

EXPERIMENTAL BOILER EXPLOSION.*

Mr. D. T. Lawson, of Wellsville, Ohio, as our readers know, has been conducting experiments with a view to determining the nature of the causes of the explosion of steam boilers, and as a result of these experiments he maintains that his original theory of boiler explosions is correct.

He believes that water raised to a high temperature, when confined and under pressure, will burst into steam when the pressure is removed from its surface; and if the exploding water meets resistance, as in a closed boiler, the effect of the concussion will be greater than the regular steam pressure.

For his experiment, Mr. Lawson had a plain cylinder boiler made in the best manner, of the best iron. It was six feet long and thirty inches in diameter. Its heads were of three-eighths inch flange iron secured by a one inch stay rod running from one head to the other. The shell was of three-sixteenths iron.

The boiler was set in an arch and connected by a pipe with a closed cylinder, into which steam was admitted to suddenly relieve the surface of the water in the boiler from pressure. A first class steam gauge was placed in the bomb-proof and connected with the boiler by a pipe about forty feet long. The valve, controlling the escape of steam from the boiler to the cylinder, was arranged to be operated by a cord from the bomb-proof. The boiler was filled with water eleven inches above the fire line, and the fire was supplied with extra fuel in the form of petroleum, the supply of which could be controlled from the bomb-proof. After a few preliminary experiments the final and successful one was tried on the 16th of June last.

Steam was raised to 260 lb., when the valve was opened, the index of the steam gauge fluctuated some 30 lb., showing an extraordinary disturbance in the boiler, and nothing more. A repetition of this with steam at 300 lb., at 335 lb., and at 365 lb., produced the same results. But when the valve was opened at a pressure of 383 lb., the boiler exploded with a loud report, scattering fragments of its shell, furnace, and stack in all directions. The stone foundations were driven several inches into the ground.

It is stated that there were evidences that the plates were rent at least four times transversely and torn open the entire length. One piece had a hole blown through it about the size of a man's hand.

It was estimated that the boiler would have borne a continuous pressure of over 700 lb. per square inch. There seems to be ample evidence that it required an extraordinary force to effect the destruction of the boiler.

We understand that Mr. Lawson has some further experiments in contemplation which he expects will furnish additional proof of the correctness of his position.

The Elias Magneto-Electrical Machine.

The magneto-electric machine of Signor Paccinotti, which forestalls the "Gramme ring" by several years, has been brought into fresh repute by the discourse of M. Govi delivered at the Electrical Congress, and by its exhibition in the Italian Section of the Exposition at the Palais de l'Industrie

Close beside it, however, in the Dutch Section, is another old machine which has not received all the attention which it deserves. Indeed it does not appear to have been on view all the time the Exhibition has been practically complete. This apparatus was invented by Herr Elias as far back as 1842, and as it contains a somewhat similar ring to that of Gramme, it may be said to have anticipated Paccinotti to a certain extent. It consists essentially of two concentric rings of soft iron, each about one inch and a quarter broad and half an inch thick, and wound with gutta percha coated wire in six sections. The outer ring is the inducing electro-magnet, which is fixed, and the inner ring is the revolving armature, which is mounted on an axle which carries a slip commutator with contact rubbers of copper after the plan now so universally adopted in dynamo-electric machines. There are six knobs or teeth projecting inward from the outer iron ring and serving for magnetic poles, in front of which the armature coils revolve. The wire is wound continuously on the outer ring, but in the reverse direction in each of the six succeeding sections. This arrangement is designed to make the projecting poles alternately positive and negative. From opposite diameters of this ring a connecting wire runs to the commutator, and connects to three of its six slips alternately. The result is that as the inner armature revolves the alternating currents generated in its coils are led off by the wires connected to the copper rubbers as

current; for the brush which draws a positive current from one slip also draws a positive current from the next, because the slips are alternately connected to coils on opposite sides of the ring, and passing in front of opposite poles of the electro-magnet.

The machine is exhibited by the Ecole Polytechnique of Delft, and is accompanied by a book on the apparatus, written by its inventor, and published at Haarlem in 1842.

Both its author and printer are now dead, and no other copy is known to be in existence. It contains a very good engraving of the machine as it stands, and we should have liked to reproduce this diagram, but the book is considered

MECHANICAL INVENTIONS.

