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The Properties and Effects of Steam.

Although much has been said and written about steam, yet, owing to its wide application on steamships and railroads, in factories and mills, events are continually transpiring to bring it before the public in some new phase, or in some old one clothed in a new dress. When we take into consideration that there are tens of thousands of steam engines in daily use, any old scientific fact, not very widely known, or any new fact brought to light, or any common error connected with steam pointed out, must be of interest to a very large number of persons.

For many years we have entertained the opinion that at least eight-tenths of the accidents caused by steam boiler explosions might be set down under the terms *carelessness, ignorance, and defects of boiler*; but a correspondent of the Dayton *Gazette*, (Ohio,) entertains queer notions respecting explosions, believing they are caused by some mysterious agent, and denies that steam explosions take place "from defects of the boiler, or carlessness, or ignorance of those entrusted with their management." Let us endeavor to explode suchnegative views by positive proof. The steamer *Pearl* exploded her boiler on the 27th Jan., 1855, at Marysville, on the Sacramento river, California, by which eighty persons lost their lives—three times more than were lost by all the other steamboat explosions which took place last year. The report of the Inspectors on this case says, "this accident was investigated *most fully*, and the decision was, it was caused by *carelessness* or recklessness of the engineer, and he absconded after the accident." On the 30th of June last year, the steamer *Lexington* exploded her boilers on the Ohio river, and although the cause of the disaster was not fully substantiated, the Inspector's report states that "from the testimony obtained, the cause was an inadequate supply of water in the boilers,"—another case, no doubt, of ignorance or carelessness. The steamer *Oregon* exploded on the Detroit river on the 20th of April last, and respecting the cause of this, the Inspector's report says, "from such information as could be elicited the Board came to the conclusion that it was caused by the failure of the supply pumps, and consequent want of water in the boiler,"—another case, no doubt, of carelessness or ignorance. On the 7th of July last, the boiler of the steamer *J. Brooks* exploded on Lake Erie, near Ashtabula by which three lives were lost. The report of the Inspectors in relation to it, states the pressure of steam at the time of the accident to be less than allowed by certificate, and the water at the proper hight in the boiler, but "the Board decided that the accident was caused by a defect in the braces of the crown of the furnace." Thus, of the four explosions of boilers which took place last year on licensed steamers, three were undoubtedly caused by carelessness or ignorance on the part of those managing the boilers, and the fourth was caused by a defect in the boiler. Many more accidents would have taken place from defects of boilers only for the rigid inspection to which they were submitted. The Inspectors' report alluded to, says, on page 12, "defects have been disclosed by the very process of inspection, which, without such discovery, would have undoubtedly resulted in terrible accidents, involving loss of life and property." This testimony, from such high authority, confirms us more and more in the views we have hitherto entertained respecting the cause of steam explosions.

The science of steam is not so simple, nor so very generally and profoundly understood as some suppose. There are some very curious phenomena connected with water and steam, ignorance of which has no doubt led to the explosions of boilers, by those who had them in charge. Thus, water deprived entirely of atmospheric air can be quietly heated far above 212 degs., the boiling point of water, without generating steam, and it can be made to explode at a high heat with fearful violence.—Steam in contact with water in a quiescent state, may be heated up to 500 degs., or upwards, without a corresponding effect on the steam gauge. A boiler in such a condition, by the agitation of the water, through a stroke of the pump or opening of a valve, instantaneously developes a terrible force, by the superheated steam lapping up the water, and expanding immensely by becoming saturated steam. In the experiments made some years since by the Franklin Institute, steam was heated to 533 degs., while the pressure on the gauge was only 103 lbs., whereas it should have been 900 lbs. It is many years since Jacob Perkins made this discovery in relation to superheated steam, and he advanced it as the cause of very violent boiler explosions, and no doubt he was right.

In England there is an "Association for the prevention of steam boiler explosions," which numbers among its members the ablest engineers in that country. Their first annual meeting was held last November, but the yearly report has but recently been published. The Chief Inspector of the Association, in his report, says, "the deficiency of water is evidently the most frequent cause of explosions." He also mentions the case of a boiler that contained water and steam, the latter only indicating 8 lbs. pressure on the gauge, and yet it was heated so high that the upper part of the furnaces above the water line became red hot, and a block of wood on the top of the boiler was charred black. "From this it is evident," the report says, "that steam may be raised to a high temperature while in contact with water, and yet remain at a low pressure. This condition can only arise from a deficiency of water in the steam, and we may reasonably infer, that if this could by any means be supplied, we should have an almost instantaneous increase of density and pressure proportionate to the degree of saturation. This will fully account for the difference in intensity of many explosions, and why these should so often occur immediately after starting the engine."

