Scientific American.

NEW-YORK, APRIL 26, 1856.

Valuable Experiments with Cast Metals.

A very finely executed and comprehensive work has just been published by authority of the Secretary of War, containing reports of officers belonging to the U. S. Ordinance Department, on the above named subject. The experiments were extended over a series of years, and were made to test the strength and other properties of metals employed in the manufacture of cannon. The work is a scientific one of great value, especially the information it contains relating to the nature and treatment of cast-iron, a material of deep interest to so many millions of people in our own and other countries.

The experiments were mostly conducted under the charge of Major W. Wade, who details them in an exceedingly clear and interesting manner. One new fact developed by them is, that iron fused a number of times up to a certain point, is thereby greatly improved in strength. In trials with some iron, it was found that its transverse strength was nearly doubled by being melted and cast four times. This is a discovery of great importance to all engineers and cast-iron founders. At the South Boston Foundry, experiments were made to test the strength of cast-iron which had been submitted to fusion during different periods of time. Eleven thousands pounds of iron were cast into four six-pounder guns; one after the metal had been under fusion or melted half an hour; the second, under fusion an hour and a half; the third, under fusion three hours, and the fourth, under fusion three hours and three quarters. The gun first cast burst at the thirty-first fire; the second, at the thirty-fourth; the third was fired thirty-eight times, and remained unbroken. Thus the strength of the metal seemed to increase in a ratio corresponding to the period of fusion, or under which it was kept in a highly molten state, and it might have been inferred from this that the fourth gun would have been the strongest of all. Instead of this being so, however, it proved to be the weakest, for it burst at the twenty-fifth discharge. In view of these experiments, Major Wade, in this report, says, "these results appear to establish satisfactorily the fact, that a prolonged exposure of liquid iron to an intense heat, does augment its cohesive power, and this power increases as the time of the exposure up to some (not well ascertained) limit, beyond which the strength of the iron is diminished. This is a new developed fact in relation to cast iron, subject to concussions, of deep import to all engineers. Experiments were also made to test the transverse strength of cast iron bars, two inches square and twenty-four inches long, the metal of which was kept under fusion during different periods of time. These bars were set on supports twenty inches apart, and the breaking force was applied at the middle. The results obtained from four castings were in favor of that which was kept fused longest—three hours. On this head the report says, "from this it appears that the cohesive power of the iron, so far as it can be shown by its capacity to resist transverse strains, is increased 60 per cent. by its continued exposure in fusion. This is also a fact of importance to engineers and architects, regarding girders and beams, subject to a *crushing* force.

In most of the books which treat of the strength of cast iron, the resistance which it opposes to certain strains, is given; but little useful information can be obtained in them regarding the very great difference of strength in different kinds of cast iron. But as the density between the lower and higher grades of this metal differs as 6·9 to 7·4—a difference of 31 pounds per cubic foot, and as the tenacity of the metal has a relationship to its density, it was found by these experiments that cast iron, having a density of 6·900, had only a tenacity of 9000; while that having a density of 7,400, had a tenacity of 45,970.

Castings of the greatest weight, according to their size, are by far the strongest, and weighing them is a ready means of judging comparatively of their strength.

Some important facts were also developed in relation to the cooling of heavy castings. At the Fort Pitt Iron Works, two eight inch and two ten inch guns were cast, one of each in the common way, solid, and one of each with a core on a tube of iron, through which water was made to circulate after casting, to cool it from the interior, according to an invention of Lieut. Rodman. The solid eight inch gun burst at the 73rd discharge; the hollow cast one stood 1500 discharges, and did not burst; the solid 10 inch cast gun stood only twenty fires, while the hollow ten inch gun stood 249. These guns were cast of the same material and at the same time; the difference in favor of the hollow cast guns, is astonishing. This is attributed to the method of cooling, it being supposed that in cooling, the solid guns contract entirely from the outside, and that a strain is exerted upon the arrangement of the particles of the metal, in the same direction as the strain of the discharges. Lieut. Rodman goes into a very subtle mathematical demonstration to show that this is the case, and that his method of cooling the casting obviates this unequal strain. But on the back of this, Major Wade presents a new fact in relation to *the effect of time*, after the castings are made, and before they are used, which is also of vast importance to engineers. Eight inch guns proved thirty days after being cast solid, stood but 72 charges; a gun of the same bore, proved 34 days after being cast, stood 84 charges, while one which was proved 100 days after being cast, stood 731 charges, and another, proved after being cast six years, stood 2,582 charges. What an important fact is thus newly developed, showing us that solid cast cannon should not be actively used until they have been kept for some years. Major Wade accounts for this phenomenon in cast iron, by supposing that the particles strained in the cooling re-adjust themselves in the course of time to their new position, and become free or nearly so, and he presents some good arguments in favor of this theory.

