Scientific American.

NEW YORK, FEBRUARY 14, 1857.

The Construction of Chimneys.

Much trouble is experienced everywhere with smoky chimneys, but more in some parts of our country than in others. Thus we have been informed, by a practical mason residing in Illinois, that no part of his business has bothered him so much as the construction of chimneys for farmers' houses on some of the prairies in that State. He has tried various plans of constructing them, to improve their draft, but during high west winds none of them draw well, and he would like to know the reason why. A smoky chimney is certainly a great infliction, and we pity all those who suffer from such an evil.

One question to be considered in building a chimney is its hight. The principle involved in this is, "the greater the hight the better the draft." Why? Because, when the column of air is forced out of a chimney by the smoke, the vertical pressure against the ascending smoke, is removed in proportion to the increased hight of the chimney.

The testimony of mechanical and civil engineers respecting the chimneys of steamboats, and those of factories, is uniform in regard to an increased draft being obtained, with an increase of elevation, and this opinion is founded on scientific data.

But another principle is also involved in the construction of chimneys, namely, that of maintaining the heat of the smoke or combustion gases, until they make their exit at the chimney top. The ascending force of smoke or heated gas, in a chimney, is just according to the difference of density between it and the column of air outside—the elevation of the temperature of the smoke above that of the air.

By reducing the temperature of the gases in a chimney to that of the air outside, its draft may be entirely destroyed. This explains the cause of retarded draft in new and damp chimneys, and flues, also in tall factory chimneys, in wet weather; the moisture absorbs the heat of the gases rapidly, and reduces their ascension force. The advantages of a tall chimney, may therefore be nullified by the rapid cooling of the gases in it, during their ascent.

There is a variety of opinions respecting the relative area of common chimneys, in proportion to their hight, but not a single author that we have consulted gives a rule or rules positively reliable.

We do not know why the chimneys of farm houses, on the Western prairies of Illinois, render the houses smoky, but we suppose it must be owing to the cold and high winds which sometimes prevail in those regions, cooling the smoke rapidly while it is in the chimney. The chimneys in the West, we infer, are no better built than those in the East. In general their walls are too thin; their interior rather rough; they are not sufficiently protected from absorbing moisture, and they radiate their heat too rapidly. Brick—the common material employed in their construction—is a tolerably good non-conductor. but very porous. The sides of a chimney should be made as thick as possible, plastered smooth inside, and coated outside, to prevent the absorption of moisture. By thus constructing chimneys of the common hight and diameter, and using inverted conical cowls, or caps, on them, or any of the most common caps, we are of opinion that most of the smoky houses, not only on our Western prairies, but other regions, may be effectually cured.

A wash, containing one pound of the sulphate of iron to a bushel of lime, is very excellent for the outside of chimneys.

Steam Fire Engines.

This city has recently contracted with Messrs. Lee & Larned for two steam fire engines of large size, to be not only fire engines but also locomotives, capable of moving themselves by steam through the streets. This is taking hold too rank. The locomotive feature might be of some little service, especially in taking the machine home from a fire, when steam might be kept up without inconvenience, but it necessarily involves some additional machinery and will, we predict, lead to far more derangement and trouble than its assistance will be worth. It can at best be but an auxiliary power; men or horses must still be depended on to surmount any inclines or obstructions, and in the present snowy and icy condition of the streets, the assistance to be derived from connecting the rotary pump to the axles would be absolutely imperceptible. In the main point—that of running to the fire—the steam could not, probably, be raised in season to be of any practicable value. We object to making either children's toys or locomotive experiments of these powerful and expensive machines. Give us the simplest engines, the most active boiler, and the surest pump in the world, and make the whole as light as possible. If the steam fire engines of Cincinnati and Boston can be beaten in any of these points—as we believe they can in both the last named—let us do it as soon as practicable at a fair price, and let the machines be kept always in order for throwing water. Every additional device will involve more cost, more weight, and more chances for derangement and fracture of the whole.

The Preparation of Drying Oil.

If oils did not possess the property of combining with oxygen, and thereby losing their soft or greasy quality (in other words, become *drying*) they could not be employed in painting. One reason why linseed oil holds such a prominent place as a menstruum for paints, is the superior quality which it possesses of absorbing oxygen from the atmosphere.

