

brass base of the chimney, form an irregular square. The hilts of several swords and some old firearms are also incrustated with oyster shells.—*New York Sun.*

STEAM BOILER NOTES.

On the 29th of October the Cincinnati Board of Aldermen passed to be engrossed an ordinance making the use of an effective smoke-consuming furnace compulsory on the part of all manufacturers and others whose business requires the use of a chimney that has become a nuisance to the neighborhood. Organizations, including a society of ladies, have been formed in Cincinnati for the purpose of procuring the abatement of the smoke nuisance.

In regions where bituminous or other smoky fuel is used because it is readily obtained and cheap, an enormous waste is made, not only from imperfect combustion, which results in the smoke nuisance, but also from the sooting of the fire surfaces of the boiler. Considerable improvement has been made in Eastern cities of this country by the introduction of deeper boiler furnaces and devices for supplying air above the fire to complete the combustion and by skillful firing so as to coke the coal near the mouth of the furnace. But it is probable that very much fuel, not only bituminous but anthracite also, is still sent out of the boiler chimney in the shape of invisible gas of a combustible nature as well as black smoke. The remedy, both for the smoke nuisance and loss incident to the collection of soot on the boiler fire surfaces, is no doubt attainable, and should engage the attention of inventors with a view of producing a cheap and simple regenerating gas boiler furnace. As showing what may be possible in this direction we abstract from a paper by William Metcalf, of Pittsburg, Pa., which was read before the Engineers' Society of Western Pennsylvania, and which we find in the *Iron Age*. He shows how much money is annually wasted through the smokestacks of Allegheny County, Pa., in shape of dense black smoke and the still more wasteful burning gas at the top of iron furnace stacks. The loss is made apparent by a comparison of the old and the new style of iron puddling and reheating furnaces, the old being the common reverberating and the new style the regenerating gas furnace. The quantity of coal used in the old furnace is from 30 to 40 bushels per ton of puddled iron, while in the gas furnace 20 to 30 bushels of slack, costing half as much per bushel, will produce a ton of iron, and after deducting the cost of gas making in the new process the net gain in cost of fuel is 38½ per cent in the puddling process. In the reheating furnaces the saving in cost of fuel is 30 per cent. Moreover, the loss by oxidation or scaling in the old furnaces is 224 pounds per ton, while in the new furnaces the loss is only 134 pounds. Estimating the loss in dollars, or rather the possible saving, it aggregates nearly four dollars per ton of bar iron once reheated. Allegheny County appears to have made, in 1878, 250,000 gross tons of rolled iron, so that its contribution to the smoke nuisance and the red chimney torches cost about \$1,000,000. Steam users will do well to make a note of this. A good gas boiler furnace appears to be an object worth looking for.

The boiler of a thrashing machine engine exploded at Martville village, N. Y., Oct. 29, killing Frank Milliman and terribly injuring eight others. Milliman was completely disemboweled and died in half an hour. Frank Timerson, the owner, had a piece of iron driven through his groin and cannot recover. One little boy had his hip broken in two places and his knee shattered. Another had his skull fractured, and there is little hope of his recovery. Others had their arms and legs broken and badly shattered. One man was blown twenty feet. Low water in the boiler is assigned as the cause.

It is to be regretted that the idea so generally prevails that some steam boilers will not explode while they contain the usual supply of water, because when low water is assigned and believed to be a sufficient cause in any case it seems to cut off further inquiry. No fact in engineering is more fully established than this, that boilers have exploded, meaning broken into fragments with similar detonating phenomena to that which attends the bursting of rocks on igniting a contained charge of gunpowder, while they are known to have contained sufficient water to fully protect the plates from overheating. This has been abundantly proved by experiment, and it is being almost daily confirmed by accidental explosions. Formerly when Cornish and Lancashire boilers having unsupported tubular furnaces were more in vogue, so much so as to be the prevailing types, the collapse of the furnaces from the softening of their uncovered tops was very frequent in England, but since the custom of properly staying such parts has become prevalent, and since every attendant knows that his first duty is to see that such boilers have an ample supply of water, their failure from this cause is very rare, so much so, a celebrated English authority has declared, that it is probable that more flues and furnace tubes collapse from irregularity of form and from other weaknesses than from shortness of water. The locomotive and other forms of internally fired boilers are often injured by overheating of the furnace tops. But this injury is not always fatal unless accompanied by a higher pressure than the crown braces or stays can sustain. Crown plates are often bagged between the braces, which is pretty strong evidence of overheating, and if such a condition existed of the crown plate of an exploded boiler it would be strong evidence that the water had been too low or the pressure too high, and if in addition to the stretching or bagging of the plate between the braces it bore other evidence of the effects of heat on a dry plate, such as the cracking off of the surface

scales and a change of color to a peculiar shade, their low water might be confidently assigned as a cause of the explosion, because it has so weakened the boiler that it broke down under its load.

