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Contents:

(Illustrations are indicated by an asterisk.)

THE CAUSE OF BOILER EXPLOSIONS.

We have for years been endeavoring to impress engineers and manufacturers with the necessity of caution and care as preventives of boiler explosions. We have repeatedly expressed the opinion that these disasters were not the result of mystery or of the complicated theories so often brought forward to account for them. These views were expressed as the result of experience, not of easy-chair deliberations, and we have no reason to doubt the soundness of them. We are rather strengthened in them by the following paragraph, which we cut from the report of the Manchester (England) Boiler Association.

This institution has been in existence eleven years. It consists of practical and scientific men who examine each boiler enrolled upon their list. The charge for enrollment is one guinea and a half, and if repairs be necessary or inherent weakness detected the same is pointed out and the proprietor is free to get his work done where he pleases. If any boiler *explode*, that is the word, after such examination, the proprietor thereof is entitled to recover damages from the association to the amount of $1500. The report says:—

"Ten years' actual working of this system has established its general utility to the steam user, as well as its sufficiency for the prevention of steam boiler explosions, while the constant investigations that have been made by this Association, as to the cause of those explosions which have occurred to boilers not under its inspection, have shown with what unnecessary mystery this subject has been too frequently shrouded, and that, as a rule admitting of but few exceptions, steam boiler explosions are neither accidental nor mysterious, but may be prevented by the application of common knowledge, and the exercise of common care."

This is our own opinion and every engineer may feel certain that if he understand his business and exercises caution and discretion he will never blow up his boiler.

INACTIVITY.

If a steam engine is stopped suddenly and left unused for a long period, the piston rusts fast in the cylinder, the packing corrodes the rods, and dust thickly covers every part.

When the human frame is inactive and torpid for a length of time the muscles relax, the nerves lose their tone, the organs refuse to perform their functions, and the whole of that great machine—the human frame—is disorganized.

Day in, and day out, men sit poring over ledgers and day-books until they are addleheaded, and the figures swim before their eyes. When evening comes, and business hours are over, instead of taking a walk so as to send the blood dancing and tingling to the remotest part of their frames, they pop into some car and drowsily roll to their doors. A very great portion of the minor ailments flesh is heir to is caused by laziness.

An afflicted individual goes to a doctor; "Something is wrong inside," but he does'nt know exactly where. Thereupon the physician looks grave, and says, "Ah! Dyspepsia;" and forthwith orders tonics, drastic purges, and what not, when all the lazy man wants is a two mile tramp in the Central Park, or a good old fashioned jouncing on a hard-trotting horse.

A certain eastern potentate, feeling himself out of sorts on one occasion, sent for his physician and demanded a cure.

"Take this mace," said the physician, "mount a horse and swing the instrument back and forth, riding meanwhile at full gallop. Certain drugs concealed in the handle will then exude; your excellency will absorb them and be cured." And he was, says the legend; the shrewd man of medicine knew full well that all the king required was fresh air and exercise, and he took this method of prescribing them.

It is better to wear out than to rust out, and shoe leather is far less costly than medical advice.

Stretching the legs relieves the tension on the purse strings, and the cheapest as well as the best medicine for dullness, head-aches, blue devils, stupidity, hypochondria, ill temper, and total depravity, is fresh air and sunlight. These are sovereign remedies, but because they are easily obtained, do not taste bad, and cost nothing, few use them.

THE SWEETNESS OF FERMENTED BREAD.

The little cavities in a loaf of bread, which give it its spongy character, and make it light, are formed by the expansion of little bubbles of carbonic acid gas; and there are three different methods by which these little masses of carbonic acid are mingled with the dough.

In making what is called aerated bread, the carbonic acid is obtained by any economical process, and is then mechanically mixed with the dough by agitating the two together in an air tight vessel. On being placed in a hot oven the bubbles of gas expand, and puff the dough into a spongy mass.

Soda biscuit are raised by setting free carbonic acid from bicarbonate of soda. This salt is composed of soda, carbonic acid, and water, and if it be brought in contact with tartaric acid, the soda leaves the carbonic acid to combine with the tartaric, and the carbonic acid is set free in the form of gas. Advantage is taken of these affinities to distribute carbonic acid gas in minute masses through the dough. Tartaric acid is first thoroughly incorporated with the dough, and then bicarbonate of soda is added and also thoroughly mixed with the mass. The tartrate of soda, formed by the combination of tartaric acid and soda, of course remains in the dough, and is taken into the stomach with the bread.

