THE WESTFIELD EXPLOSION.---HOW BOILERS OUGHT TO BE INSPECTED.---INTERESTING TESTIMONY BY A WIDE AWAKE MAN.

Having made, in another column, what comments we wish to make on the evidence of Mr. Robert K. McMurray, published below, we shall say little by way of introduction here. The gentleman named is an inspector employed by the New York and Hartford Steam Boiler Insurance Association, and was a manufacturer of boilers for fifteen years. We regard his evidence as the most important and valuable given at the inquest, and commend it to the careful consideration of our readers.

Robert K. McMurray was sworn and said: I am Inspector-in-Chief of the New York and Hartford Steam Boiler Insurance Association; my duties are to inspect all boilers of parties who ask to be insured. and reject any that are unsafe; I have been myself a maker of boilers for nearly fifteen years past, and have been with the Hudson River Railroad Company as an assistant inspector of boilers; our practice is to inspect boilers every three months, in accordance with the terms of the policy; we inspect the boiler internally, and then once a year we give notice to have the boiler cleaned and well swept, so that we can get at the condition of the iron.

HOW CRACKS IN BOILERS ARE DETECTED BY THE INSPECTOR.

We get what is then called a "cold inspection," and go in to see that there are no cracks, and see that the braces are tight, and if the "crow feet" are fast; we find a good many cracks, and we also search for leaks; on the outside of the shell we examine all the parts with a hammer and examine the seams; if there are any cracks we can discover them by the sound of the stroke of the hammer; sometimes, where there are seams cracked and we cannot distinctly get at them at first, we sound on to another sheet, and by comparing the difference of sound of the whole and the broken sheet we find out the crack; we have 1,500 boilers now to inspect, which we inspect four times annually; I would not swear that I could have discovered that crack in the boiler of the *Westfield;* we have many times to discover defects, and have not such good opportunities as in that; still in my own mind I have not the slightest doubt that by using a light pin hammer I should have discovered it; it is my special business to see if there are any cracks in boilers by sounding and testing.

BLISTERS.

Sometimes in searching a boiler we discover a blister; if that blister is not too thick we cut it off altogether; if too thick we patch it after cutting it; I believe the cause of the Westfield explosion was in the laminated sheet; I have no idea how long those cracks had been there, but they must have been there for years; we have more trouble with her class of boilers than with any others, and where that crack was, was just the place we should have looked for them; I looked and could only see that there had been one saddle there; with regard to the fact of the boiler not having been opened for a year, we should have felt compelled to make a complete —we were duty bound to make a thorough—investigation; there was nothing that I could see to prevent there being a thorough examination made; there was plenty of room under there, and although it was very dirty we always look there because we find so much trouble there; we are all the time discovering defects, though we examine four times a year; it is common to find such defects; we have a thorough system of searching, and there is nothing in this type of boiler to prevent any one going in; we go clean through all the large flues and the under and upper parts of the shell.

THE HYDROSTATIC TEST OF LITTLE VALUE.

Immediately after the hydrostatic test, we often find a great many defects, so that *we can place no reliance whatever on the hydrostatic test;* we had a case the other day up in Buffalo, and I was there while the inspector was there with the hydrostatic test on the boiler; he had already given a certificate for the boiler to be worked up to ninety pounds per square inch.

TO FIND DEFECTS, GO INSIDE YOUR BOILER.

And immediately afterwards I went into one of the boilers and discovered an immense crack; we have no risks on the ferry companies; I have no idea of the amount of risks we have at present; if a man had inspected a boiler for us, and it afterwards turned out he had insufficiently done so, I should recommend him to be discharged.

EDUCATION NOT AN ESSENTIAL QUALIFICATION FOR ENGINEERS.

I do not see any reason why we should not accept the risk with an engineer running her the same as the one on the *Westfield;* I would not have hesitated at all, knowing the antecedents of such a man; if he was capable of taking charge of the water, and understood the management of the engine, I should think he would do well enough.

STANDARD OF EDUCATION FOR ENGINEERS.

Mr. McMurray continued the remainder of his testimony, bearing, for the most part, upon the general qualifications of engineers. He thought engineers and boiler tenders should be intelligent, careful, and sober, and should thoroughly understand the working of the boilers and engines placed in their charge. Beyond this, he did not regard a high standard of education necessary.

