Correspondence.

Strength of Walls.

To the Editor of the Scientific American:

Being an admirer of the splendid illustrations which you issue, I take the liberty of stating what I know of the relative strength of brick and stone walls. I have seen in your December issue an article taken from the *Brick and Tile Gazette*, saying: "A two-brick wall is equivalent in strength to one in solid masonry two feet." As a mason I feel inclined to contradict such, when no proof is given only that bricks absorb more moisture. Now, I say if a stone wall two feet in width is properly built, it is equivalent in strength to a 2 foot 6 inch brick wall. JOHN TREACY.

New York, January, 1886.

Boiler Explosion—St. Mary's Church, Fort Wayne, Ind.

To the Editor of the Scientific American:

The explosion of the boiler of the steam heating apparatus in St. Mary's Church, in this city, which occurred on Wednesday, Jan. 13, between 12 and 1 P.M., made a complete wreck. St. Mary's Church was a large and stately edifice. The boiler was in the cellar, at the east end, under that portion of the church where the high altar is situated, and located in a recess built out from the east wall of the church. One portion of the force of the explosion apparently drove up through the floor overhead and out through the roof of the recessed portion, hurling that portion of the roof, which was of tin, over on the parsonage, which is situated close by, east of the church; the other portion tore up the floor of the church, and demolished everything within its reach, as can be easily imagined by one of the boiler heads cutting its way to near the front door. The large stained glass windows, with their frames, were blown into the middle of the street.

So quick and violent was the force, that many of the window frames were split from top to bottom, and that portion having the lugs upon them, which held them in the walls, were left in their places; at the same time, the massive side walls were thrown out of line at the top, and now overhang about two feet from the perpendicular. The large windows, sash and all, away up in the belfry of the tower, were blown out. There is a double row of columns running through the church, which apparently sustained the roof.

A schoolhouse on the south side, immediately adjoining the church, is so shattered that it has been abandoned. The priest's residence, on the east, is in the same condition, and will have to be taken down. In fact, all is ruined.

Is it possible that the missing boiler sheet was blown to atoms? It is nowhere to be found. Even if it was a bad one, it held on long enough to create a force more destructive than dynamite, for that is generally local in its effects, whereas this boiler explosion was general and extended in its action.

It is said the safety valve was weighted to carry thirteen pounds of steam to the square inch; that would be reasonable for so large a church. But who knows what the condition of the valve itself was? Who knows whether it had ever been lifted since it was started last fall?

A boiler that will hold together long enough to cause such fearful havoc of life and property ought not to be blamed if it blew up, nor the makers censured. It would be interesting to know how much pressure it sustained before it gave out.

It is safe to say that ignorance the most profound, in the use of steam, had charge of that boiler, and a fearful penalty has been the forfeit. WM. LYNE.

Fort Wayne, Ind., January 17, 1886.

Mitis, or Wrought Iron Castings.

As this new process is now in successful operation at the works of the Worcester Malleable Iron Company, Worcester, Mass., it will be interesting to note its chief characteristics and values. Mr. T. Nordenfelt, in a paper read before the Iron and Steel Institute, May, 1885, gives the following among other particulars:

I have called our produce "wrought iron castings" because they are made of wrought iron alone, without any other additions than such chemicals as we have found most suitable for our purposes, and I have called these castings "Mitis castings," the Latin word "mitis" meaning, of course, mild, flexible, or ductile.

The origin of this invention is as follows: We had at Carlsvik, in Stockholm, a malleable iron foundry which fairly succeeded in producing good malleable castings, but we did not succeed in making these castings so absolutely free from faults that I could use them in my gun manufacture. We adopted the method originated by Mr. Wittenstroem, assisted by the experience of Mr. Ludwig Nobel, of dynamite and petroleum reputation, and the results of a couple of years' experiments by Messrs. Faustman and Oestberg and myself, with the guidance of Mr. Wittenstroem, are what you now see before you. The first castings were produced in January, 1885.

