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Contents:

(Illustrations are indicated by an asterisk.)

TUBULAR BOILERS.

Many boiler explosions have occurred of late at the West, and almost every mail brings intelligence of some new disaster. To judge from the newspapers and from letters we receive, the traveling public in that region seem to be panic stricken.

Almost the first question passengers ask when they come on board is, "Has the boat got tubular boilers?" says a correspondent, and naturally enough all the explosions thus far have been boilers of that class We shall show hereafter why it is natural.

When steam generators of this kind were first introduced here, there was a universal dislike to them among a certain class of engineers. They were denounced as "dangerous," as "powder magazines," as "hell kettles" and numerous other slang names. It was soon found, however, that tubular boilers were no more "dangerous" than others, if properly cared for, and that, if explosions occurred, it was not from any inherent defect in the system, but by reason of gross neglect on the part of those in charge. It is not the boiler which is dangerous, but the men in charge of it.

As tubular boilers generate steam more rapidly than flue boilers, they use more water. The fire surfaces being finely divided, so to speak, or spread in small areas through a large body of water, are liable to get over-heated very rapidly if from any cause the supply of water is stopped. And, since they always work at higher pressures, constant and intelligent care is needed to prevent them from being injured.

The boilers on the Mississippi river are not exactly what would be called tubular boilers in this part of the country, since, if we are properly informed, the majority have tubes five inches in diameter. It is not the size of the pipe that determines the character of the boiler, for a tube is a tube whether five inches or five feet in diameter, so to all intents and purposes these boilers are tubular boilers, having large fire surface and small water spaces.

Where heat is rapidly conducted through water, as in iron tubes, the water is repelled from the hot surfaces, and dirty water, such as that in Western rivers, more rapidly than clean. Moreover, from the method of setting the boilers they are unequally heated, so that one side may be intensely hot while the other is comparatively cool. The boilers in the center of a gang of five, being set in a row, must necessarily receive a great portion of the heat while those outside have not so much; the result would be to make steam faster in the middle than in the other boilers, and not only cause them to foam but to drive the water out from one into the other. This is not uncommon, and many engineers have noticed in a gang of boilers that rapid firing, as with wood, will give three gages of water in a boiler that was scant, and less in the other that was full.

Dirty water, as we have before remarked, is very bad for any boiler, but particularly for these. Our engineer correspondent says: "I have seen the spaces between the flues entirely stopped up, so that they had to be drawn to clean them. Where mud accumulates to this extent, it is certainly not difficult to account for the explosions, or rather collapses, since most of the accidents are of this nature.

The remedy is to use more care, and some means to prevent mud from accumulating so fast as to stop up the spaces.

We print elsewhere an extract from the *New Orleans Delta*, which evinces a singular spirit. It is not the part of wisdom to denounce tubular boilers because some passengers leave the boats fitted with them. As well might every one stop traveling on railroads, for all locomotives are tubular boilers of a much more "dangerous" type than those which have exploded.

Tubular boilers make steam so much cheaper and more rapidly than common return-flue or cylinder boilers, that they should be used everywhere when they can be. In all places where fuel is scarce we find them; in all cities, in railways, in steamers, in steam fire engines, and in factories—wherever, in short, steam is used as a motive power. It is too late in the day to decry them, and they will eventually find their way into general use on the Mississippi river as they have in all other countries. In the steam fire-engines are tubular boilers where the tubes are only $\frac{3}{4}$ths of an inch in diameter, and the spaces between $\frac{1}{4}$th of an inch, and the fire is so forced by the draft and exhaust that the blaze comes out of the top. One hundred and eighty, two hundred, and much higher working pressures are carried, and they are in use all over the country, every day, for hours at a time; they don't explode unless neglected.

WHAT TO SEND TO THE FRENCH EXHIBITION.

A writer in the *Daily Times* of the 11th ult. discussing this subject says:—

The importance of our being well represented at the great exhibition of 1867, is generally admitted, but the fact that "Yankee notions" alone, the staple of our provincial fairs, will neither represent or glorify us in the world's competition, has not been sufficiently impressed upon the right people. It is labor lost to tell Sniffkins, of Bungtown, patentee of the great American back-action tooth-pick sharpener, that his invention does not embody the engineering genius of this people, and Smith, of Smithville, that in his Union hen-persuader are not centered the mechanical hopes of the country.