A CHARITABLE institution, valuable to the afflicted and to the science of surgery, is now open at 69 West 35th Street, New York. Its object and importance are indicated by its name, the New York Ear Dispensary. Drs. George B. Pomeroy and Samuel Sexton are the attending surgeons.

The Magnetic Mineral Wells.

These new wells are in the immediate vicinity of Grand Haven, Mich., at a locality called Fruitport, a village delightfully situated on the peninsula formed by the waters of Grand River and Spring Lake, and only about one hundred miles distant north from Chicago.

The water from one of these wells has been analyzed by Prof. Wheeler, of the University of Chicago, and has been found to contain 628·3719 grains of solid matters to the wine gallon of 231 cubic inches. The matters in solution are as follows:

Chloride potassium	4·2880
" sodium	405·5330
" calcium	113·4200
" magnesium	36·2000
Bicarbonate soda	0·0547
" lime	0·1308
" iron	1·0090
" magnesia	0·0040
" manganese	0·0534
Bromides	2·1700
Sulphate of soda	46·7000
Silicic acid	0·5030
Ammonia	0·0158
Organic matters	18·2902

With traces of lithia and alumina.

The water, independent of whatever magnetic properties it may possess, is certainly an interesting one. It is among the richest in solid constituents, and certainly ought to possess valuable therapeutic properties. Its dissolved matters are, in amount, fully two and a half times as great as those of the St. Louis spring—the latter footing up to 279·60 grains —and seem also to be more valuable and interesting qualitatively. They are fully double those of the Saratoga Pavilion spring (311·7 grains per gallon), and one fifth greater than those of the Saratoga Excelsior (507·8 grains), and the Gettysburgh springs (566.3 grains). The Fruitport waters differ from all the others above mentioned in containing a large proportion of their constituents in the form of chlorides, and in having but a small relative proportion existing in the form of carbonates dissolved by means of carbonic acid as bicarbonates.

It is not at all surprising that these waters should have attracted some attention. Already their locality promises to be a favorite one for pleasure and health seekers from Chicago and other western cities, and excellent hotel accommodations for such have been provided by the enterprise of the first named place. The facility with which the locality can be reached will recommend it to many, while the ascribed wonderful magnetic properties of the waters, in connection with the pleasant and healthful surroundings, will serve to attract those anxious to find remedies for old ailments. The assertions, says the *American Exchange and Review*, which have been so persistently made regarding the magnetic properties of these and some other wells throughout Michigan are based not merely on the dictum of ordinary observers or visitors, but are founded measurably on the investigations of well known and able scientists.

In his latest report of the progress of the State geological survey, Prof. Winchell has the following on this somewhat novel feature in mineral waters: "The water, however, seems to possess the property of exciting polarity in a rod of neutral iron inserted into a bottle of it, through a cork. The polarity of the outer end is the same as that of the south end of the needle. I ought to add, however, that some experiments since made at Eaton Rapids by Dr. Hilgard, of the United States Coast Survey, with delicate apparatus, do not sustain the indications of my rougher experiments. Nevertheless, my results were so many times produced, from so many different wells and under such varying circumstances, and so completely in accordance with a rational method that, for the present, I cannot see the propriety of discarding them."

There remains much to be done before sufficient is collected for satisfactory generalization upon the origin of this peculiarity of the Michigan waters. In the meantime much will be accomplished by their use as a remedial agent.

The Scientific Value of Cheese Factories.

The American system of cheese factories was established nearly twenty years ago, and in its present condition of maturity it retains all the essential features which were characteristic of its infancy. The test of twenty years' experience in a country where apparent improvements are eagerly submitted to a fair trial is amply sufficient to prove the success of the system. Recently the question of the adaptability to English dairy districts has acquired considerable prominence in agricultural circles, and is now passing from the stage of discussion to that of experiment. The two great merits which are claimed for it are, economy in the labor of production, and superiority of quality in the produce. It is evident that if a dozen farmers convey their milk to one building (a factory) to be made into cheese or butter, fewer hands are required to perform the work than if the process were carried on at a dozen different places by as many sets of people. The factory can be furnished with better labor saving machinery than the farm dairy, and the former establishment requires no more supervision than the latter. The process of cheese-making, also, occupies practically the same length of time, whether the quantity of milk under treatment be large or small, so that two or three persons whose energies are concentrated at one place will produce as great an economic result as a dozen or more who are necessarily employed at as many different points, each one going through the same routine independently of the other.