Some oils are of such a fixed character that they cannot be employed in paints because of their limited affinity for oxygen. The very best oils, however, are slow dryers, hence they are treated chemically, to give them drying qualities. There are chemical compounds called "dryers," which painters mix with oil, to feed it with oxygen, or to separate its glycerine. Turpentine is nothing more than a drier; but the oxyds of lead and zinc, in the form of sulphates, boiled with oil, are the most common driers.

The nature of the action of *dryers* upon oil is of much interest to painters, especially as so little attention has been given to the subject by chemists.

A recent number of the London *Chemical Gazette* contains a brief account of experiments by the eminent German chemist, Professor Wagner, in this field of practical chemistry, a succinct but clear account of which will interest a large circle of readers.

He repeatedly prepared protoborate of manganese for driers, and effected its precipitation whilst hot, and thus obtained it of a coffee-brown color, and consequently containing much oxyd, and always of remarkable efficacy. He, however, endeavored to obtain it perfectly free from oxyd, and for this purpose effected the precipitation with borax cold, and obtained a snow-white powder, but this furnished no varnish. He therefore returned to the previous mode of preparation with the assistance of heat, and found that it was obtained of the darkest brown, and also of the strongest action, when both the solutions of sulphate of manganese and borax were diluted as much as possible and mixed boiling.—The siccative action upon the oil must, therefore, be ascribed to the oxyd, and not to the protoxyd.

By further experiments he found that the boracic acid is quite superfluous, and that free oxyd of manganese or its hydrate is as efficacious as the borate. The oil need only be heated for a very short time—about a quarter of an hour—with about one-eighth per cent. o the hydrated oxyd of manganese. The heat applied need not approach the boiling point by a long way; but no general temperature can be given, as new oil has a much higher boiling-point than old. The siccative quality, however, increases with the heat. But as the oil becomes darker and thicker in proportion to the heat to which it is exposed, it is the best plan in general to remove it from the fire as soon as it clears and begins to fume very slightly. Streaks of it now become firm in twenty-four hours. To obtain the drying oil of a very pale color, it must be heated still less. The drying is thus retarded several hours, but the color has scarcely become perceptibly brownish, whilst in the former case it always acquires a chestnut brown color.

He obtained a wine-yellow oil, quite unaltered, without heat, by mixing 1 per cent. of hydrated lime with a linseed oil four years old, which dried by itself in three days. After being frequently stirred for two days, a streak of it was perfectly firm in twenty-four hours. Oil of the same year, however, did not become siccative even by boiling with lime.

The oil dissolves very little of the small quantity of oxyd of manganese, and the salt when removed may be repeatedly used in the preparation of drying oil. When a drier oil is mixed with an equal weight of crude oil, it requires nearly twice as long to dry; but the time necessary for the solidification of the coating gradually diminishes with the age of the oil.

Safety of Life in Steamboats.

We are indebted to Benjamin Crawford M. E. of Pittsburgh, Pa., Inspector of Steamboats in the Seventh District, for a copy—just published—of the proceedings of the fifth annual meeting of the Board of Supervising Inspectors, held at Boston in October last. It contains matter of interest, not only to the engineering community, but the whole travelling public. A very striking feature in this report is the large number of boilers (134) found defective during the year. Twenty of these were condemned from further use; the others ordered to be repaired and strengthened. This large number of steamboat boilers proved defective, by the hydraulic test, and by which undoubtedly several explosions were prevented, leads us to demand the enactment of laws in every State for testing the strength of all steam boilers for locomotive and land and boat engines, before they are allowed to be employed for constant use.

On another page there is a communication on steam boilers from Mellen Battel, one of our oldest and most experienced steam engineers and inventors, in which he points out how boilers should be stayed and constructed and his opinions deserve general attention. He also gives his views regarding the cause of priming or foaming in boilers, and how it can be prevented. His theory is certainly original, and if correct, a remedy for this dangerous action in steam boilers can be easily provided. From the Inspectors' report, we learn, that of the two explosions which took place on steamboats, during the year, resulting in loss of life, one was caused by the boilers *priming*. This was the *Metropolis*, a steamboat on its first trip on the Ohio river, and the first explosion which has taken place on that river since the new steamboat law was rendered in 1852. In this case the engineers were deceived by the foaming of the water, a very unusual thing in high pressure boilers and on our Western waters; but a full investigation by the Inspectors at Cincinnati evolved the fact conclusively that the boilers were red hot in some parts from want of water, and that the metal was torn apart with a very moderate pressure of steam. By this accident eleven lives were lost. This feature in steam engineering demands further investigation, and for this purpose we direct the special attention of our engineers to it.

