Explosions of Steam Boilers---Their Causes and Remedies.

This subject has been so often discussed, and the public is so well acquainted with it in all its details, that it seems almost like repetition to say any thing more about it. Were there no causes for discussing it now, we would not say a single word pro or con, but when we hear of one or more steam-boilers exploding every week, and many of our fellow beings and friends suddenly deprived of life by such sad catastrophes, we cannot nor dare not be silent,—if we say nothing more than bid farewell to the departed, and demand justice on the guilty living.

In no country in the world is there such a recklessness of life, on steamboats, as there is in ours. During the past year sixty-seven steamboats were lost on our Western waters, the majority of these losses being caused by explosions. Four hundred and sixty-seven lives were lost, and a great number severely injured. On our northern lakes, in the course of nine years, 7 explosions of steamboilers have taken place, and 11 steamboats have been consumed by fire. About five hundred lives were lost by those accidents. The chief quarter for the explosions of steamboat boilers is the Mississippi and its tributaries. On the 13th of last September, the Anglo Norman blew up, carrying sorrow to many hearts in this city; and two days after that, the steamer Knoxvilleexploded at the same place

A writer in the "N. Y. Herald" believes that the explosion of the Anglo Norman was caused by the steam becoming *stame*. This is a new property of steam, discovered and thus defined by Mr. Frost, of Brooklyn. who, no doubt, is the author of the article. *Stame* is steam brought into contact with a hotter surface than 212°, out of contact with the water in the boiler.

He thus speaks: "the Anglo Norman was furnished with a low pressure condensing engine, constructod at one of the first foundries, and furnished with all known inventions, notwithstanding which, the boiler, weighing many tons, exploded, and disappeared from the boat.

The low pressure boiler exploded, from some unknown and unexpected cause to the capable and practical engineers aboard, causing their horrible deaths, and also of ten others, and the more or less concentrated infliction of excruciating torture on eighty-five others, to the endless sorrow of their numerous relatives, and still leaving all other persons in dread of like inflictions when exposed to similar circumstances, seeing that neither low pressure engines, or the wisest engineers, are exempt from, or possess sufficient knowledge to be secure from equal calamities. We have experimentally found the addition of comparitively trival quantities of heat to steam apart from water, so rapidly and greatly increases the volume of steam by a wonderful, peculiar, and hitherto undiscovered law of nature, that little more than one-tenth the heat requisite for the formation of steam, when added to steam apart from water, doubles that volume of steam, and that about two-tenths, or one-fifth the heat required for the formation of steam, when added to steam apart from water, increases the volume of that steam eight fold, so that it is thus shown the extra caloric applied to steam, apart from water, is more than thirty times as effective for the production of noxious or destructive force, as was the same quantity of heat when applied for the production of steam; therefore, it must be seen, proportionally, the further application of but an inconsiderable quantity of heat to steam, would constitute an infinite expansive force.

We have thus seen the nature of the unknown and unexpected danger contingent on the use of one of the best constructed low pressure boilers and engines, superintended by men of superior information, but ignorant of these newly discovered properties of heat kindly provided by providence for the greater advantage of mankind, under the penalty of death and torture for their misuse or ignorance."

This much is given to prove the cause of the Anglo Norman's explosion, namely, *stame*. A writer in the Herald answers this and says, "if the writer" (alluding to Mr. Frost) "supposes he has discovered a new agent, called "stame," yet I am not convinced that he is right. It is perfectly well known to all who have used the steam engine, that both high and low pressure boilers are constructed so that the smoke flue or fire passage, frequently passes through the steam chamber.

If his argument was correct, the heat of this fire flue must generate the "stame" in all cases where such boilers are used, and immediate explosion of course takes place, as soon as any steam is formed in the boiler.

I am induced to believe that all boiler explosions are occasioned by gas, generated by water coming in contact with red hot iron; and that this gas and its consequences are only occasioned by a low stage of water within the boiler, causing the upper surface of the fireplace to be exposed naked to the action of the fire, which surface is almost instantly heated red hot, and the first jet of water within the boiler covers this surface and the result deprives the engineer of the power of confessing the cause. The explosion in Hague street, last winter, and the numerous steamboat explosions of late, may all, in my opinion, be attributed to this cause.

