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Contents:

(Illustrated articles are marked with an asterisk.)

ONE CAUSE OF BOILER EXPLOSIONS.

Whenever a boiler explosion occurs, the attention of the coroner's jury is directed to the discovery of imperfection in the material or workmanship, or a wrong principle in the form and arrangement of the parts. Frequently the engineer and fireman, or the individual who combines both these offices in himself, is removed by the explosion from all opportunity to give his testimony, and the proprietors are unable, if not unwilling to give light on the subject. Sometimes the engineer or fireman is censured, but seldom is the employer reprimanded for his dereliction of duty.

A correspondent, himself a practical engineer, says that it is surprising there are not more explosions. He says that in Connecticut the engineer is often required to be his own fireman, to split his wood, do every "chore" in and around the engine house, and oil the shafting, mend the belts, etc., for the whole establishment for from \$1,50 to \$2 per day. He asks, "who is going to study and fit himself for an engineer with such remuneration and such duties before him? When the inspectors were last around, they asked one engineer how much his safety valve carried. He replied he did not know what the safety valve was; no one had told him! He had used it to pile wood upon to dry. It being set at eighty lbs. he took hold of the end of the lever to lift it, but it had stuck on its seat, and he was compelled to use a lever to raise it. Another, besides the weight, had a large casting hung on the lever. When asked what it was for, he replied: so it would not blow off. Being told he must have it so as to blow off, at a certain pressure, he said he was not going to have it so it would blow off at all; and added, that the engineer who was there before him had it blowing off nearly every noon, but he had not had it blowing off since he had been there, which was about twelve months. I have seen boilers, where they had been using acids in the water, and the boilers were very badly corroded; still they would not change the feed pipe to good, pure water because it would cost, perhaps, fifty dollars. If any of these boilers had exploded, they would have looked for fault in construction, or want of water, or something of the kind."

"Now why don't our State Legislature make a law prohibiting any one from running an engine who shall not prove he is a competent engineer, and so stop the loss of life which follows these explosions?"

RAISING OF WATER BY CREATING A VACUUM.

Even before the time of James Watt it was well known that by creating a vacuum in a closed vessel, by condensing the steam with which the vessel was filled, the pressure of the atmosphere would carry water through a pipe to the vessel yet it is singular that this mechanical fact has never, until lately, been turned to practical account. A correspondent proposes to create a source of power by building a tank into which he leads a siphon connecting with the water. He pro poses to work the siphon by exhausting the air. The water thus raised to be used on a wheel.

There is in this city a model of a contrivance by which water is raised and discharged on a wheel, the same water being used over and over again, the only loss being that oc casioned by evaporation, which is easily made good by a small pump. The process is to introduce steam—the exhaust of a non-condensing engine is sufficient—into a reservoir connected by a pipe with a supply of water below, and then, by a jet of water condense the steam, creating a vacuum which is in ! have decided our countryman the winner of the wager. What stantly filled with water to be discharged into a flume or re- will Mr. Bull say to that?

servoir, and thence lead to a wheel. It is surprising how much water a quarter-inch steam pipe will furnish the power for raising. A flour mill, we are told, is now running by this method in Virginia, not far from Chambersburg, Pa. This method of utilizing the waste steam of engines seems to promise very satisfactory results.

PLASTER OF PARIS-GYPSUM.

This substance possesses some peculiar properties. It consists of sulphuric acid, lime, and water, its composition, or rather the proportion of its component parts being similar to that of alabaster. Its abundance in the tertiary basins around Paris has given it the name of plaster of Paris. It is found in Nova Scotia in profusion in the lower carboniferous rocks. It is produced by the decomposition of iron pyrites and lime stone in juxtaposition. It is formed wherever sulphuric acid is generated and comes in contact with carbonate of lime. Crystallized gypsum is called selenite, and the ancient Romans are said to have used it as glass. It is often colored by oxide of iron, to gray, brown, red, yellow, and even black.

