

THE Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

Messrs Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill London, England, are the Agents to receive European subscriptions for advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.
"The American News Company," Agents, 121 Nassau street New York.

VOL. XIII, NO. 25. [NEW SERIES.] Twentieth Year.

NEW YORK, SATURDAY, DECEMBER 16, 1865.

Contents:

(Illustrations are indicated by an asterisk.)

Green's System of Deodorizing Petroleum.....	383	[Correction.....	389
Polytechnic Association of the American Institute.....	384	To Clear a Boat of Water without Ballast.....	389
Zinc Manufacture in Illinois.....	384	The Russian-American Telegraph.....	389
Breeding In and In.....	385	Report of the Secretary of the Treasury.....	389
Aluminum and Aluminum Bronze.....	385	Report of the Secretary of War.....	389
Condition of the Patent Office—Suggestions about Amending the Patent Laws.....	385	Report of the Secretary of the Navy.....	389
Our View of the Razor Question.....	385	*Evans's Graduating Circular Plane Stock.....	390
*The Foot Lathe.....	386	*McCrum's Self-guiding Gage.....	390
Recent American Patents.....	386	*Pneumatic Dispatch.....	390
Porcelain Pictures.....	387	A Patent Sold for a Large Sum.....	390
Another Trial in Working Steam.....	387	Boiler Explosions.....	391
Patent office Decisions.....	387	Rimmers.....	391
New Books and Publications.....	387	Experiments in Burning Water.....	391
Notes and Queries.....	388	Boiler Explosions from Explosive Gases.....	391
Progress of Patents since 1850.....	388	Patent Claims.....	392, 393, 394, 395
*Negative Slip.....	388	*Stearns's Rosing Machine.....	393
The Hand Lathe.....	388	Modification of the Lenoir Gas Engine.....	393
The St. John's Boilers.....	388	The Great Paris Exposition.....	393
Scarcity of Water for a Steam Engine.....	389		

BOILER EXPLOSIONS.

On another page we publish a communication from Mr. Norman Wiard, arguing that the explosion of the *St. John's* boiler was not the result of defective construction—though he admits the existence of the chisel cut along the line of fracture. He contends that if this cut weakened the plate it would have been shown in the hydraulic test.

We feel no disposition to criticise harshly this amiable attempt to reason away the defect in the broken plate, and to exonerate the boiler makers from all blame. The disaster must be to them a serious loss—though not so serious as to the fifteen passengers who were scalded to death by it. Mr. Wiard contends further that we ought not generally to blame engineers, inspectors, and boiler makers with inefficiency, but to look for the cause of explosions in agencies beyond human control. There is another class of reasoners who take the opposite ground, and insist that it is injurious to give an impression to engineers that they are dealing with forces beyond their power to master. Our own position is that it is best in all cases to know the exact truth.

In the history of boiler explosions these two truths stand out prominently: first, those who have investigated the subject most thoroughly are best satisfied that these disasters do not usually result from the mysterious action of uncontrollable forces, but from mechanical defects; second, when sufficient care is taken to avoid these defects, boiler explosions are entirely prevented.

No other persons have examined so many bursted boilers as the experts appointed for this purpose by the Manchester Boiler Association, and no examinations have been made with more care and fidelity. In every case, so far, those intelligent engineers have found some fatal defect in the construction of the boiler, or some impropriety in its management. Not one case yet has come under their observation in which the disaster was produced by any mysterious and uncontrollable agency.

During the long years in which the late John L. Stevens was running his steamboats on the North River, it was his practice to crawl into his boilers after every trip, to sound their plates with a hammer, and to give them a careful inspection. It was also his practice to pay his engineers twenty-five cents per day extra if they would abstain entirely from the use of ardent spirits. Mr. Stevens's boilers did not explode.

The Cunard steamers have now been running twenty-five years, rolling and driving their way through the storms of the Atlantic, and no boiler in any one of them has given way. Why not? The theorists may answer as they please—our own opinion is, that it is because they are thoroughly made and properly taken care of.

In so complicated a fabric as a modern steam boiler, where hundreds of pieces of iron are fastened together in various directions, of course any unequal expansion of the several parts from the different temperatures to which they may be exposed, should be provided for; but this provision is only one element in proper construction, and there is no element which has received more attention.

RIMMERS.

Rimmers are indispensable tools in all shops that profess to do good work. No matter how well holes may be drilled, they are not perfect unless rimmed. The twist drills now in use in the best shops make holes as perfect as drills can, yet even with them it is necessary to run a rimmer through where two parts are to be bolted fast—as a cylinder on its frame, a pillow block in its seat, or other details that require to be immovable.

The most common form of rimmer in use is the fluted one. The cutting part consists of many blades worked out of the solid metal either by planing or milling on a machine. These tools are good in many cases, but they are frequently made with too many and too sharp cutting edges. The hole formed by such a rimmer is not round but a series of angles, as any one can see or feel by looking at it or putting a finger in. In our opinion it would be far better to make rimmers of this class with five or seven cutters than twelve or fourteen, as is generally done; and, furthermore, to leave less to rim in the work than is generally left, so that instead of taking a rank hold of the metal, the cutters would just clean the surface, and no more. In holes from half an inch to an inch, the sixty-fourth part of an inch is ample, if the drill is what it should be. In holes from an inch to two inches, a full sixty-fourth to one-thirty second should be allowed to rim out. Holes over two inches are cheaper bored out with a bar and cutter than rimmed, where it is possible, for the reason that rimming is done by hand and is slow and hard work, while boring is done by power, and is quick and easy. Rimmers with seven blades require to be well backed off, as taps are, but not so much as to cause them to jam in the hole and work hard.