The most serious accidents during the year were caused by the burning of vessels—most of which occurred on the lakes—and no less than 177 lives were lost by them. The Inspectors have done much to render steamers more secure against accidental fires, but a great deal more is yet required, and not until all their entire boiler rooms are enclosed in plate iron will safety from fires be insured. The Inspectors recommend that all steamers be provided with pipes leading from the boilers to all parts of steamers, for the purpose of using the steam to extinguish fires should they occur. This is an excellent plan, and one which we have on several occasions recommended for the purpose.

A communication from Jas. H. McCord, Inspector of Boilers in the St. Louis District, related his experience with fusible plugs in boilers. Those made of alloy, he stated, were a source of trouble and annoyance to all those who were compelled to use them, and they were also unreliable, and he requested that their use be suspended. A few weeks since we directed attention to the character of these plugs in boilers, and the views of Inspector McCord accord with those we then expressed.

There are three points of peculiar interest to which we request Government Inspectors and all engineers to direct their attention during the present year, namely: priming in boilers, safety plugs, and the rendering of steamboats fire-proof. Much scientific and practical information on these three points have yet to be elicited.

A Turpentine Explosion.

For want of scientific knowledge a dreadful accident occurred near the village of Steuben, Pa., on the 21st ult. The Rev. E. H. Havens, a Wesleyan Methodist minister, was engaged in the preparation of a balsam, of which the principal ingredient was spirits of turpentine. He had about two gallons of this fluid and a quantity of rosin boiling together in an open vessel upon the stove. By some means fire was communicated to the inflammable mixture, and while he was endeavoring to convey it out of doors, an explosion took place, scattering the burning fluid over the persons of himself, his wife and three children who were in the room, and setting fire to the building. The father, mother and a daughter died soon after the explosion.

Turpentine is not explosive, but it is a very volatile hydro-carbon, and easily converted into gas by heat. If its gas be saturated with eight times its volume of the atmosphere. and a spark or light applied to it, the whole will explode instantaneously. This was the manner by which the serious accident described was caused. The turpentine was evaporated from the vessel on the fire; it became saturated with oxygen, and thus the contents of the room became combustible, and was ignited at once by the flame of the blazing rosin. If the preparation had been made in a close vessel on the fire, to prevent the turpentine evaporating into gas, this accident would not have taken place. All hydro-carbon volatile fluids, such as turpentine, alcohol, benzole, camphene, &c., should always be kept in close vessels. For the sake of preventing other accidents of a kindred character, we hope these facts will be made to reach every household in our land.

Pictures on the Retina of Deceased Persons.

It has been asserted that as images are impressed on the retina of the eye, the last scene or image pictured on the retina of a person suddenly deprived of life would remain upon it, and could be viewed, if the schlerotic coat (white of the eye) were removed. It was proposed by one of the Coroner's Jurors, in the case of the late Dr. Burdell, assassinated in this city, that an examination be made of his eye to find out some clue to the assassin, by the image impressed on the retina. No such examination was made. Prof. Doremus stated to the Court that no good authority had ever endorsed the opinion respecting impressed pictures on the retina of deceased persons: he believed such opinions to be erroneous.

Models! Models! Models!

We have several models in our possession which have come from sources entirely unknown to us, as there are no names attached, to them. This is very annoying to us, and must prove so to the inventor. In sending models, inventors should always prepay the charges, and forward us the express receipt without delay. This saves double payment in many cases.

Bituminous Shales for Making Gas.

The Toronto (C. W.) *Globe* states that Prof. Hind recently delivered a lecture in that city, before the Mechanics' Institute, on the above subject. He stated that a light illuminating gas was produced from a species of bituminous shale—a rock extending from Whitby and Oshawa on Lake Ontario, to Collingwood on the Georgian Bay, Lake Huron.

There is still a dearth of fuel in Cincinnati; crowds of people press forward to the coal yards, taking their turns in purchasing.