STEAM BOILER EXPLOSIONS.

We feel that this is a hackneyed subject, and approach it with reluctance, but so many explosions have recently occurred, that the public mind is excited to more than the usual degree of tension regarding them. We have now before us nine letters from correspondents on the subject, and these cover 33 pages of manuscript. Some of them are well written and we would willingly publish those if our space permitted, but being unable to do so, we shall endeavor to present the subject-matter of some of them.

One letter from a distinguished practical engineer in Cincinnati contains a description of the explosion which took place in Whittaker's factory, in that city, on the 10th of January last. This explosion cannot be accounted for by common causes, such as excessive pressure, or want of water. The boiler was 20½ feet in length, 38½ inches in diameter, and had two round flues, 16 inches in diameter, of ¼-inch iron. About three weeks before the explosion, the engine and boiler had been put in good repair, and worked three days with the steam at a pressure of 98 lbs. on the square inch. The next time it was used was when the explosion occurred. When steam was raised to 15 lbs. pressure the water was up to the highest gage-cock, and the engine started. It was now worked for 45 minutes at intervals of time, during which the furnace doors were open, and the pressure gradually fell to 10 lbs The doors were now closed to raise the steam a little higher, and in one minute afterwards the explosion took place. No feed water was pumped into the boiler during the working, as there was plenty of water in it. The two flues collapsed, and the boiler itself was projected through the thick walls of the cellar in which it was placed, which were of blue limestone, then it struck the chimney stack which had 12-inch walls, and it cut through three sides of it; then it encountered the dry-house wall, 2¾ feet thick, of blue limestone, and it cut its way through it with a clean hole like that of a bullet passing through glass; thence it passed on and demolished three furnaces standing in a line, each 7 feet square, with 12-inch brick walls; and was only arrested by a cross stone wall 2¼ feet thick, built up against the earth pavement on the other side of the street. All the persons in the building were more or less injured, but none fatally. When the boiler was examined there was no evidence of a deficiency of water or excessive heat in it at the time of the explosion; a large amount of water escaped from it in the cellar and into the room above at the time. The steam-gage was afterwards tested and found correct. These facts have been obtained from intelligent and reliable persons, who were in charge of the boiler and engine.

We have been somewhat particular in relating this case because it is one of the most extraordinary and destructive explosions that have ever occurred. The boiler had plenty of water in it, the pressure was only 10 lbs on the inch, and it was capable of standing 9[illegible] lbs. Here certainly is a fact for the electrical theory of explosions. There is one other way, however, of accounting for the circumstance. Water deprived entirely of its air can be heated considerably above 212° without indicating an excess of pressure, and it is then liable to explode like gunpowder. As no feed water was pumped into the boiler while it was in operation, all the air was no doubt expelled from it, and the explosion may have been thus caused. This is one kind of explosions.

In a letter from A. H. Goff, of St. Louis, Mo., on this topic, he attributes explosions to two causes, one by superheating the steam when the engine is stopped, and the other by decomposition of the water. When the engine is stopped and no steam taken from the boiler, the fire gradually creeps up the sides of the plates, causing the steam to become very hot and dry, in which condition it has a great affinity for water. When the engine is started, the water is relieved from some of its pressure, thus causing it to rise upon the heated plates. The superheated steam thus receives its full quantity of water, imparting to it such an overwhelming elasticity that few boilers can withstand it.

This no doubt is a full explanation of the cause of many explosions. The remedy for this, as well as the previous conditions for causing an explosion, is to keep the feed pump in motion during the whole time the engine is standing idle. Donkey-engines for feeding boilers have prevented scores of explosions. An explosion by water becoming low in the boiler is thus explained by our correspondent. When the plates of the boiler become overheated, they decompose the oxygen, and set the hydrogen free; if no water is pumped in, an explosion cannot take place, but "whenever water is introduced, the hydrogen receives its full quota of oxygen, and a terrible explosion is the consequence."

Water (H. O.) is composed of two gases, oxygen and hydrogen. When these are mixed together in proper quantities and a spark sent through them, they explode with violence, forming the fluid water. Neither hydrogen nor oxygen will explode separately. Red-hot iron decomposes water, by the oxygen uniting with the metal and setting the hydrogen free, and this may take take place in a boiler in which the water has been suffered to become low, but the fresh feed water cannot supply the requisite quantity of oxygen to cause an explosion, as it merely contains a small amount of atmospheric air, in which the oxygen only forms one-fifth of the whole.

In a carefully-prepared communication by the experienced engineer, J. G. Whitlock, of St. Luke's Hospital, this city, he attributes explosions to saturated hydrocarbon gas, caused by the water becoming too low. For example, if we take common coal, or wood gas, and saturate it with eight times its volume of air and then ignite it, a violent explosion will take place. If the water used for a boiler contains a great deal of organic matter, called "slush," and if a considerable amount of grease finds its way into it, this gas will be generated when the water becomes low and the plates red-hot. It now only requires a sufficient quantity of oxygen to saturate this gas and cause an explosion. Our correspondent believes that this is furnished from the heated air in the boiler, or some other source,, as he has never known of an explosion which was not due to a deficiency of water in the boiler at the time. He is of opinion that the gradual accumulation of pressure in the boiler will not cause an explosion, but a mere rip in the metal. He has frequently seen smoke issue from the gage-cocks and valves of boilers when the water became low, andfrom his long experience and the many facts on the subject brought under his notice, he is of opinion that unless the water becomes too low in a boiler, an explosion will not take place.

