Correspondence.

Zinc in Boilers.

To the Editor of the Scientific American:

In your paper of December 12, a correspondent states that zinc is a preventive of boiler incrustation. Seven or eight years ago, I tried the experiment, under the idea that an electrical condition might probably have something to do with boiler incrustation. The boiler I had was an upright one. I placed a piece of zinc, weighing about two pounds, on the dome inside, between the tubes; it remained there about two months, and during that time the boiler was opened at the bottom, on three sides, for a weekly cleaning. I noticed that the mud (Mississippi mud) was quite different from that previously deposited. Before it was mostly made up of scales; but after the zinc was put in, the deposit was soft, and scarcely a sign of scale was visible, the surface of the iron within looking fresh and new.

Notwithstanding this favorable action of zinc, it is not to be recommended for this purpose. I found the cylinder, piston rod, and piston head badly incrusted by something which I could not understand; the pump worked badly and frequently failed, becoming incrusted within. I sent it to be repaired to the maker, who, on opening it, expressed his surprise at its condition, and said: "How came this stuff on the pump? It looks like calamine." Zinc as a preventive of boiler incrustation will not do; if, however, the zinc produces a galvanic current, and renders the iron negative, then the experiment is suggestive of a principle that can be used by an external application of the galvanic force.

Carondelet, Mo. L. T. WELLS.

To the Editor of the Scientific American:

I saw in your issue of December 12 that an engineer on the steamship St. Laurent, running between New York and France, had left an ingot of zinc in one of his boilers; and on looking for it at the end of the next trip, he found it all wasted away to a mere mud. This is not new here. Mr. J. J. Illingworth, Chief Engineer of the Utica Steam Cotton Mill, first introduced zinc in their boilers nearly 20 years ago; and by his recommendation it is now used in the New York Mills' boilers and in many other places. Mr. I. claims that the zinc has a great affinity for oxygen, and therefore absorbs the oxide in the water, and thus prevents its affecting the iron of the boiler. I herewith send you a couple of pieces which I obtained from him; and you will see that they are not all gone to mud, as they would have been if they had been left in the boiler a week or two longer. These pieces have been in the boiler about four weeks. In the New York Mills where soft water is used, the zinc will lay there without being affected: but as soon as the hard water of the Sauquoit Creek is used, it begins at once to affect the zinc. Nor is this all the effect of the zinc in the boilers; it prevents the steam pipes (running round the mill for heating purposes) from rusting.

To show this more conclusively, I will say that the piping in the above mill, where zinc has been so freely used, has been in 25 years, and has needed no more than the ordinary repairs that such pipes require. But on the other hand, the company built a new mill (which was started in October, 1869), and, for some reason not explained, there was no zinc put into the new boilers for about 3 years. The result of this neglect or oversight was that the heating pipes all through the mill began to leak at the elbows, couplings and Ts; and on taking the pipe apart for repairs, it was found that, wherever the steam either struck the T or elbow or dripped into it, there was a hole eaten into it; and when a piece of pipe was to be taken down, there was no telling where the workman could stop, because the pipes, Ts, elbows, and couplings were generally eaten away. I also send you a T, which is a fair sample of all the pipe and other joints connected with it.

When this was brought to the knowledge of Mr. I., he began at once to put zinc into the boilers of that mill, and the result of it is that the rusting of the pipes has entirely stopped, and the bill of repairs lessened accordingly. I am told that the above engineer has used zinc in his boilers for over 25 years, with the same results in all cases.

Utica, N. Y. AJAX.

Phosphor Bronze.

To the Editor of the Scientific American:

The manufacture of this alloy was commenced in our city in 1872, and has since gradually gained its way into many of our industrial works. At the time of its introduction, I had charge of the machinery of one of our large rolling mills, and was induced to try it for journal bearings for our rolls and other heavy machinery. The disadvantage that bearings in rolling mills labor under is that they are scarcely ever bored or fitted in any way, the pattern being made as exact as possible, so as to save the work of fitting. Thus the bearings are subjected not only to the heat induced by friction, but also to that imparted to the rolls by the hot iron passing between them. Add to this the muddy, gritty water run upon the necks to keep them cool, the immense amount of cinder thrown into them from the hot iron, and often bad grease and a careless roller, and you have a combination of difficulties that are hard to overcome. The brass bearings in an eight inch train of rolls last for from one hour to six months, the latter being the exception. As I have seen both brasses and necks cut so badly as to be worthless within an hour, by cinders getting into them, by worthless grease, by hard spots in the brass starting a neck, by the chippings from the neck tearing the brass to pieces, and by the carelessness of the roller, I know what the bearings have to stand.