An improvement has been made in double oscillating engines, in which two vibrating pistons, attached to separate rock shafts in axial line with each other, are arranged within sector-shaped chambers, and carry crank arms on the outer ends of their rock shafts. Attached to these arms are rods which serve to reciprocate slides, that work in suitable slideways, and have pivoted to them rods which are connected with cranks on the driving shaft of the engine. This forms a very compact and efficient engine, and is the subject of a patent recently granted to Mr. Robert L. Stevens, of Albany, Oregon.

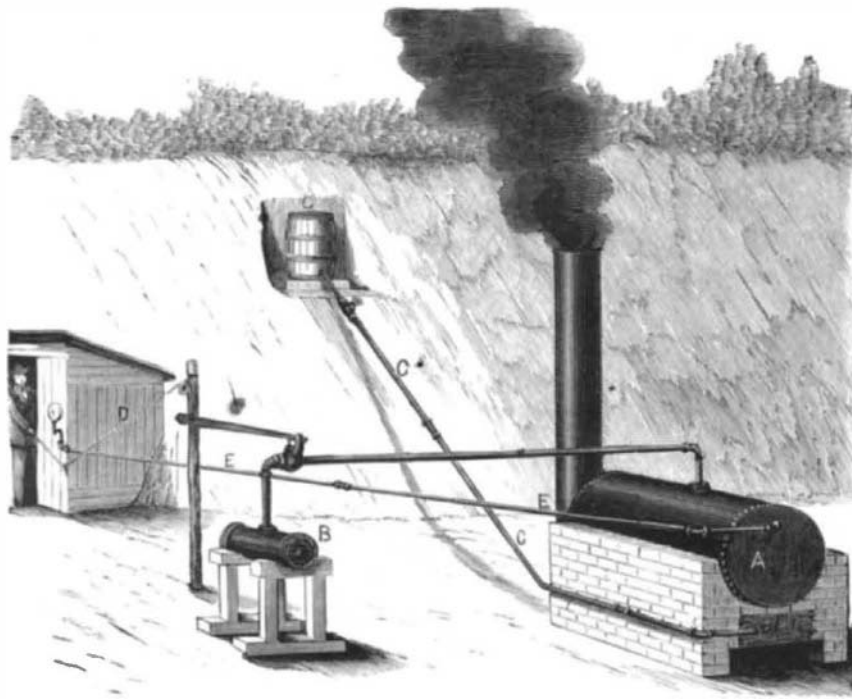
An improved stop motion for warping machines, which allows the winding of single or double threads, and will insure stoppage of the machine, has been patented by Mr. John B. Greenhalgh, of Blackstone, Mass. This invention is an improvement upon a former invention by the same party. The improved devices are fitted between the cylinder and bobbin stand of the machine. In operation the threads pass from the bobbins, through guides, to and through eyes of fallers, and through a vibrating guide to the beam on the cylinder. The fallers are thus held up out of reach of a rod that is constantly vibrated. A belt shifter is set to hold the operating belt to the fast pulley, and a latch-engaging lever retains the shifter. In case any thread breaks, its faller, being thus released, drops into the path of the vibrating rod, and the rod, by coming into contact with said faller, moves a bar to which the fallers are pivoted, and which projects upward from a shaft that, in thus being partially turned, releases the belt shifting mechanism, and causes the belt to be thrown on to the loose pulley.

Mr. Peter McCourt, of Grand Haven Mich., has patented an improvement in loose pulleys, whereby the rattling noise usually common to such devices, and which is consequent upon the wearing of their bearings, is avoided. The invention consists in a pulley, which operates as a loose one, rigidly mounted on a shaft having a bearing in its hanger, and having its one end fitting loosely on a box that is loosely mounted on the end of the shaft on which the driving pulley is mounted, so that the loose pulley will not revolve loosely on its shaft, but the independent shaft of this pulley will rotate in its bearings. The loose box in which the adjacent ends of the two shafts have a bearing remains stationary.

A simple but serviceable improvement in harrows has been patented by Mr. John H. Stokesbary, of Aurora, Neb. This invention consists in making the tooth bars of the harrow square with the perforations for reception of the shanks of the teeth passing diagonally through them, and securing the harrow teeth by upper and lower notched or angular washers receiving opposite angular portions of the bars between them, said washers being secured on the teeth against the bars by nuts on the tooth shanks above the bars and shoulders on said shanks below the bars, and serving to strengthen the bars where they are weakened by the perforations for the teeth, and to prevent the said bars from being split by the side pressure of the teeth.