It is used extensively for making plaster casts and for stuc co. It is prepared for these purposes by calcining, which is simply heating it in kilns or kettles until the water is expell ed. It is then a fine powder, like wheat flour, and to be used must have the water which it previously held returned to it. To preserve it from contracting the moisture in the atmosphere, it should be kept as nearly air-tight as possible. Much of the plaster or gypsum sold in the market is deteriorated by careless handling and packing. When mixed with water it "sets" quickly, and no time should be lost between the mixture of the gypsum and the taking of the cast. Of late years it has been a favorite substance with dentists in taking casts of mouths to which teeth were to be fitted. We know of no way by which this substance, being once used, can be brought to its original state.

It is used to some extent in glazing porcelain; but it is more largely used as a fertilizer of soils than for any other purpose. Containing a large proportion of sulphate of lime, it is extensively used as a manure. It is excellent for grass of all kinds, furnishing just the nutriment needed.

Petroleum for Steam Fire Engines.

We notice that at a late fire in Boston one of the steamers was run by petroleum oil instead of coal. The Traveler says 'When the alarm was given the steamer started in the direction of the fire, and arriving at the scene of conflagration, her steam gage indicated 100 pounds of steam. Only three minutes were consumed in raising this amount of steam. She remained on the ground six hours and a half, and during that time the steamer averaged 80 pounds of steam and 120 pounds of water pressure, and 100 pounds of water-pressure with two streams. Another remarkable and important fact demonstrated was the steamer, using oil, gained 30 per cent of water pressure over any other engine at the fire, by reason of not choking the exhaust. This is regarded as a great desideratum gained. Another great point shown was, while the streets leading to the fire were choked up with smoke thrown off by the other steamers, scarcely any smoke came from No. 3, using the new fuel."

While we have doubts as to the advantage of substituting petroleum for coal on steamships, we believe that it is possible to contrive an apparatus for its combustion which will be of real value in such cases as the above.

Tortoise Shell.

A correspondent inquires as to the production and manu facture of tortoise shell. It is the product of a marine tortoise or turtle generally known as the "hawk's bill." The shell, so called, is in reality only the outer covering of the shell proper, and is found simply as scales or plates. These are removed by the application of fire. The turtle is caught and secured to the ground, when a light fire is built on his back, which loosens the plates so they can be removed by a knife. The animal is then left free and the separate plates are in time replaced by a solid plate or shield. The shell is rarely removed from animals weighing less than 160 or 170 pounds, as it is too thin for use in the arts. The shell is manufactured into various articles by being softened in hot water, which renders it pliable and nearly plastic. It is largely manufactured in Providence, R. I.

Comets and their Talls.

ten, illustrated article on the above subject in which he ad- is one of Frink's double-cone reflectors. This is but one of an vances the idea that the comet has "no tail at all; only by darting along with the utmost rapidity, its sphere yields to the impression of atmospheric air and assumes the shape generally seen." We were of the opinion that the orbits of the comets were beyond the reach of atmospheric influences.

Navigating the Air.

Mr. Frank Oliver of Biddeford, Me. writes that he has constructed a machine by which he can sustain himself in the air by working a crank, and sees no reason why larger machines propelled by steam power could not work. If our correspondent will send a description and drawing of his machine we shall be glad to publish it. "It is wonderful if

American vs. English Muscle---The Yankee Wins.

We see by a cable telegram of the 11th inst. to our daily papers that the jury who had the matter of testing the Chatwood and Herring safes at the recent farcical trial in Paris,

FAIR OF THE AMERICAN INSTITUTE.

DEPARTMENT OF THE DWELLING.

Entering the exhibition halls by the main door, and turning either to the right or left, the visitor finds himself in the section allotted to the display of articles of domestic utility, an extensive and varied collection, embracing all apparatus for warming, lighting, cooling, and ventilation; all kitchen utensils and machines for washing and preparing clothes; cabinet and table furniture; ornaments for the dwelling, and building accessories and permanent attachments. So large is the number of articles which are properly classed under this comprehensive division, that a mere mention of each would make a report too voluminous for our columns, and we must limit ourselves to a brief note of a few of the more especially prominent.