Persons ignorant of these phenomena connected with steam, may, no doubt, be ready to attribute very violent explosions to some mysterious agency—electricity, or some invisible ether. Intelligent engineers, however, know how to obviate explosions arising from unsaturated steam, by keeping the water in their engine boilers continually in agitation.

We have been thus particular in presenting the foregoing information relative to the nature and effects of steam, in order that ignorance of the causes of boiler explosions may never be held up as an excuse for defects of boilers; or carelessness, or recklessnes on the part of those having them in charge.

Dangers of Railroad Traveling.

Railroad accidents have recently become very common. Two have taken place on the Hudson River R.R. within two weeks. The first was caused by one train running into another on the same track, near Poughkeepsie, on the 9th inst., by which three persons were instantly killed and a number dangerously wounded. The second was caused by the breaking down of the bridge over Spuyten Duyvel Creek on the 14th inst., when the train was passing over it, by which two persons were killed—the engineer and the fireman—and seven severely wounded. There were a great number of passengers on both the trains on which these accidents took place, and it has been a subject of wonder that so few lives were lost. The first accident was caused, it is said, by the incompetency of the "signal man," who did not warn the approaching train in due time, of the danger. The second accident was caused by the ice of the creek, during high tide, lifting the track off the spiles. This was, perhaps, one of those accidents which human wisdom could not provide against in that particular case, but certainly a bridge built on any railroad, the safety of which depends on the contingency of floating ice during a high tide, does not say much for the civil engineering of the road.

On the 14th inst. the train of the Morris and Essex Railroad, N. J., ran off the track, by which several persons were injured but none killed. On the same evening Col. Raymond, a passenger on the train from Philadelphia was jammed between the car when he had arrived at the end of his journey in Jersey City, and was very seriously injured.

Owing to the bad management of some of our railroads in relation to the safety and comfort of the passengers, we believe it would be a good plan for the several States to make laws, appointing supervisors and inspectors to exercise the same powers on railroads as those appointed under the "new steamboat law," for safety of life on steamboats.

The Mason Testimonial.

We have been notified by the Treasurer of this fund—Mr. S. T. Shugert—that in consequence of the return of Judge Mason to the chiefship of the Patent Office, it is deemed advisable to defer the presentation indefinitely, and in the meantime to return all funds to the original subscribers. Under the circumstances, perhaps, this is the best course that could be adopted. All persons, therefore, who have subscribed through us, are hereby informed that their orders upon us for the amounts they have paid in will be duly honored. We shall, perhaps, on another occasion, give them a new and better opportunity of testifying their approbation and appreciation of Mr. Mason's services.

The amount pledged, added to the sums paid in for this testimonial amount to between six and seven hundred dollars. Had the subscription been continued it is probable that a purse of two or three thousand dollars would have been made up.

Inventions in the London Crystal Palace.

It is well known that the Crystal Palace which stood in Hyde Park in 1851, still exists, and in far greater splendor than when it attracted tens of thousands within its walls in that year. It was removed from London and re-erected at Sydenham—a few miles from the metropolis—on a bold hight, where it overlooks the adjacent country. It is divided into different apartments or courts, for the display of ancient and modern art, and on a beautiful day it is sometimes visited by twenty thousand persons, from all parts of the world.

We have just received a circular from the Secretary—G. Grove, Esq.—of the Association to whom the Palace belongs, informing us that the directors have appropriated a portion of the Palace for a "Court of Inventions," in which it is proposed to receive and exhibit free of rent, specimens, models, and drawings of newly invented and patented articles. This is a very worthy feature connected with the Institution, and may be of advantage to American inventors who visit England with inventions for public exhibition and sale.

Recent American Patents.

Improved Gas Burner.—By Charles A Cummings and Cortland Douglass, of New London, Conn.—The metallic tip or burner through which flows the gas used for lighting, is perforated according to the form of light or flame that is desired. If, for example, an erect slender flame is wanted, the top of the burner is so perforated as to leave a small perpendicular hole; a hollow disk perforated at its edges with several fine holes, forms what is known as a "sun wheel burner;" two apertures made at angles so that two jets of gas will issue against each other and spread, produce what is known as the "fish tail" flame, and the tip is known as the "fish tail burner."