We have evidence to the contrary of this, but no doubt he is right in regard to a majority of explosions taking place from a deficiency of water as the leading cause. The preventive for this is in the exercise of more care on the part of engineers. As various heaters for buildings have exploded, we have also received a very able communication on this subject from Mr. Whitlock, which we will publish at an early date, as the time is at hand when many of these will be put up for winter use.

Another correspondent, L. G. Evans, of Spring Hill, Ala., attributes explosions to the water becoming too low, and the plates highly heated, whereby, when fresh water is fed in, a vast amount of steam is rapidly generated, and the boiler is exploded by the excess of pressure. His remedy for such a result is to make the safety-valve of such a large area that it will carry off the excess of steam without rupturing the metal.

A dreadful accident took place at Roach's foundry, Goerck-street, this city, on the 2nd inst, by which several persons lost their lives. The cause of it was low water in the boiler, whereby the plates became red-hot. The gages were examined just a little before the accident and indicated plenty of water. It has been proved that this was owing to the water priming, whereby the engineer was deceived as to its quantity and hight. The metal of the exploded boiler was found burnt and brittle.

We have also received a letter from Mr. Thomas Prosser, C. E., this city, on the subject, but as it enters more into the pressures of steam, and the science of expansion, we reserve it for future publication.

Another correspondent proposes arched boiler-heads to prevent the common kind being blown out and torn away.

The conclusions which we draw from all our correspondence on this subject and from information derived from other sources is, that the chief and common danger of explosions is low water in the boiler, when there is an intense fire in the furnace.

Leaving all the theories of the causes of explosions entirely out of the question, the great agent of safety is the feed pump, and engineers should pay the most unremitting attention to see that it is kept in proper order, and that the requisite supply of water is constantly furnished. Not an explosion related in the whole of our correspondence would have taken place had the requisite feed water been supplied.

THE COTTON CROP.

What is called "the crop year" has just closed, and it has been a somewhat eventful one. The previous year of the panic had passed with a very small consumption, leaving large stocks of goods in the hands of merchants, as well as considerable supplies of raw materials in the hands of manufacturers. Returning ease in the money market has been accompanied by abundance of crops, cheapness of food, low rates of transportation, and every element of a large consumption of goods, promising to absorb the whole of the crop, how extensive soever it might prove to be. This promise was not disappointed up to January, and purchases at home and abroad were very large at improving prices. The intervention of war changed the course of events to some extent, imparting a disposition to curtail business, more particularly in the United States, where the purchases of the spinners underwent a sudden curtailment for a season. As a whole, the disposition of the crop has been as follows:—

	1856.	1857.	1858.	1859.
Crops	3,550,000	3,150,000	3,150,000	3,700,000
Exports	3,000,000	2,400,000	2,650,000	3,000,000
Consumption	550,000	650,000	450,000	700,000

The quantity exported this year has been mostly the same as in 1856, but at higher rates. The official values of that year, as compared with the current values this, have been as follows:—

	Bales.	Export value.
1856	2,991,175	$128,382,531
1859	3,000,000	150,000,000
Increase		$21,617,649

This amount goes far towards compensating for the decline in breadstuffs. The quantity and value taken by the spinners in the United States, in the two past years, are nearly as follows:—

	Bales.	Value.
1858	450,000	$20,020,000
1859	700,000	38,500,000
Increase	250,000	$18,480,000

This marks a high degree of activity among the manufacturers, and in addition to this large production the quantities imported have been considerably increased as compared with last year. The combined supply, however, imported as well as manufactured, has not, taken with last year, equaled the average of the years 1856 and 1857. The continuance of the war caused a rapid decrease in the purchases of the spinners during May and June, under the impression that a prolongation of hostilities would inevitably cause a decline in the material. The restoration of peace has now given a new aspect to the matter, with the promise of some years of repose, accompanied by good harvests, and an earnest desire on the part of the European governments to promote confidence and thereby develop material well-being. The demand for goods is likely to exceed that of any previous year. At the same time, the promise of the cotton crop to this moment is, as far as can be judged at this early day, in excess of that just now brought to market. It is not impossible that the exports of the coming year may be pushed to 3¼ millions, at a price equal to that of 1857, say average $65 per bale, which give an export value of $210,000,000, and impart to the southern section of the country a greater degree of prosperity than ever yet fell to its lot. The character of the northern business will probably change. It is always the case that a rise in the value of the raw material induces a change from coarse to fine numbers, that is to say, to put more labor and less material into the fabric. At the same time, the cheapness of food, which favors the development of city business at the expense of the agricultural sections, causes a demand for the finer qualities of cloth rather than the coarser kinds. The demand for material is once more active since the settlement of the peace questions, and the industry of the manufacturers is daily on the increase.—*United States Economist.*

LUBRICATING SUBSTANCES.—A careful experiment, made on the Michigan Central Railroad, in regard to the comparative value of whale and metallic oils, resulted in showing a great difference in favor of whale oil. Running a single train 103 days, one-half of the journals were lubricated with whale oil, consuming 28½ gallons, costing 60 cents per gallon; the other half with metallic oil, consuming 27 gallons, costing $1.34 per gallon.—*Railroad Register.*