I will describe the three most important trials made with the bronze bearings. I placed a set of trial bearings under the necks of a pair of finishing rolls, in a ten inch mill, on November 25, 1872. On November 23, 1873, they were taken out and examined, when it was found that they had not worn one thirty-second of an inch on the bearing proper; and they were only discarded because the collars were worn out on account of the excessive end wear, caused by forcing the bearings against the ends of the rolls by set screws, to keep the grooves over each other. The second test was a much severer one. A set of bronze bearings were placed under and over the middle roughing roll of an eight inch train on December 2, 1872, and were used just one year before they were worn out, though the necks of the rolls had been previously badly scored by cinders. In the roughing rolls of any mill a large amount of cinder is thrown into the bearings, thus making such tests as the above very severe. In the first test, a careful roller was in charge of the mill; in the second test, a careless one. The third test was the most severe of all. One of the E bronze plates was put under the upright shaft of a thirty-five ton rotary squeezer, and a set of A bronze plates under the horizontal shaft. Every rolling mill man knows that it is an impossibility to keep all the cinder from the bearings of the horizontal shaft, cover it as you will. The one mentioned had four covers, owing to the fact that, as water is used on the squeezer to keep it cool, it will wash fine particles of cinder into the journals. After using it from August 1, 1873, to August 1, 1874, having made about seven millions of revolutions and turned out over ten thousand tuns of iron, the upright bearing had worn but one sixteenth of an inch, and the horizontal about one tenth of an inch, a result far ahead of any other I have ever been able to hear of.

Six or seven grades of this alloy are now made, being marked by letters, the Sligo, or A, being used principally for journal bearings. The E brand is almost as hard as steel. I send you a sample of the A, and also a chart of its tensile strength compared with other alloys. I have never had anything to approximate it for rolling mill use, except a composition of nine parts tin to one of copper; but this is not often available, on account of its low melting point.

I am induced to send you these lines, as I have not noticed any actual trials reported by any of your correspondents, and for the reason that I have received so many good things from the table you spread that I cannot refrain from adding my mite. JOHN A. BRASHEAR.

Pittsburgh, Pa

Steam Boiler Explosions.

To the Editor of the Scientific American:

The frightful results of the bursting of steam boilers, entailing (it may safely be assumed, in three cases out of four) the loss of life or maiming of one or more persons, have led to many inquiries as to the probable cause of these catastrophes. The almost invariable verdict is rendered, however, by the coroner's jury that "Mr. ——, the engineer, came to his death by the explosion of a steam boiler in the factory of Messrs. Smith & Jones, to whom no blame is to be attached, the cause of said explosion being unknown, reliable witnesses having sworn that five minutes prior to the explosion the water stood at 3 inches over the flues and the steam gage indicated only 90 pounds pressure to the square inch." In some cases, a stoker testifies that he observed a trifling leak in the lower part of the boiler a day or two previously, but did not mention it, as it appeared so insignificant. Let us, however, examine into the subsequent effects of this insignificant leak.

The nature of the effects of one of these apparently spontaneous explosions, the demolition of the entire building in which the boiler was, the shattering of all the windows for some distance around, and the deafening report, all preclude the possibility of our assuming a steadily increasing force as their cause. A sudden and violent force, such as caused by the explosion of gunpowder, has evidently here been at work. Witness the bursting of the Westfield's boiler, of which two pieces, smashing through bulkheads and machinery, traversed the entire length of the ferry boat and lodged respectively in her stem and stern. I need not recall, to the recollection of your New York readers who visited the scene of the disaster, the appearance of the buildings near the excavation on the New York and New Haven railroad one year ago, occasioned by the explosion of the boiler of (if my memory serves me) but a six horse power engine. Since such effects as these could only be the result of some sudden and violent force, where must we look for it?

It is obvious that no steadily increasing power could produce the too well known effects of bursting boilers, as is shown by the manner in which they do occasionally burst while being subjected to the water test. Then, as a rule, a line of rivets gives way, or a seam tears open; but in no case is a fragment torn completely away, as is almost invariably the case when they burst while in use.

The reason is simply this: Let us assume that a boiler containing 1,000 pounds of water generates steam to a pressure of 90 pounds to the square inch. According to Regnault, the temperature of the water in the boiler would be 318° Fah., or about 106° above the boiling point under the ordinary atmospheric pressure. Now suppose the boiler to burst from weakness of a plate or corrosion of a line of rivets. The pressure is instantly relieved, *but the water in the boiler is 106° above its natural boiling point.* Now the heat required to raise 1,000 pounds of water through 106° would raise about 586 pounds of water through 180°, or, according to Lavoisier, would convert about $\frac{2}{11}$ as much water into steam at the ordinary atmospheric pressure. What is the consequence? *About 207 pounds of water are instantly converted into steam,* occupying about 2,890 cubic feet: in other words, producing an explosive effect just about twice as great as an equal bulk of gunpowder. Imagine exploding 3 cubic feet of gunpowder in a steam boiler!