Mr. Kittil Anunsen, of Winchester, Wis., has patented an improved turbine water wheel. This invention consists of a vertical circular case containing a horizontally revolving water wheel having inclined buckets, and containing above said wheel a fixed circular platform having a circle of inclined tubes inserted through it near its periphery, which tubes extend downward to deliver water into the buckets; and it consists, further, of a movable circular disk or cut-off covering the face of the tube platform, and having a circle of inclined apertures corresponding with the tubes, which cut-off is capable of being turned about its vertical axis, by any suitable mechanism, for the purpose of closing the tubes or of bringing the apertures in coincidence with them. Means are also provided for clamping the cut-off disk down upon the tube platform and holding it immovable thereon in any desired position, and for releasing it when it is necessary to adjust the cut-off. This makes a cheap and effective water wheel.

A very useful attachment to printing telegraph instruments, in the shape of a tape supporter, has been patented by Mr. Edward J. McLoughlin, of New York city. The object of this invention is to provide a device especially applicable to stock printing telegraph instruments for supporting and displaying the tape as it runs from the instrument and thereby preventing its disarrangement. The device consists of a shallow trough within and along which the tape passes as it is run from a stock or other printing telegraph instrument. This trough is constructed at its one end to admit of its ready attachment by a thumbscrew to the edge of the table on which the instrument sits, and is provided at or near its outer end with a transverse rod arranged to prevent the



LAWSON'S EXPERIMENTAL BOILER EXPLOSION—ARRANGEMENT OF BOILER.

so rare and interesting that it has been taken away for purposes of translation.

Remarkable Lathes.

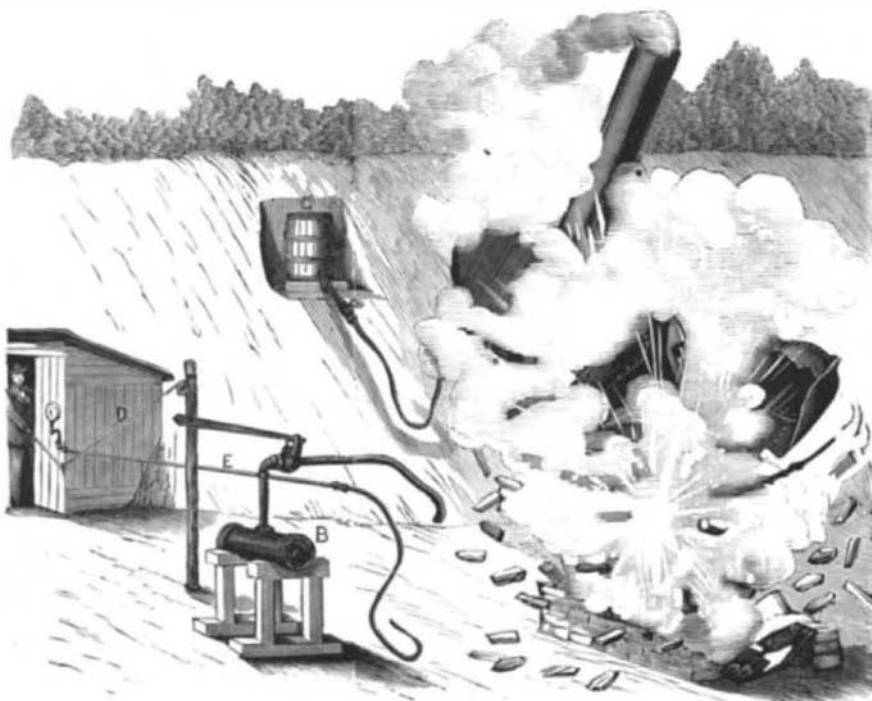
The London Iron Trade Exchange has printed a paper contributed to the Iron and Steel Institute by Colonel Maitland,



FRAGMENTS OF THE EXPLODED BOILER.

Superintendent of the Royal Gun Factory, at Woolwich, Eng., in which appears the following in relation to the gun turning lathes:

"The very nature of the manufactures in the Royal Gun Factory necessitates the turning of very large and very heavy masses. Lathes have therefore been designed and completed in this department remarkable for magnitude and power. They can deal with weights up to 200 tons, and



LAWSON'S EXPERIMENTAL BOILER EXPLOSION.

* In SUPPLEMENT 313 will be found an essay by Mr. Lawson in which he gives a detailed account of this experiment, and sets forth the principles he claims to have discovered.

are sufficiently powerful to reduce by six inches at a single cut the diameter of a 12-foot tube. These lathes have the following dimensions: 6-foot centers, 60-foot beds. There are nearly 200 tons of material employed on each of them, and the maximum power of their gearing is 150 to 1."