It should be impressed upon our real thinkers and workers in the useful arts that they should, that they must, undertake this matter of national advertising in earnest. English constructors crowd the aisles of every international exhibition with their machines and their book orders for duplicates from every manufactory and public work in Christendom. What did it profit a French engineer to send locomotives away to London in 1862? Successful competition with Manchester and Newcastle, not only in the markets of the world, but in England. French locomotives are already ordered for English lines. Why should Austrian, Belgium, Swiss, and Swedish builders send full-sized steamship engines to the World's Fair? Only to show their neighbors—and that successfully, as the result has proved—that other people than John Bull can make these things upon good models and at reasonable prices. But what foreigner or what pioneer manufactures or public carrier, in the newly civilized parts of the globe, would think of coming to America for the best machinery.

The writer commits a common mistake. He argues upon the ground that inventions are generally made for notoriety, whereas they are designed to be useful and accumulate wealth with. If there is a demand for tooth-pick sharpeners, certainly "Sniffkins's" opportunity to invent an improved one is not going to be lost. The idea that ingenuity cannot be shown in a tool for an insignificant purpose is erroneous. Surely every person will admit that simplicity combined with efficiency is the great essential of machinery.

The apple parers that shave off a thin skin from the fruit in a minute, where the clumsy fingures of a servant would cut away a quarter of an inch, and be twice as long about it, are not to be ridiculed. Hundreds and hundreds of them are manufactured, and as for the ingenuity displayed in their construction and design—certainly no one will gainsay it.

So, too, with that essentially Yankee invention, the kerosene lamp. Few persons who use them ever reflect upon the several processes the burners go through, the vast amount of work, and the ingenuity of many of the machines used in producing them. One of the most ingenious little pieces of mechanism that has come into our hands lately is a cherry stoner, and it is a one-sided view to suppose that such things exert no influence because they are small.

Some years ago we visited the Crystal Palace in this city but we do not remember seeing any English marine engines. We saw one engine that would go under a thimble, and another two inches high, but they impressed us as specimens of labor lost. So with many other articles of a similar character There were rolls of carpets and piles of tapestry, but of the great machinery we saw but little.

Certain details of engines might be sent with profit, as, for instance, an American steam chest fitted with poppet valves, the trussed connecting rod, the beam used on our steamers, the front links and the valve gear.

These are all essentially native and to the manor born, and the workmanship cannot be surpassed, and on this hint we hope some of our shops will act.

The question to be considered in sending articles to the French Exhibition is simply a commercial one. Our marine engine makers know very well that they have no market there, as the type of engine for marine use most in favor with us is ridiculed abroad with unsparing severity. In the line of stationary steam engines we could not compete with any hope of success; for the prices would be so nearly alike that no margin would be left for profit, and so with all other machines. Instances are not wanting, however, where they have been made and sold in England at lower rates than they could be here, but these are not the rule, but the exception.

It is a mistake, however, to suppose that our engines are not used abroad, simply because they were or are not shown at exhibitions.

On the Danube river there are a number of American steamboats and engines running, and our marine engine shops have for years found markets for their products in Siam, in China, the West Indies, South America, and all the British Colonies. What would be gained by sending heavy marine engines to France?

We can bear witness that foreigners are continually coming to America for the best machinery, and we are frequently in receipt of letters from correspondents abroad, in Great Britain, asking for the best machines for certain purposes. Would any more come if we sent an engine there?

We are enthusiastic in respect to the representation of our manufacturing interests abroad, but this matter of fairs is beginning to be held in low esteem, for it is found that a few monopolize the prizes, and that dishonest officers award themselves premiums, and leave the exhibitors the expense and loss of time for their share.

TO PRESERVE IRON SHIPS FROM RUST.

In a recent issue of the SCIENTIFIC AMERICAN we referred to an invention wanted to preserve iron clad vessels from the destructive effects of rust, which has become a very serious matter in England and France. Hon. Wm. D. Kelley, in a recent speech on the Navy Appropriation Bill, notices this paragraph, and thereupon founds an objection to the re-establishment of a navy yard at Pensacola.

Judge Kelley takes the ground that naval supremacy among nations is hereafter to be settled on land. That nation which has the amplest supply of forges, furnaces, and rolling-mills, of iron and steel, and the most workshops and skilled workers in iron and steel, will be the master nation on the sea. The question is one merely of machine power and skill in working the metals.

At Pensacola, or in that vicinity, there are neither forges, furnaces, machine shops, nor skilled workmen. Nor is the water at or near that yard fit to float an iron navy not on active service.

In reference to the want in France of a composition to prevent the action of rust, he remarked that the fact thus disclosed is nature's guarantee of the supremacy of the American navy. More fortunate than England and France, we have fresh-water harbors in which we can float iron vessels. Fresh water is a cure for the diseases inflicted upon them by salt water.

This subject is one that concerns the interest the whole country, and deserves careful considera