The figures here given are rather an under than an over estimate, as no account has been taken of the evaporating power of the enormous amount of heat made sensible by the condensation of the superheated steam in the boiler at the moment of explosion. R. D. WILLIAMS.

Maryland Agricultural College, Md.

Bridging the Niagara River.

To the Editor of the Scientific American:

Is it impossible to erect a bridge across the Niagara river at Lewiston, to consist of one or more arches of some enduring material, such as stone, bronze, or iron? Will some engineer answer this question, or give an opinion?

Such a work, if practicable, and built about 100 feet wide, would be better for the interests of the people of this continent than the results of the late war. It might be built as a monument to Washington, and be dedicated to his memory. If such an enterprise can be inaugurated and completed in twenty years, I will give $500 toward it, and $500 to create a trust fund of $100,000 for the engineer and the family of the engineer whose skill shall be used to this end.

We have a monument of the war system in our colossal debt; now let us have one for a better purpose—one that shall interlock the friendship of two great and growing nations, Canada and the United States, and put them on good behavior and progress in the arts of peace. I make this proposition in the highest hope for results to industrial progress.

C. A. H.

[The suggestion of our correspondent is a good one. We think it probable that such a bridge could be built, and that Captain James B. Eads, of St. Louis, Mo., is the man to execute the work.—EDS.]

A New Light.

Considerable attention is now being given in Paris to a new lamp, the invention of Messrs. B. Delachanal and A. Mermet, and intended for photographic and other purposes where a brilliant light is required.

The media employed are carbon sulphide and binoxide of nitrogen. Ignition of binoxide of nitrogen containing vapor of carbon sulphide produces a brilliant flame of a violet blue tint, peculiarly rich in chemical rays. The carbon sulphide lamp by which this flame is produced continnously is constructed simply of a flask with two tubulures, the vessel having about 30·5 cubic inches capacity. The flask is filled with spongy fragments of coke, or, better, of dried pumice, which imbibes the carbon sulphide. Through the central tubulure passes a tube to within a short distance of the bottom; in the other mouth or tubulure is fixed a tube of larger diameter, about 7·85 inches in length. The latter tube is of glass or metal, and contains an arrangement acting as a safety valve as well as impeding return of the gas and preventing explosion. Binoxide of nitrogen is passed by this tube into the flask, and the gaseous mixture is conducted by a caoutchouc tube to a kind of Bunsen burner, from which has been removed the air port and the cone regnlating the supply of gas. The binoxide of nitrogen is produced by a St. Claire Deville apparatus; but instead of decomposing nitric acid by copper, which would be too expensive, a mixture of nitric and sulphuric acid is caused to act upon iron.

The flame, which is about 10 inches in hight, possesses high photogenic properties, and is much superior to the light obtained from the magnesium ribbon. The apparatus is nearly as portable, the mixed acid being contained in one vessel which communicates by a tube with a vessel containing fragments of iron. Supply is regulated by a cock. The flame is constant, unlike that of the electric light, and is not subject to spontaneous extinctions like the magnesium lamp. Photographs of human subjects are obtained in a less exposure than fourteen seconds. Photometric tests show (flame for flame, per measure) about twice the power of the oxyhydrogen light.

The inventors are studying the question of development of the green coloring matter of plants by means of this light. The experiments are being made in M. Dumas' laboratory at the Central School of Paris, and the result will shortly be made public.

Jaw-Wrenching Chemical Nomenclature.

Is it not about time that something was done to simplify the chemical names of organic compounds? It seems to us that some of the new cognomens trench closely upon the bounds of absurdity; and while they may be clear enough to the older chemists, accustomed to words which would stagger the best of orthographists, we submit that they tend to heap up a mountain of technicality as unnecessary as it is discouraging to the coming student, and thoroughly unintelligible to the general reader.

A recent number of the *Deutsche Chemische Gesellschaft* informs us that a certain chemist has studied *orthoamidocresylparasulphurous* acid, and that by the aid of hydrochloric acid and chlorate of potash he has transformed it into *trichlororthotolaquinone*. Further on the author discourses on *nitrorthocresylolparasulphurous* acid, and finally some other chemist hurls at us the fearful jaw-breaker of nitrate of *ethenyldenitrophenyldiamine*. There are plenty more examples of this kind before us, but we spare the reader. These names are of German origin, and hence the German chemists are responsible for them. Goethe, in his "Aphorisms on the Natural Sciences," says: "The Germans have the gift of rendering the sciences inaccessible," a sharp criticism which finds an apt illustration in the present instance.