We have seen rimmers made with lozenge or diamond-shaped teeth, which worked very well. A pineapple forms a good natural illustration of their pattern. Such a rimmer is easily made in the lathe. To make it, put on screw gear to cut a quick pitch—say one turn in two inches for an inch rimmer. Cut a right-hand thread and then cut a left-hand thread on the same piece, plane it out, and back it off the same as any other rimmer. Such a tool will cut a round smooth hole and take more metal out with less labor than a straight fluted rimmer. Stubbs makes a five-sided, or pentagonal rimmer, with flat sides, that does well enough in a small work, but we never had a fancy for rimmers with flat sides. If it is necessary to straighten up a hole with a rimmer, and the tool is forced over to one side, a pentagonal rimmer is almost certain to bear in and work the hole oval.

Half-round rimmers are very useful to boiler makers or in rough work, but have no place in a machine shop.

A square rimmer is not worth a cent to do good work well. Holes, in castings that are cored out and have to be rimmed, should be drilled when over an inch, being first stopped with hard wood plugs, driven in tight, so that the drill will have a bearing on the point. Holes up to and under one inch may be cleaned out with a drift pin, which is simply a square-end punch. All rimmers, of whatever form, should enter the hole to be rimmed at least one inch before they begin to cut, so as to get a fair start and stand straight.

EXPERIMENTS IN BURNING WATER.

We observe that our respected cotemporary, the *Mechanics' Magazine*, copies the reports which were published some time since in the daily papers of this

city, of some experiments with Hagan's water-burning stove, which seemed to show an economy of about thirty-three per cent by the use of a steam jet in the fire. One of the editors of the SCIENTIFIC AMERICAN was appointed on the committee to conduct those experiments, but declined to serve, on the ground that the apparatus to be used and the plan of the experiments were such that the results would be of no value. One of the clear-headed and learned professors who did serve on the committee refused to sign the report, and assigned as the reason for this refusal that he did not believe the apparent economy to result from the introduction of the jet.

BOILER EXPLOSIONS FROM EXPLOSIVE GASES.

From the proceedings of the Polytechnic Association, reported in another column, it will be seen that one speaker was very desirous of an explanation, why the theory that boiler explosions are caused by an explosive mixture of gases, is not sound. This theory has been strongly urged by some pretty intelligent men, and it possesses some elements of plausibility.

It is well known that water is composed of oxygen and hydrogen; that it can be decomposed by red-hot iron—the oxygen combining with the iron, and the hydrogen being set free; and that if this free hydrogen is mixed with the proper proportion of atmospheric air and set on fire, a violent explosion takes place. It was imagined that when water gets low in a steam boiler the uncovered portions of the boiler might become red hot, and the other steps in the process might successively follow. On examination, however, this theory, like all others yet propounded, is found to be unsatisfactory.

Prof. Tillman remarked at the Polytechnic that, even if hydrogen were set free in a steam boiler, there would be no air present to mingle with it, and thus to form an explosive mixture. In reply to this, the theorists would affirm that water does absorb air, and carry it into boilers, the first action of the heat being to expel this absorbed air; and the correctness of this reply must be admitted. There are, however, objections to the theory which cannot be answered.

Hydrogen and oxygen enter into chemical combination only at a high temperature. When fire is applied to a mixture of these gases, the atoms coming in contact with the fire are heated to the temperature at which combination takes place, and the heat generated in burning these raises the temperature of adjacent atoms to the point at which they combine, and thus combustion is rapidly propagated throughout the mass. If the mixture is pervaded by a sufficient proportion of steam, combustion cannot spread through the mass. It is impossible to suppose that the interior of a steam boiler is ever sufficiently free from steam to permit explosive burning of hydrogen.

If hydrogen was set free in the presence of oxygen, and at the temperature of red-hot iron, it would be burned gradually as it was liberated, instead of accumulating in quantity, and then burning explosively.

Finally, when hydrogen and oxygen are mixed in the proper proportions, and set on fire, the pressure produced is no greater than that of steam; it is, in fact, the pressure of steam. Hydrogen, in burning, combines with oxygen and forms water; which, under the action of the heat generated by the combination, exists in the form of steam.

QUARTZ CRUSHER.—Charles W. Stafford, of Saybrook, Conn., has applied for a patent through the Scientific American Patent Agency for valuable improvements in quartz crushers. The machine has been tested with excellent results thus far, and a large one is now being constructed at the Morgan Iron Works, in this city. The Empire Mining and Manufacturing Company, of this city, of which Senator Nye, of Nevada, is President, have agreed in writing to purchase the patent for \$100,000, whenever a satisfactory test is made. The inventor is sanguine of perfect success.

We are happy to state that Messrs. Crawford, Fales, and Connolly, who have hitherto acted as assistant examiners, have been promoted to principal examiners. This is an act of well-merited justice to faithful and excellent men.