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ENGINES AND BOILERS---HYDROGEN IN BOILERS, BURNING BOILERS, SETTING BOILERS.

A correspondent inquires "what is the advantage of a high pressure over a low pressure engine or *vice versa*? One person tells me that the reason why the low pressure engines are not generally used in manufactories is that they are so bulky. If so, why use them on steamers? They do not usually have spare room there. Another says they use them on steamers because they give more power from the same coal; but they are of slow movement, then why not use them on shore, and if a quicker movement is required speed up the machinery by belts etc.?"

In England the low pressure or condensing engine has, until lately, been the favorite. Latterly, however, the high pressure is being used very extensively. We always doubted if there was anything gained by using the low pressure condensing engine except under certain conditions. The extra first cost, frequent repairs, and greater care and skill in working it neutralizes to a great extent the advantages obtained from condensation. Another objection to their use on land is that it is frequently difficult to get a supply of water for generating steam, to say nothing of the twenty-nine additional volumes for condensation. The condensing engine is not necessarily slow in movement. It may move as fast as the non-condensing engine; in fact from 350 to 800 feet per minute for the piston is no unusual speed, the latter of which may be considered pretty good speed for a non-condensing engine. One very good reason why condensing engines are used for marine purposes is that the steam is gotten rid of noiselessly. If one has traveled on Western rivers, where non condensing engines are used, and then at sea, where condensing engines are the rule, he would appreciate this fact.

Another correspondent, J. G, believes that a boiler will not explode without a sufficient cause, and that with sufficient water and a steady fire explosion is impossible. His theory of explosions—acknowledged by himself as not original—is that hydrogen, one of the gases which compose water, is the cause of explosions. He says: "May not a boiler be heated when the water is low to a temperature sufficient to decompose the water, or a portion of it, the oxygen combining with the iron and the hydrogen left free, which fluid, if ignited, would, in my opinion, produce an explosion violent enough to shatter the strongest boiler?"

This gas theory comes to us about once a month, on an average. We have replied to it repeatedly. The decomposition of the water supposed by our correspondent is a fact well established, but the hydrogen must be ignited to explode, and it is doubtful if our correspondent can tell us how hydrogen can be made to explode without a sufficiency of oxygen to make it inflammable. If the oxygen of the water has combined with the iron it certainly is not in combination with the hydrogen, and no oxygen from the atmosphere can enter the air tight boiler. The hydrogen notion is an exploded idea.

"B. O. B." of Canada says that by burning coke and the crude tar which accumulates on the bottom of oil stills he can run his five horse power engine with half the expense of wood fuel; but he is told that this fuel will rapidly burn out and destroy his boiler.

The information of our correspondent is correct. His boiler will not last so long using coke or coal oil as using wood. One reason is that the heat is more intense, and if not distributed, will act like the concentrated heat of a forge. But the principal reason why these fuels will destroy the boiler is that they contain sulphur which rapidly disintegrates the material of the best boiler iron.

An interesting communication from N. A. V., of Mass., which is intended merely as an inquiry, but which gives some facts that may be of value to others, says: "There are some points in setting a boiler which are not referred to in the interesting and valuable article on that subject in your issue dated Aug. 31st, which I think deserve attention; viz. the proper distance between the boiler and grate; is it proportionate to the area of the grate surface, or is a certain fixed distance always best? I had several evaporating pans, about thirteen inches above the grates, and it became necessary to raise the level of one pan; to save the time the grates were not disturbed, but the fire space was made five inches higher and after the change a tun of coal did one-third more work than before. Since then I have altered other furnaces and they have all operated in the same way. Does the same principle hold good in a steam boiler, and what is the best hight? Many furnaces are improperly bound together. A boiler should have a pair of strong rods, say of three-quarter round iron at the front end, one pair through the bridge wall, and another at the back end, also one pair lengthwise through each side wall. The binders should be of bar iron, one and a half by three quarters inches, turned up six inches at the end, for the rod to pass through, and put on edgewise. A furnace so secured will stand twice as long as one without proper binders and there will be no annoyance from the breakage inseparable from cast iron binders."