But the once popular notion that an explosive gas is generated in a boiler by overheating its fire surfaces should be entirely set at rest by the late experience in tubular coil boilers, which have water regularly thrown upon their heated surfaces and which send over to the engine steam as explosive as that coming from the surface of water in old styles of boilers. This experience should likewise demolish the theory of the evolution of steam with an explosive suddenness capable of instantly shattering the strongest boiler.

The discoloration of plates of exploded boilers which occurs from a sharp bending of the plate while wet, is often mistaken for evidence of overheating, but it has quite a different shade, and when fresh is covered with a recent layer of red oxide resulting from the exposure of the bright fibers or small particles of the metal to moisture and air.

It has not only been well established that boilers do explode while containing sufficient water, but it is now believed that much the larger percentage of explosions result from weakness, either congenital or acquired, or from overpressure resulting from sticking of the safety valve. Although many defects in construction result disastrously, still it seems trivial to cavil and dispute about the weakest point in the construction of a boiler when it can be shown that even that weak point was many times stronger than what was supposed to be the yielding point of the safety valve, and when an extensive acquired weakness, such as a cracked or grooved seam or an absolutely immovable safety valve, is found among the ruins after the explosion, or, in their absence, plenty of circumstantial evidence all pointing to such fatal defects. Intelligent and experienced boiler inspectors often criticize construction, as of right they should do, but they are not generally captious critics of construction that has proved amply safe if they find the boiler has exploded because the steam could not otherwise escape.

From the *St. Thomas Journal*, of late date, we learn that a most distressing accident occurred on board the propeller *Canada*, at the docks of the New England Transportation Line, which, from evident suppression, escaped the press until developed by a fatal termination and a coroner's inquest. The boiler of the *Canada* needed cleaning. The second engineer, Thomas Brown, went inside of it, while fireman Muir held a light at the man-hole. John Clark, one of the hands, passed in some oil for loosening the scale. The boiler was a trifle warm, and the oil, scattering somewhat, caused an escape of gas, and ignition, and then a fearful explosion. John Muir was blown ten feet away, and his eyesight in an instant obliterated forever. The engineer crawled out a mass of fire and flames, his shirt burned and his flesh roasted. In this terrible condition he lingered until Thursday and died in untold agony.

In the *SCIENTIFIC AMERICAN SUPPLEMENT* of March 13, 1880, was published an illustrated account of experiments with gas-fired steam boilers made by Mr. Haupt, of Brieg, at the works of the Lower Silesian Mining Union. The illustrations include sixteen drawings of boiler furnaces and gas producers, and show the best methods of bringing the gas and air in contact and the steps by which the most favorable results were obtained.

A trial was then made, continuing for eleven hours, in the most practical manner, by placing gas burning and coal burning furnaces in competition. The result was that the coal burning furnace evaporated about 2½ pounds of water per square foot of heating surface per hour, and under similar conditions the gas burning furnace evaporated from 44 to 5 pounds per square foot per hour. The economic result is not given in pounds of water evaporated per pound of fuel, but in experiments made previously by MM. Müller and Ficht, of Paris, an economy of 32 per cent of fuel is stated to have been attained in Upper Silesia, Dortmund, and at Essen.

A boiler at the Worcester (Mass.) Dye and Bleach Works exploded October 24. William Ronayne was scalded badly and had a leg broken. Wm. Dick and Martin Davis were also scalded.

The boiler in Samuel Johnson's sawmill, near Gistville, Henry County, Ky., exploded October 31, killing David Hoover and mortally wounding John L. Johnson, Pleasant Hensley, and Jennes Hall. Five others were seriously injured.

Sanitary Work and Needs in New York.

The annual meeting of the Medical Society of the County of New York, October 24, was devoted mainly to the report of the Committee on Hygiene. The chairman of the committee, Dr. John C. Peters, said that as far back as 1865, a council of hygiene, composed of the best physicians in the city, decided that diphtheria and scarlet fever were more virulent and abundant in the neighborhood of filthy stables than in other localities. It was the same with infectious pneumonia and severe diseases of the eyes. There is a cheap process of baling manure which could be easily adopted in large car, omnibus, and livery stables. This prevented fermentation, rotting, and offensive odors, and made the manure a valuable article of export to the Southern States, as it was easily and cheaply handled. In small stables it might be packed in barrels, and Dr. Peters said it had long been carried on steamboats in this way without its presence being known. These plans would do away with all the manure vaults in the city of New York, many of

which were under the sidewalks, and exceedingly offensive. As the stables were for the most part in the best sections of the city, the abatement of this nuisance would add more to the health and comfort of the people than any one thing except the suppression of the 15,000 or 20,000 privy vaults, only too many of which were in the central part of the city between Fourth and Sixth Avenues. These vaults were said by the Board of Health to cause more sickness and death than any other one thing, and the manure vaults were only second to them.