That the gas called "stame" may be used as a motive power, all engineers will doubt who have observed their engine to stop action suddenly, under what was thought to be a high pressure of steam, but found to be gas (generated in some unaccountable manner) which will not propel an engine.

I do not believe that any boiler has ever yet been exploded by steam. Wrought plate iron is almost invariably used in construoting steam boilers. The pressure of steam is gradual, and its first effort to escape is made at some weak point, as an air bubble in one of the plates."

These opinions are worth something, because no man ignorant of the steam engine could write thus about explosions. But let us give some more opinions. They are valuable as they exhibit the salient points of those minds who have given the subject attention. A writer in the Mobile Tribune attributes all explosions to *high fire lines* on the boiler and *low water lines* within.

He says, "the, and the only remedy against such accidents, is to lower the fire lines, by bringing the side wall against the boilers at, or below their centres. This will always prevent explosions, except in cases of total negligence on the part of the engineers, by which boilers suffer materially for want of water. To assert that pure steam has ever exploded a good boiler, is to assert a palpable impossibility.

Any boiler made of merchantable iron, of three-eighths of an inch thick (the usual thickness) will bear, with safety, 6,000 pounds to every inch in its length, on any one line drawn from end to end. In this estimate 50 per cent is deducted for loss of metal by punching process, instead of three-sevenths, which is the actual loss.

All this noise then, about explosions by steam, is a "fal-de-ral," and will not bear the light radiating from philosophy and mathematics. No: steam has not done this mischief, nor ever will; but that article called hydrogen gas, which is a full blooded-cousin to gunpowder, has done all the mischief. One pound of hydrogen gas will do more, in the way of explosions, in one day, than two hundred pounds of pure steam will accomplish in one hundred years.

After hydrogen gas is generated, by firing on steam, an explosion is then produced by the gas coming in contact with heated iron which causes ignition; and the effects are similar to those caused by igniting gunpowder.

If every man on earth were to assert, or even swear positively, that the water lines were above those of the fire lines at the time of the explosion, it could have no weight in bringing such a conclusion to my mind."

So much for what this gentleman says, and he claims to be acquainted with steam. Let us now refer to the opinion of a man of genius, practical skill, experience and fame. We refer to a report of Mr. Fairbairn, the eminent engineer of the authorities of Halifax, Eng., on the explosion of a boiler attached to a woolen factory in that place. He says, "the only remedies he can suggest are that boilers should not be allowed to be placed under buildings where people are employed, and that those now in the position be as speedily removed as possible.

That boilers of the wagon shape should not be worked at a pressure exceeding 10lb. on the square inch.

That after a certain date every new boiler should be proved up to not more than one-third its bursting pressure, and to three times its intended working pressure.

Lastly, that every boiler should be fitted with two safety valves; one to be self-acting, and beyond the reach of the engineer or any other person but one, to whom the duty of examination should be expressly entrusted."

In reference to the opinion of the person who alludes to stame being the cause of the explosion of the Anglo Norman, we would state that Mr. A. C. Jones, in a letter from New Orleans, to the "Franklin Journal," two days after the explosion, states that her boiler was of the wagon form, 30 feet long, and 16 feet wide. In the interior there were four plain arches (without any water bridges) extending to the back end, with eight return flues above them. From evidence elicited, it appears that no more than 24 lbs. of steam were carried when the explosion took place, and Mr. Jones states that the boiler could stand 54 pounds. We have here one cause of explosions developed, namely, our engineers place too much confidence in the strength of their boilers. Here is Mr. Fairbairn, who has tried, perhaps, more experiments to test the strength of iron than any other living man, says that 10 lbs. is as much as a wagon-shaped boiler should be allowed to carry. The reason why there are less explosions in England, is owing to the low pressure of the steam used. Mr. Jones believes that the explosion was caused by "the middle arches giving way, and the lower part of the boiler opening out sideways." The engineer was a careful man, and there was plenty of water in the boiler. Neither *stame* nor water in a *spheroidal* state was the cause of the explosion. It was a bad boiler. We believe, however, that over-pressure, is not the only cause of boiler explosions. Some boilers have exploded when no over-pressure could account for the accident. But hydrogen gas never will cause an explosion, as set forth by the correspondent of the Mobile Tribune, for this gas is not explosive, and will not explode until it is mixed with a certain amount of oxygen or the atmosphere. By very great heat water may be resolved into its elementary gases in a boiler, and an electric spark may do the rest. Electricity is generated in the boiler. We do not believe, however, that many accidents take place from such causes. The bad construction of boilers, and over-pressure are the main causes. It may be that there is something in the sediment of the waters of the Mississippi, which, in the steam boiler, amounts to little else than explosive powder—the chlorate of potass. This subject should engage the attention of some chemists in our western cities.

