort Enterprise again on March 17, 1821, having journeyed eleven hundred miles, the thermometer averaging about 50° below the zero of Fahrenheit. He had only a blanket and a deerskin for covering at night, and was frequently two or three days at a time without food. Three months afterwards, the party was at Coppermine, 80 miles further on, having dragged their canoes, supplies of food and material, overland to the stream at that place. After travelling by the shore for five hundred and fifty miles, they found themselves in open sea, and believed that their object was accomplished, but found, to their extreme chagrin, that they had only reached the commencement of a large gulf. Having only three days' provisions remaining, they mournfully decided to retrace their steps, and turned towards Hood river. "Short of food," says the narrator of this memorable voyage, "in a country deserted even by the few animals which supply the scanty larder of the Arctic voyager, ill provided with all that could facilitate their progress, eating the remains of their old shoes and whatever scraps of leather they had, obliged from exhaustion to abandon their canoes when they came to rapids, subsisting, at the last, upon rock tripe and the mosses which they could gather by the way, disappointed in finding assistance at a station where they had expected it, the sufferings of this party were almost unparalleled, and such as but few men could have endured. They lost two of their companions, and reached, in July, 1822, York Factory (their starting point), whence they had started three years before." In this time they had journeyed upwards of 5,500 miles, through obstacles, in weather, and with privations such as have seldom fallen upon men, even among the noble army of martyrs to scientific discovery.

There must be a feeling of gratification all over the world at the solution of this formidable problem. It has interested the civilized nations of the earth for nearly seventy years, expeditions having been fitted out, through all that time, to add to our scanty fund of information on the subject. And none can say that the labor, the money, or even the lives, have been ill bestowed in the cause. The bravery and self-sacrifice of the warrior has always been the favorite theme of the poet, and deeds of courage in the battle field have never lacked praise or pœan; but a more imperishable and enduring glory is due to the peaceful traveller who risks his life in pursuance of the far higher duty of increasing our knowledge, and carrying the never fading banner of Science to the uttermost parts of the earth.

THE SALE OF PATENTED ARTICLES.

As we contemplate the few homely articles which form the outfit of an editor's table, it occurs to us to enumerate how many of these exist in their present convenient form solely on account of the stimulus of a good patent system.

To begin with, there is the inkstand patented. So is the ink it contains. So are the pen rack, the penholders, and pens. So are the ruler, the eraser, the blotter, and the paper fasteners. Yes, and so are the paper files, and the portfolio, and even the gas burner, by the aid of which, these shortening days, we are able to protract our labors somewhat into the dusk of evening.

All these things are good after their kind, and were purchased, as being most likely to be convenient for our use, out of many other patented articles.

If we, in the limited furniture of an editorial *sanctum*, can find ourselves so much indebted for comfort and convenience to patented articles, surely it were not a hard task for the farmer, the artisan, and the housewife to count up a host of things which not only minister to their comfort, but without which they could scarcely now proceed with their business, and all of which have been patented. Very few of these things would have been produced without the hope of gain held out by the patent system.

Those who will take the trouble to see how many patented devices are in constant use by them, will certainly be better prepared to appreciate the value of patents in themselves, and will not be so ready to throw odium upon the system on account of the practices of an occasional fraudulent vender that infests rural districts.

It has been complained that there are many of these who pass through the country, under the pretence of selling rights to use or to make and sell patented articles of various kinds but whose sole object is to defraud the simple, and to make money by dishonest practices.

Thus we have heard of a case where the exclusive right to make and sell a machine for a certain town was sold to three individuals in the same town. We have heard of other cases where parties, in signing a supposed agreement to pay a stipulated price for a machine at the expiration of a given time, under a proviso that certain results should accrue or the article should be returned, have signed negotiable notes which were sold at a discount, and which they were compelled to pay when the scoundrels, who took advantage of their simplicity, were far beyond their reach.

On account of these and other fraudulent practices, many have been victimized and become disgusted with patented articles; and now refuse to examine useful and important inventions, which it would be for their interest to purchase and use. This is as silly as it would be to denounce watches, because some rascals sell pinchbeck for real gold.

The utter absence of common and necessary precautions, in the transaction of all business, displayed by the dupes of fraudulent vendors, enables pretenders and cheats to bleed their purses. Let our rural friends never sign their names without being sure what they are signing, consult their lawyers as to the validity and intent of the contracts they propose to make, take the affidavit of parties proposing to sell patent rights that they are entitled to sell, and that the territory bargained for has not already been sold, and employ such other precautions as careful business men always use, and they will render the occupation of these land sharks very unwholesome, in a legal point of view.

That the simple and careless shall become the dupes of the shrewd and unscrupulous is in the nature of things. If a man should lie down to sleep in an exposed situation, and wake to find his pocket-book and watch abstracted by some prowling thief, he would scarcely blame anything more than his own folly. So if men attempt to execute contracts, and take upon them obligations of which they know nothing, without trustworthy advice, they must themselves take the burden of blame if they get swindled.

This, however, does not exonerate the swindlers. In many cases they might be brought to justice, were it not for indisposition to pursue and punish them. Such a course, though a duty to the public, protecting both honest sellers and buyers, involves some trouble, and it is much easier to "take it out" in maledictions against patents and all who traffic in them.

HOW TO PREVENT AND HOW TO EXTINGUISH FIRES.

The discussion of the proper building materials to use, and the best means of extinguishing fires, are, of course, the prevailing topics, just now, at Chicago. A correspondent, writing to one of the papers of that city, asks: "Have we any incombustible material that can be safely and economically put in the place of wood for these finishing works? Iron only is at present available, and with the present perfected processes of working, preparing, and finishing iron, we see no reason why it cannot be made equally acceptable in all these uses. If it were employed, the contents of a building, the goods and merchandize stored in it, might burn; but, except in the case of large quantities of highly inflammable material—as oils, spirits, etc.—could scarcely produce sufficient heat to materially damage the structure, and even then there would be no possibility of the fire extending beyond the building in which it originated. I believe that iron may be used, and our buildings be none the less ornate, none the less acceptable, all things considered. The only question to be discussed, then, under this head, is that of economy."

This correspondent's belief about the use of iron is correct, and has, for years, been in practice in most of the prominent cities, Chicago excepted.

The same correspondent says:—"Recent events prove that water, applied with all the skill and power men possess, is utterly useless to arrest the progress of flame under precisely those circumstances which most demand an efficient means of resistance to the fiery element. Certain gases have the effect of at once smothering and subduing the most violent conflagration by withdrawing the supply of oxygen. But here a difficulty presents itself. That which thus smothers a fire suffocates all living beings, and, for the same reason, to apply the gas, without its deadly result, is the problem for solution. This problem we commend, as we have done the first one, to the investigation of all who are interested in humanity, and can do aught to promote its study."

We suspect that the writer is not a reader of the SCIENTIFIC AMERICAN, and therefore perhaps not as well posted, in respect to the nature of the existing appliances for using water in cases of fire, as he might otherwise be. For example, on page 191 of our present volume, he will find illustrations of the Hall method of extinguishing fires by means of water directed through perforated pipes, which, at a small