The raw material we first used was Swedish wrought iron scrap, such as horseshoes, rivets, etc., and the castings we obtained from this raw material were found to have about 20 per cent higher tensile strength than the wrought iron used—the tensile strength being 24 tons per square inch and upward—and this percentage of gain in strength has been maintained for other raw materials.

We could not at first see that our castings were in any way less pliable or ductile than the Swedish wrought iron used as raw material, and you will observe from the samples, all of which are bent cold, that the castings show as good a quality in this respect as can possibly be expected from wrought iron forgings.

We got rid of all slag, and at the same time we were free from all risks of the delamination and imperfect welding occurring in wrought iron forgings. Our castings are therefore more dense than wrought iron, and have practically no fiber; they have the same tensile strength in all directions, this advantage being obtained at the cost of the slight loss of elongation caused by the absence of slag, and by the virtual absence of fiber.

We do not alter to any considerable extent the chemical properties of the material we use, and I need hardly say that I do not claim that we improve (more than already stated) the actual raw material used. What we put into the pot we get out of it, with such alterations only as are caused by the treatment to which we subject it; therefore, if we use iron free from all impurities, we obtain exceedingly good castings, and if we use iron with a very large percentage of phosphorus we naturally obtain proportionately brittle and unsatisfactory castings. A pure iron, such as refined iron from Middlesbrough, gave us castings to all intents and purposes as good as the best English forgings, while such perfect raw material as hematite puddle bars gave us castings which were equally as good as, if not better, in every respect, than, those produced from Swedish wrought iron scrap.

We found that raw material containing one-fourth per cent of phosphorus was too impure to prevent brittleness in the castings, but when we mix two-thirds of scrap containing one-fourth per cent of phosphorus with one-third of refined iron, hematite, or Swedish iron, we obtain castings quite satisfactory for general purposes; when we mix half and half, we obtain castings quite as ductile as and much stronger than ordinary forgings; while using refined Yorkshire iron, hematite, or Swedish iron alone, we obtained castings which I may be allowed to call "extra" quality, that is, their ductility (as shown by the samples) probably exceeds what can be produced by forgings, while their strength is fully 20 per cent greater in all directions than the best wrought iron forgings.

All the above named mixtures, with less than one-quarter per cent of phosphorus, give us castings which can be welded and mended like wrought iron without the slightest trouble.

It seems to me that what we do might be said to be that we make exceedingly mild steel by melting the wrought iron almost free from carbon, instead of making mild steel by decarbonizing pig iron, which contains about 3 per cent of carbon.

Good pure cast iron would probably not be a much cheaper raw material than the above named mixtures of wrought iron scrap, while on the other hand we do not require the costly apparatus of the Bessemer and Siemens manufacture, and the very inconsiderable cost of our furnaces would enable our castings to be made on a much smaller scale than those made by the Bessemer and Siemens methods; while, on the other hand, those methods may produce very heavy castings more cheaply than we can. Our method will also probably be found a more economical way of using up scrap than any other.

The manner in which we make the "Mitis" wrought iron castings is as follows: You will see that the samples show an unusually clean surface, and the iron runs, perhaps, more perfectly than in the best cast iron castings. This, of course, means that we use a very great heat; in order to obtain this heat, we melt the wrought iron in crucibles placed in furnaces, each containing six crucibles. Each furnace has one fire, and we work two crucibles together; the pair furthest away from the fire is warmed to a certain degree by the waste heat, the second pair is heated also by the waste heat to a point where the scrap approaches its melting temperature, and in the pair nearest to the fire the wrought iron is completely melted. As this last pair is lifted out, the second pair is moved forward into its place, the third pair is moved forward into the place of the second, and a fresh pair of filled crucibles is placed in the compartment furthest away from the fire.

In order to obtain quickly the great heat required, we employ as fuel the residuum of petroleum, called naphtha, which is easily obtainable in unlimited quantities, and which is not in any way dangerous.