(For the Scientific American.)

Linen---The New Discovery.

It is surprising to many that linen manufactures have been so long neglected in this country. Flax grows well here, and the Americans are certainly not far behind other nations in manufacturing skill. The truth is the recent improvements in the spinning of flax by machinery happened to be made in another place, and where flax was produced in the condition most favorable to the method of manufacture there; while our farmers would not go to the trouble of water-rotting flax for the prices which they might obtain by shipping it abroad, in the absence of all markets for it at home.

In 1845 I discovered processes and invented machinery by which it is demonstrable that fine linen can be produced from hemp or flax cheaper than cotton goods of equal fineness; and in that year I visited England, Scotland, and Ireland, mainly to ascertain whether my invention was known there or not, and where I communicated a knowledge of it to one person only, a Liverpool merchant. It seems that others have made, or seem to have made, a similar discovery in Europe, and English newspapers express joy at the prospect of English independence of American cotton growers, from their ability, by these new improvements, to produce linen at so low a rate as to run cotton out of the market. It is not very surprising that England is elated at this prospect, notwithstanding her free trade notions.

But the tables will soon be turned. We can produce linen so much cheaper than it can be produced in the United Kingdom, or European countries generally—that in less than twenty years, they must be as dependent upon this country of cheap land for manufactured linens as they now are for raw cotton! The reasons are obvious. The unsteeped or unrotted hemp or flax is preferable, requiring much less labor in its production than the other. Flax is now grown for the seed only in this country, and to so great an extent, that lint enough is thrown away to supply the whole country with linens. If we will pay the farmer anything for the flax straw he now casts out as worthless, he will be doing just that much better than he now does. It can be purchased at from five to seven dollars a ton, making the lint cost not exceeding thirty dollars a ton, or a cent and a half per lb. This makes the product of an acre amount to only about five or ten dollars, while it is proposed to pay, in Ireland, more than five times that amount for the product of an acre of flax in the same condition (unrotted), and Irish lands cannot be cultivated for a much less sum.

By using flax or hemp unrotted, it must be manufactured in the neighborhood where it is grown. It will not do to think of transporting from 5 to 6 tons of flax straw to Ireland to get one ton of flax lint, nor can we expect our farmers to erect factories for the purpose of half manufacturing their flax, to be completed by foreigners. They will confine their business to agriculture only, and, after taking off the flax seed, haul the flax straw to the neighboring factory, to be manufactured into linen, as they now haul their wheat to a neighboring mill to be manufactured into flour.

If European countries can grow flax cheaper than we can, they can manufacture linens cheaper, if not, not.

By the new process I may say that machinery does more, and labor less in proportion than by the old processes of manufacturing linens, so far giving our new country an advantage more than sufficient to counterbalance the difference in the price of labor in the two continents.

The new process will not probably affect the price of linens for some time to come, and, for many years, the manufacture must be extremely profitable. Machinery can now be purchased, by which a guaranty is made that linen yarns, as fine as 100 leas, can be produced as cheap as cotton, at present prices, and so long as linens remain as high as now, or anything like it, very large profits will be made. It will require a considerable number of linen factories to affect the prices of linens materially, and no doubt the first factories will make the most money. Immense fortunes were made by the first manufactures of cotton, on Arkwright's plan of spinning by rollers, and similar fortunes may be expected by the pioneers in the new linen movement.

O. S. Leavitt.

Maysville, Ky., Jan., 23, 1351.

An American Steamer on Lake Nicaragua.

The American steamer Director succeeded in passing the San Juan river rapids on Jan. 1st, and immediately ran up the river, and launched upon the noble Lake of Nicaragua. This is the first steam vessel which has ever appeared on the great lake. The news of her arrival at San Carlos, the southern port on the lake, spread throughout the neighboring country like wild-fire, and hundreds of the natives, many of whom had never before seen a steam vessel, came running into the town. Lake Nicaragua is 95 miles long, by 20 wide, studded with small but luxuriant islands. It is one of the most beautiful inland sheets of water upon the face of the globe.