In fermented bread the carbonic acid is obtained from the flour. All grain contains starch, and by proper treatment starch may be converted into grape sugar, which in its turn may be changed into carbonic acid and alcohol. Both of these changes are effected by fermentation. Panic fermentation is simply the growth of yeast. Yeast is a microscopic plant, and when immersed in a proper liquid and subjected to the proper temperature, it propagates and grows with great rapidity. When it grows in contact with moistened starch it converts the starch first into sugar, and then the sugar into carbonic acid and alcohol. The sweetness of fermented bread is doubtless due to the circumstance that a portion of the sugar formed from the starch remains in the bread without being changed into carbonic acid and alcohol.

CAIGNARD DE LATOUR made the discovery that there is for every vaporizable liquid a certain temperature and pressure at which it may be converted into the aeriform state, in the same space occupied by the liquid.

EXPERIMENTS WITH CAR BRAKES.

Mr. William Loughridge, of Weverton, Md., proposes that the Presidents of the railroad companies in the United States should undertake a series of experiments "to determine the laws of friction governing the retarding of trains, by equipping a train of ten cars, to be controlled by the engineer or brakemen in such a manner as, in my judgment, will secure the greatest safety to trains and economy to the railroad companies."

Mr. Loughridge then specifies the objects he desires to ascertain: we have no space to reproduce them at length. The Presidents of the leading roads in the country have already agreed to pay their share of the expense attending the experiments, provided the sum required of each shall not exceed $100.

The experiments will be made at the Bolton machine shops of the Northern Central Railway, at Baltimore. Further information can be had by addressing Mr. William Loughridge, care of E. W. Barker, 362 North Eutaw street, Baltimore, Md.

WHAT A GREAT THING AN ARMY IS.

If any of our readers wish to form a clear and vivid conception of the appearance and extent of an army of 80,000 men, let them take a look at Mr. Hope's painting of the encampment on the Pamunkey. At the only time when the Army of the Potomac was ever all collected in one body it was fortunately spread out on ground sufficiently level for it to be seen at one view; and, fortunately, one of our best landscape painters was present, and took a careful sketch, from which he has produced a large and elaborate painting.

For several years we have observed Mr. Hope's studies of forest scenes at our artist exhibitions, and have been much impressed with their minute fidelity to nature. Some of our lazy artists, who wish to get a great deal of money for a very little work, affect to sneer at this pre-Raphaelite attention to details; but, for our part, we agree with Ruskin, that this extra finish is "added truth." In art, as in other things, and more especially in art than in anything else, excellence is to be obtained only by tireless labor. Mr. Hope has the same fault that nearly all of our landscape painters have, his landscapes are too nearly of the same color. It requires no great experience to recognize the work of any one of our prominent artists by the characteristic color. Mr. Church's landscapes are an exception to this, his paintings having the innumerable shades of green that are to be found in nature.

In minute and laborious finish Mr. Hope is not to be excelled. In this painting of the Army of the Potomac, every tent, and every tree is carefully painted in the exact position which it occupied in the landscape, the steamboats and schooners are the same in number and in form as those which were afloat at the time on the river, and the long lines of infantry, artillery and cavalry, present the same appearance in the picture that they did in winding their way out of camp. The longer the picture is studied, the more is the spectator impressed with the extent and power of an army of 80,000 men. With the idea of having such a force in our control, we can enter readily into the feelings of Marmion as he contemplated the army of James IV. before the battle of Flodden Field:—

"Oh! well, Lord Lion, has thou said,
Thy king from warfare to dissuade
Were but a vain essay:
For, by Saint George! were that host mine,
Not power infernal nor divine,
Should once to peace my soul incline,
Till I had dimm'd their armor's shine
In glorious battle fray!"

Shocking Occurrence.

On the 8th instant, 2,700 barrels of petroleum, stored in a yard in Philadelphia, took fire. Some of the barrels burst with the heat, and the blazing liquid ran into the streets and filled up the gulleys and sidewalks, so that the lower parts of the houses in the vicinity were surrounded with a lurid sea of flame. The scenes which occurred were harrowing, and no less than six persons—four or five of one family—were burnt to death on the sidewalk. Numbers of houses were laid in ruins, and the damage was very serious.

A NEW bridge has been built over the Mississippi at Clinton, Iowa. It is 3,650 feet long. The draw leaves passage ways, each 123 feet wide, for steamboats.