The proper distance from the grate to the boiler is an important point. It was inadvertently omitted in the article to which reference is made. Where space will allow we think about two feet from the bottom of the boiler to the grate is the right distance when using anthracite coal. For bituminous coal thirty inches is better. We think, from our experience with evaporating pans, you would find a better result by dropping your grate still lower, Such binders as you suggest are, we believe, generally used. The proper binding of the masonry of a furnace is a very important matter, and the suggestions of our correspondent appear to be timely and valuable. We are quite certain that money, trouble, and time could be saved by proper attention to the setting of boilers. No subject is more important to mechanics and manufacturers, and we shall soon present another illustration of this matter.

THE COAL PRODUCTION OF ENGLAND.

Our readers will remember that it is not a very long time, since the predictions of Sir William Armstrong relative to the probable exhaustion of the coal supply of England and the discussion of this subject in the House of Commons by Mr. Gladstone and Mr. Mill, caused considerable consternation in Great Britain.

Speculations of all sorts were indulged in by the press, the geologists propounded all sorts of theories and put forward all sorts of estimates as to the total quantity of coal actually deposited in the British Islands.

The political economists portrayed the most dreary future for England, and indulged in minute descriptions of the effects of the gradual falling off in coal supply—the gradual decrease of manufacture, and consequent impossibility of maintaining the present population, which must gradually decline by emigration or otherwise until a balance was reached between the mouths to be fed and the means of supplying them. Without adopting any of the estimates of the geologists as to the total quantity of coal in the British Islands, which, indeed, vary so much as to cause serious doubts to be entertained with regard to the accuracy of their predictions—it will be interesting to note that many eminent authorities estimate that beyond the depth of 4,000 feet, assuming the rate of increase to be about 15 per cent. per annum, the coal will be exhausted in about one hundred years.

All authorities seem to agree that 4,000 feet is maximum depth from which coal can be raised, simply on account of the high temperature, and that even at this depth and with the best ventilation, the colliery can only be worked during the cool months of winter.

To show the difference of the opinions that exist as to the total supply, the following opinion expressed by the *Quarterly Journal of Sciences*, three years ago, is given: "We are inclined to place the possible maximum of production at 100,000,000 tuns a year; and yet it has been shown that even with this enormous 'out put,' there is coal enough to last eight centuries."

The following table of the coal raised to the surface in England for the last twelve years will show that "the possible maximum of production" of this high authority was reached and surpassed in only two years from the date of its utterance. And also that since the great discussion in Parliament on this subject, the ratio of increase has been some 14 per cent.:

COAL RAISED IN ENGLAND FOR TWELVE YEARS.

Years.	*Tuns.*	*Years.*	*Tuns.*	*Years.*	*Tuns.*
1855	64,453,079	1859	71,979,765	1863	83,292,515
1856	66,645 450	1860	84,042,698	1864	92,787,673
1857	65,394,707	1861	83,635,214	1865	98,150,587
1858	65,008,649	1862	81,638,338	1866	101,630,543

COAL EXPORTED DURING THE SAME PERIOD.

1855	4,976,902	1861	7,855,115
1856	5,879,779	1862	8,301,852
1857	6,737,718	1863	8,275,212
1858	6,529,483	1864	8,809,908
1859	7,006,949	1865	9,189,021
1860	7,321,832	1866	9,916,244

Consequently, the coal used in England during this time, was

1855	59,476,177	1861	75,780.079
1856	60,765,671	1862	73,336.486
1857	58,656.889	1863	80.017,303
1858	58,479,166	1864	83,977.965
1859	64,972,816	1865	88,961,566
1860	76,720,866	1866	91,714,299

The home consumption has thus increased during the last twelve years, 54 per cent., and hence if the ratio of increase goes on at this rate, the eight centuries of 80,000,000,000 tuns supply existing in 1864, will be reduced in one hundred years by about forty-five billions, and in another one hundred years the eighty billions will be exhausted with no further increase in the ratio of consumption; but if the same ratio obtains, then the succeeding fifty years after the first one hundred will alone take out over one hundred billions.

But we think the opinion that the present ratio of increase cannot continue for such a period of time as even fifty years, is fully warranted, from the fact of the immense labor required to mine such vast quantities of coal.

THE EAST RIVER BRIDGE.