From these furnaces we can draw 8 to 10 pairs of crucibles per day of 12 hours; and when we, as we intend to do, commence working day and night shifts, we can cast 15 to 20 times every 24 hours. This is a considerable gain, as I believe that in Sheffield the crucibles are taken out only about 3 times in 12 hours; and we have the further advantage that we refill each crucible every time by its full charge of about 66 pounds of scrap, whereas in Sheffield a full charge of 60 pounds is only put into a new crucible, their second charge being about 50 pounds, their third about 45, and so on.

Our next step is to deal with this exceedingly hot iron. We have carried out a method of moulding and facing sand which works to our entire satisfaction, and we have made use of water moulds of a special construction when a great number of castings have to be made to the same pattern. In order to do this expeditiously and cheaply, we use a ladle in which we keep the iron at its full heat by means of a surface blast of very hot gases, and we fix a number of moulds around the circumference of a turntable in such a manner that one mould can be filled after the other as quickly as it is brought under the lip of the ladle, and the castings are immediately taken out of the moulds, so that each mould is ready for refilling as soon as it comes round again under the lip of the ladle.

The raw material being wrought iron only, the castings do not require to be in any way annealed, but are simply cleaned up by emery wheels or otherwise, and delivered to the purchaser.

As the iron runs so exceedingly freely without large heads, and as it falls out of the moulds so easily, this method of "Mitis wrought iron castings" must tend to save labor to a very important extent, and we have already found that it enables us to considerably lighten and greatly vary designs—such as designs of machinery, etc.—as we can, without extra cost, shape our moulds so that we give the strength of the metal where wanted, but only where wanted, whereas in forgings it would often not pay to complicate the shape.

This method also enables a constructor to make *much bolder designs*, and of more different forms, knowing that such designs can be easily and cheaply carried out. Here again we find great advantage in being able easily to *weld the castings*, as we can cast the parts, which would otherwise be difficult to forge, or which would require much machining, and weld them on to a bar or rod as required. Some of the samples show links, bearings, and clutches used in this way.

I can hardly imagine any form of forging which it would not be more advantageous to cast by this method. You see before you the most difficult forms, such as pulleys, smoke consumers, wheels, knees, and bends of piping, etc., which give the tensile strength of mild steel forgings without any greater expense than for castings of ordinary shapes, except what may be caused by the greater trouble in making the mould.

We have also lately made some very successful steel castings with a higher percentage of carbon, some samples of which, unpolished, as well as burnished, I have brought here. These promise well for the future, the surface being exceedingly clean and taking a very high polish, and we have tried them successfully for ordinary edged tools; for instance, we cast at present some of our tools for the gun factory in Stockholm, and we cast them ready to shape, after which we have only to harden and grind in order to make them ready to put into use. These steel castings we also make out of wrought iron scrap as raw material, adding the quantity of pure pig iron required to bring up the percentage of carbon to the point required for each different purpose.

I do not mean to say that tools can be made better by this method than by the ordinary methods, but it is certainly a more direct way than to make wrought iron bars into blister steel and then melt this blister steel in a crucible, and my method is certainly cheaper, seeing that pure scrap can be obtained at a very much lower figure than the bars, and that my tools are cast ready to shape.

Sciatica Relieved by Cocaine.

Dr. W. B. Menz, of Vidalia, La., writes to the *Medical Record* that he was called to see a lady, fifty-five years of age, who had been a constant sufferer from sciatica for ten years. The pain was very severe, and extended along the entire length of the nerve. She had run the whole gamut of anti-neuralgic remedies, and had never obtained anything more than very transitory relief. Having with him a vial of a four per cent solution of cocaine hydrochlorate, Dr. Menz determined to try the efficacy of a subcutaneous injection. The hypodermic needle was inserted deeply over the sciatic foramen, and about twenty drops of the solution were passed into the tissues. The pain ceased almost immediately, and during the six weeks that have since elapsed has not returned, although there has been no further treatment, and one injection only was practiced. The relief given by other remedies had never been of more than from two to four hours' duration.

IN case of a bite from a rabid dog, Dr. Billings recommends that the wounds be cauterized with strong carbolic acid. It is much less painful and more effective than burning with a hot iron. The wounds will also heal in less time.