The superiority in the quality of the manufactured article may be more difficult of explanation, for the best farm dairies produce as good cheese as any factory. The reason why the establishment of factories has improved the average make of cheese is because fewer first rate cheese makers are required under the factory system. But when Jesse Williams established the first factory twenty years ago, the great bulk of American cheese was extremely poor, and for many years after it was almost unsaleable in the English market. At the present day, on the contrary, it can compete on even terms with all but the very choicest English makes, notwithstanding that it has to undergo the ordeal of a long seavoyage. The factory system, therefore, has not only improved the average quality of American cheese, but it has very considerably raised the standard of the choicest brands.

Students of nature are perfectly well aware that the most sure and rapid progress is made by means of association and co-operation. The same phenomena are observed from different points of view by workers in the same field; a comparison of their notes leades to the grouping of kindred facts; the apparent exceptions are seen to be the product of attendant variations in the methods or circumstances of observation and, by a process of induction, an explanatory theory is arrived at, to be confirmed or rejected by future investigations. In this manner the cheese factory system has gone far towards the establishment in America of a science of cheese making. Each factory has been the theater of exact observations, which have been duly recored. The results of comparisons of these records have been embodied in papers read before the American Dairymen's Association; and the conclusions of the authors have been frequently put to the crucial test of experiment.

Hints to Carpenters.

The *American Builder* believes that there is much labor in vain in the ornamentation of houses, especially wooden houses. It tells carpenters, before making and fixing a quantity of ornament, to be sure that it is good, and goes on to say: There are many things that you do, and many others that an architect—if there be one in the case—will often instruct you to do, which are neither tasteful nor in good construction. Of course there are exceptions. You may be sure of this, however, that the more elaborate and covered with ornament and carving a building is, the more you are going on the wrong tack. Real beauty consists not in added features but in the body of the work itself, and this fact should always be borne in mind.

The principle of carving wood for outside ornament is wrong. We would not say it is to be discarded altogether, but, still, we have that leaning. Cut work, and that of the simplest kind, is the best. Complexity in forms and ornaments is mostly bad. It not only requires unnecessary labor to produce, but there is actually vexation in the mind of the spectator When people see a thing that is crowded with intricate work, that it takes them trouble to make out, it is tolerably good evidence that such work is not exactly what is wanted.

Give great attention to the sizes and proportion of doors and windows, and pay especial attention to the construction; and never, if possible, conceal its principles, but let them form the basis of ornament.

Moldings, cornices, and miters are not be put in exposed positions.

It is surprising what an excellent effect can be produced by cutting, even with little or no molding or carving.

We do not stick much molding or carving about a ship. How plain, yet how beautiful it is, simply because of its proportions and because—it looks like work.

BE CONTENTED.—Bulwer says that poverty is only an idea in nine cases out of ten. Some men with $10,000 a year suffer more for want of means than others with $500. The reason is the richer man has his artificial wants. His income is $10,000 a year, and he suffers enough by being dunned for unpaid debts to kill a sensitive man. A man who earns a dollar a day and does not go into debt is the happier of the two. Very few people who have never been rich will believe this, but it is true. There are thousands and thousands with princely incomes who never know a minute's peace, because they live beyond their means. There is really more happiness among the workingmen in the world than among those who are called rich.

THE following ludicrous arrangement of sentences, quoted from different parts of a letter of H. M. Paine in the SCIENTIFIC AMERICAN, relative to his electro-motor, are produced by the *Brooklyn Eagle:* "Some years since I made the discovery that when hydrogen gas was treated by simple contact with turpentine, it was rendered highly luminous without any perceptible waste of the turpentine. An engine on this principle has been in constant operation for eight months running nine hours per day, doing a duty of 67,000 foot pounds, at an expense of three ounces zinc per day of nine hours."

THE use of petroleum as fuel for locomotives is again being discussed, a Frenchman having devised a new form of boiler furnace for the purpose. It is claimed by the inventor that the engine consumes its own smoke perfectly, a great desideratum in the combustion of petroleum. The oil is supplied to the fire very gradually, to avoid danger of explosion. We are informed that the consumption of oil was at a rate thirty-five per cent by weight less than that of patent compressed coal, of good quality.

A CURIOUS experiment, that of testing the vitality of fishes under a great pressure of water, was recently tried in France. Fishes preserved their health under the weight of 400 atmospheres, equivalent to that of a depth of 13,600 feet.