In the section allotted to the exhibition of cooking and warming apparatus is the Imperial Range, made by Moneuse & Duparquet, measuring 271 feet long by 5 feet 9 inches wide. There are eight fire-places, two broilers on one end, fourteen baking and eight warming ovens. The flues are led off below the floor and the range is accessible on all sides. Near this range is placed a four-oven caboose with its accessories, made by Thos. M. Sheppard, also a brass yacht stove and several creditable specimens of copper work, by the same manufacturer. Bramhall, Deane & Co. exhibit a large French range for which they claim economy of fuel, simplicity of management, and by the employment of a patent water front, great external coolness.

The Francestown soapstone works show several soapstone stoves, which from their novelty attract considerable attention. A stove having several new features and rejoicing in a somewhat pretentious title, is Calvin Pepper's Radical Cooking Stove. The air is here fed to the fire through a perforated metal plate covering the entire upper surface of the fire, so that the combustion actually proceeds from above downward. Cooking can be done by radiant heat alone, the flame and heated products of combustion passing beneath the kettles, etc., into and around the baking oven. Although designed for burning coal or wood, it can be readily converted into a petroleum or coal gas burner. In the assortment of gas stoves we notice the Union and the Dome cooking stove. The latter has the perforated plate which is common to all gas stoves, so situated as to be beyond the reach of dirt, or accident, or damage from the flame, and has moreover an air tube through the burner bringing an upward current of air in contact with the aerified gas at the point of ignition, securing a strong and steady flame, and free from that almost universal evil of gas stoves, their unpleasant odor.

Before leaving this group we must notice the case of grates, fenders, and fire irons exhibited by Messrs Jackson & Co. Theirs is conceded to be the handsomest display made by any exhibitor in the section.

Messrs. Jackson & Co. have on exhibition at their new and elegant warerooms in Union Square an arrangement for heating rooms by burning gas in an open fireplace which is very ingenious and attractive. The gas jets are so concealed in imitations of logs of split wood that when ignited the fireplace has the appearance of containing a glowing wood fire.

For lighting our dwellings, the petroleum lamp makers present for inspection a varied collection of their wares, Julius Ives & Co. having perhaps the largest assortment. One of the good points in the Ives lamp is the arrangement of a tube in the burner, providing thereby a means for filling without the inconvenience of unscrewing or removing any of its parts. The shade and chimney are combined with the cone of the burner, and all are opened together by a hinge whenever the wick is to be reached, or the lamp filled or lighted. Danford's atmospheric lamp dispenses entirely with chimneys, a brilliant and steady flame being obtained by supplying artificially a steady stream of oxygen around the flame, a train of clockwork in the base of the lamp furnishing the means for accomplishing this end.

Next to the stoves and heating apparatus, by way of contrast, are placed the refrigerators. One of these household necessities exhibited by Stephens & Ritchie has slate substituted for charcoal, as a non-conducting medium, thereby doing away with the dampness and musty odor which often arises from refrigerators lined with other substances. The Zero refrigerator, a too suggestive name to be attractive at this season: also a milk, wine, and water cooler, which is a convenient article for househeepers, are exhibited by Alex. M. Lesley.

A correspondent from Galveston, Texas, sends a well writ- | Confronting the visitor at his entrance into the main hall assortment of these contrivances, which are intended for economizing, by concentration, of gas, kerosene, and daylight. The body, of the form required, is made of tin, and is covered with plates of glass corrugated upon one side. For lighting public buildings or show windows these reflectors are to be highly commended.

Leaving for the present a description of the imposing array of washing machines of every conceivable construction, and which from their number require a report by themselves, we turn to the group under which cabinet furniture is classified. First stands the invalid bed, invented, as a circular informs us, by a soldier while lying sick in hospital. The bed is divided into three equal parts, each of which may be inclined at varying angles, allowing the patient to assume a variety of positions, changes very acceptable to the invalid.

Mr. A. S. Lyman presents for public approval a bedstead constructed on the principle illustrated in these columns some time ago. The object of his invention, it will be remembered, is to filter and purify the impure air supplied to the sleeper for respiration, to dry it when too damp, and in summer to cool it. To effect this the head board is made