Reports were read from Sanitary Inspector Day, stating that the Board of Health would ask for four additional sanitary inspectors, two meat inspectors, of which none now existed, two additional disinfectors, two additions to the vaccinating corps, and three engineers to enforce the provisions of the new plumbing bill, all of which, and more, the Committee on Hygiene hoped would be granted.

The Board of Health had made 94,000 inspections, of which 24,000 were of tenement houses, and 5,400 were found objectionable. The Board inspected 8,000 privy vaults, of which 4,300 were found to be full, filthy, or out of order. Thirteen hundred inspections of stables were made, and 475 were discovered to be in a filthy condition. The first six months of the present year 3,400 dead horses, 8,500 dead dogs and cats, 80,000 pounds of bad meat, and 70,000 barrels and boxes of decaying fruit and vegetables were removed. Eight hundred and forty barrels of zinc and iron disinfectants were used, and, although made of old tin cans, pails, and the like, served the purpose remarkably well. One thousand gallons of carbolic acid and 13,000 gallons of dead oil were also used. During the past nine months there had been 14,000 cases of contagious diseases, of which 1,100 were smallpox, 5,000 scarlet fever, 4,000 diphtheria, 2,000 measles, 600 spotted typhus fever, 600 typhoid fever, and 500 cerebro-spinal meningitis. The wealthier classes were responsible for a great deal, as they owned the better part of the worst tenement houses and stables, with their disgusting vaults and manure pits.

A communication was read from Dr. Janeway, Commissioner of Health, and also a member of the Committee on Hygiene, calling attention to the provisions of the new plumbing bill, and stating that typhus fever had been absolutely eradicated. Diphtheria had prevailed more extensively during the last three months than at any time since 1875. Dr. Janeway thought the greatest sanitary need of New York was an increased supply of water, and he believes that to the short supply was due a great many deaths. The death rate at one period reached 56 in 1,000. At the same date the death rate in London was only 18 in 1,000. For many weeks, Dr. Peters stated, it had been above 30 and 40, and in London it rarely reached 20. The highest death rate in London was 31, and that was reached only once.

The society elected the following officers for the ensuing year: Dr. F. R. Sturgis, President; Dr. W. Gill Wylie, Vice-President; Dr. W. M. Carpenter, Secretary; Dr. P. B. Porter, Assistant Secretary; Dr. O. B. Douglas, Treasurer; Drs. D. Lewis, E. F. Ward, E. B. Bronson, D. Webster, and A. Jacobi, Censors.

MISCELLANEOUS INVENTIONS.

A changeable and perpetual calendar, of durable construction and in convenient form, has been patented by Mr. Jabez Bath, of Brooklyn, N. Y. This invention consists in a combination of cards and numbered blocks indicating respectively the year, month, days of the week, and days of the month, or a slide will suffice for the days of the week. These devices are inserted within suitable recesses on removing slides in the frame for the purpose.

Mr. Philip Herbold, Jr., of Galion, Ohio, has patented an improved bed lounge having hinged sections. It is so made that the mattress will not be obstructed by any central ridge in the center, and when used as a bed the center rails are firmly supported.

An improved whip socket, patented by Mr. William A. Bradley, Jr., of Bridgeport, Conn., consists of a glass socket having a hole in the bottom for the escape of any water that may enter. It is provided with a simple clamp, by means of which it may be fixed to the dash board.

An improved coal shovel, which can also be used to sift ashes and separate them from the cinders, has been patented by Mr. Charles H. Starin, of Brooklyn, N. Y. The invention consists in a slotted or perforated shovel with a plate pivoted to each longitudinal edge of the bottom, which plates can be raised to close and cover the perforated or slotted bottom by means of a wire pivoted in the handle and provided with an extension, which can be depressed very conveniently by the person holding the shovel.

An improved compound cut-off cock has been patented by Mr. James Mullaney, of New York city. The object of this invention is to facilitate the controlling of a water supply from two distinct sources through the same delivery pipes.

An improved running gear for vehicles has been patented by Mr. Er Harder, of Berkshire, Ohio. The object of this invention is to construct a wagon or bob-sled gear especially adapted for use on rough roads and for making short turns. The front and rear axles are pivoted and connected together by chains.

Messrs. Charles W. Spickerman and Jeremy R. Martin, of Winnebago City, Minn., have patented an adjustable square for marking siding boards for a house, in order to cut perfect joints when the house casings or corner boards are beveling or drawn back by nailing.