Engineer Roebling's report seeking to establish the practicability of the bridge project, prepared for the edification of the members of the New York Bridge company, has been made public. The leading points of his plan of construction and the dimensions of the proposed bridge, have already appeared in our columns. From the City Hall Park on this side, to the Brooklyn terminus on Fulton and Sands streets, the total length will be 5,862 feet. Of this whole length 3,480 feet will be suspended in three openings, the central span being 1,600 feet from center to center of the suspension towers. The cost of this structure is very exactly estimated by Mr. Roebling at $6,675,357. On the assumption that on the completion of the bridge as many people will avail themselves of this means of passage, as now patronize the five Brooklyn ferries, a fine investment, yielding extraordinary returns is promised to the members of the N. Y. B. company. To sink iron tubes below or upon the bed of the river, he denounces at best, as a temporary shift, and permanent tunnels of masonry only to be built when money is worth 2½ per cent, and the population shall have increased ten fold. In this we beg leave to differ from the distinguished exgineer, as our opinion, founded on some attention given to this and similar projects, is that it is very much cheaper, more feasible, and profitable to use the bed of the river as a roadway than to suspend sucha structure as that proposed by Mr. Roebling one hundred and sixty feet above the water. It might be a curiosity as a work of art, and monument of engineering skill, but it might also be a monument of the folly of its builders.

We have before had occasion to remark that for an expenditure of less than the sum of money which it is proposed to spend on this single aerial bridge, the people of Brooklyn might lay down several spacious and enduring tunnels. Indeed all of the principal business streets of Brooklyn and Williamsburgh could be directly connected with New York on the subterranean plan, and sooner or later these tunnels will be constructed.

It may be well for all who propose to invest this immense sum of seven millions in a single bridge to consider what would be the probable effect upon their investment, of the laying down of these underground roadways. With such competition the bridge would have to be maintained at a dead loss, instead of a profit; so it strikes us.

FAIR OF THE AMERICAN INSTITUTE.

According to announcement, the Thirty-Seventh Annual Exhibition of the American Institute of this city, was opened on Thursday, the 12th, inst., in the commodious armory of the Twenty-second Regiment, on Fourteenth street near Sixth Avenue, the building being fitted up and temporarily enlarged for the occasion. The opening of the exhibition on the day appointed was as usual premature, a large part of the space allotted to exhibitors, not being occupied, while many of the articles in position were not ready for public inspection. Although as yet very incomplete, the Fair promises during its six weeks continuance, to present a full and fine display of the products of American industry.

The opening address, on Thursday evening, was delivered by Horace Greeley, the president of the Institute. Gen. Halpine was advertised to read a poem on the occasion, but was confined to his residence by sickness. Mr. Greeley, in welcoming his audience to this festival of labor, asserted that the American Institute was about to commence the erection of a palace of Industry, which shall give a place to perpetual as well as to annual exhibitions. Within this building on the 4th of July, 1876, is to be opened the most magnificent Exposition that the world has ever yet seen, and hither the world is invited to come and see what America has done and can do, and to place in competition with it all that has been or can be done by the rival skill of the Old World.

The Recent Boiler Explosion.

On Tuesday, Sept. 10th, a boiler in Twenty-eighth street, this city, exploded and shot into the air, descending on the roof of a dwelling house at some distance, and passing through the roof and three floors to the basement or cellar. Its explosion and consequent fall caused the death of several persons. It was an upright boiler of somewhat peculiar construction, which has been illustrated and described in this paper. The real cause of the explosion cannot, as yet, be more than surmised, as up to the time of writing no investigation, either individual or official, has been made. One is ordered, however, and if close scrutiny and the assistance of practical men can determine the facts we shall have them to present to our readers in our next issue. In the meantime we forbear the expression of any opinion, which must necessarily, under the circumstances, be of but little worth.

THE CUBAN CABLE.—The shore line of the cable, after various mishaps and discouraging delays caused by unpropitious weather, has at last been successfully laid. Congratulatory telegrams were transmitted through the wires on the 10th inst., by the Captain General of Cuba, to the Council of Ministers at Madrid, on the completion of this last link in the chain of direct telegraphic connection between the Spanish possessions and the Mother country.