The present improvement relates to "fish tail burners," and consists in introducing a very small and thin blade of metal between the two apertures on the tip, so as to separate the jets. This device is alleged to serve two purposes: first, the gas jets strike against the blade and become more widely spread, and thus produce a broader flame than when they issue against each other. Second, the blade becomes highly heated and imparts extra caloric to the issuing gas, producing more complete combustion, and, consequently, better light. The improvement may be attached to the burners in use at a cost of a few cents.

Improved Hydrant.—By C. J. Cowperthwaite, of Philadelphia, Pa.—The design is to afford convenience in repairing, and to prevent freezing of the pipes in winter. By the simple turning of a rod the case of the hydrant may be connected with, or disconnected from the main pipe, and the internal parts of the hydrant, valves, etc., withdrawn for examination or repair. The labor of digging and withdrawing the hydrant from the ground, the soldering of pipes, renewing of stop cocks, etc., which has hitherto been always necessary in order to effect repairs, is avoided. There is a self-acting arrangement of the internal parts, which allows all water to escape from the hydrant, and thus prevents bursting of the pipes and overflows in consequence of freezing. It is a good invention.

Improvements in Mowing and Reaping Machines—By Wm. F. Ketchum, of Buffalo, N. Y.—This invention consists, first, in attaching the cutter bar to the frame of the machine, by means of a single bar of steel, made sufficiently elastic to yield to any unevenness of the ground; thus equipped the apparatus is a mower. The second improved feature relates to the machine when used as a reaper, and consists of a straining bar, which extends from the bottom of the platform to the frame, in such a manner that, while it adds support, it also counteracts the elasticity of the bar first mentioned, and renders the machine sufficiently stiff for reaping. Mr. Ketchum is the inventor of many valuable improvements in harvesting machines. His mowers enjoy a world-wide reputation for excellence.

Extension Table.—By E. A. Curley, of Westport, Conn.—This invention consists in having a box in the table for the reception of the extra leaves, said box occupying the place generally allotted to the drawer of ordinary tables. The bottom of the box is furnished with springs, upon which the leaves are piled. The spring serves to lift the upper one always even with the top of the table; convenience in handling the leaves is also afforded by the springs. Altogether, the improvement is a very useful one.

Instrument for Pruning Trees.—By W. W. Harvey, of Saltville, Va.—The pruning of the upper branches of fruit trees is generally done by means of a common chisel, mounted upon the end of a pole, the operator standing upon the ground. This contrivance answers very well except where the limb to be severed is too large for removal by one blow of the chisel; in attempting to give a succession of blows the chisel is rarely guided into the same cut, and the limb becomes hacked, the tree injured, &c.

The present improvement consists in elongating the handle or shank of the chisel, and slipping it loosely into a hole made in the extremity of the pole; if the chisel is now driven into the limb it sticks fast, and allows the pole to be drawn back a little, and thrust forward again against the chisel, with the same effect as a mallet; by repeating this operation the larger limbs may be expeditiously severed, with that smooth clean cut which is so necessary to the health of the tree. The end of the pole is, of course, furnished with a thimble, to prevent splitting.

Improved Harvesting Machine.—By Gilston Sandford and Thomas Hull, of Poughkeepsie, N. Y.—This invention relates chiefly to the manner of hanging the driving wheels and frame of the machine. The principle involved is rather novel in its application: suppose the axletree of a common cart instead of being made horizontal were bent in the form of a crank, the bow part being turned up, and the body of the cart being attached to the uppermost part of the bow; it is plain that whenever the bow was turned out of a perpendicular line the cart body would be brought nearer to the earth.

The above principle is exemplified in the present improvement. The axles of the driving wheels are hung eccentrically to the frame in circular movable bearings, by turning which the frame of the machine, together with the cutters and platform, are elevated or depressed at pleasure. The same feature permits an instant disconnection between the driving wheels and cutting gear. These movements are made by means of a convenient lever.

Paper Feeding Apparatus for Printing Presses.—By Samuel I. Chapman, of Charleston, S. C.—In this improvement the air pump is employed in connection with a perforated cylinder to suck up the sheets from a pile, one by one, carry them into the press, and discharge them at the proper moment. The discharge is effected by a cut-off arrangement, which causes the pump to change from exhaust to blast, and blow the sheet from the cylinder. Engravings would be required to convey a full idea of the working of this invention.

Machine for Dressing Millstones.—By R. D. Nesmith, of Lake Village, N. H.—It is doubt-