The lesson to be derived from this, by our engineers, is, that heavy castings of iron for beams and machinery, subject to strains, are less capable of resisting them immediately after being cast; in other words, old castings are much stronger than new iron castings.

There is much other new and useful information in this work, for which we cannot find room to allude in this article, but will take occasion to do so in a future one.

New Patents.

The official list of Patent Claims, which we publish this week, is very long, covering nearly one page of our paper, and embracing more than sixty inventions. Over one-third of the whole number, twenty-one, were patented through the Scientific American Agency. The great success which attends our efforts in this direction, must be particularly gratifying to our clients.

Maine has Spoken.

Resolutions against the further extension of the Woodworth Planing Machine Patent have passed both branches of the Legislature of Maine, and received the Governor's signature. This is, indeed, good news.

We most earnestly hope that Congress will listen to the voice of reason and to the wishes of the people, as expressed through their petitions and popular assemblies, and not permit a devouring monopoly to be longer continued.

Ferry Steamboats to be put under a Safety Law.

It affords us much pleasure to be able to inform our readers that an amendment to the New Safety Steamboat Law, is now before Congress, including all passenger ferry steamboats, and tug boats, and some new provisions for the greater safety of all steamers.

American Institute Election.

The election for officers of the Institute takes place on the 8th of next month. Henry Meigs is nominated for Corresponding Secretary, W. B. Leonard for Recording Secretary, and E. I. Backhouse for Treasurer.

Recent American Patents.

Marble Saw—By J. E. Haviland, of Galveston, Texas.—This invention is for cutting two sides of a block of marble at once, on a taper or otherwise. The improvement consists in a peculiar connection between the saw gates or frames and the driving pitman, whereby the angle at which the saws cut, may be changed at pleasure without any alteration of the pitman.

Improvement in Stoves—By W. H. Binney, of Seneca Falls, N. Y.—In this stove there is an air pipe passing down through the center of the fire and communicating with an air chamber in the base. It is claimed that stoves of this description yield a much greater amount of heat, in proportion to the fuel consumed, than those in common use. The inventor also provides a damper for admitting air to the fire, above its surface, which unites with the escaping gases and causes their combustion. An additional economy is thus obtained.

Water Elevator for Cattle—By J. A. Ayres, of Hartford, Conn.—This is a farm-yard contrivance, of such a nature that by its use the cows or oxen whenever they wish to drink can raise their own water from the well. The invention consists of a movable platform so connected with a rope and wheel that the weight of the animal, in stepping upon the platform, causes the wheel to revolve and raise a bucket of water. The bucket is furnished with a faucet, which is opened in rising by striking a pin, and the water then runs into a trough. When the animal leaves the platform the faucet shuts, the bucket sinks into the well and fills again, ready for another customer.

Repeating Pistol—By Palmer Lancaster, of Burr Oak, Mich.—Most of the repeating firearms are furnished at the breech with a revolving barrel containing several powder chambers, which are successively discharged through the long barrel. In the present invention the revolving barrel is dispensed with and the straight breech piece containing the chambers is substituted; said straight piece slides transversely, or at right angles, to the line of the long barrel. The improvement consists in a novel method of moving the breech so as to bring its chambers, alternately, into line with the long barrel for discharge.

Improved Shoe Last—By A. J. Barnhart, Hartfield, N. Y.—Many lasts are composed of two pieces, the upper, or block, and the lower, or foot part. They are chiefly used in combination when the leather is to be stretched over them, and are fastened together by pins. The present improvement consists of a lock or catch for effecting the fastening, whereby greater convenience and firmness is obtained

Improved Harvester—By W. A. Kirby, of Buffalo, N. Y.—Consists, first, in having the driving wheel of the machine hung in such a way that it is allowed to swing, and thereby allow the wheel and also the finger bar and sickle to be raised or lowered by the inequalities of the surface of the ground, each acting independently. Second, in a peculiar raking attachment. Third, in the peculiar mode of attaching the fingers to the finger bars. It is a good improvement.

Improvement in Raking Attachments to Reapers—By Wm. H. Hovey, Springfield, Mass.—Consists in the employment of a reciprocating rake, and also a swinging rake applied to the platform, so arranged as to sweep off the grain with the utmost evenness, regularity, and certainty. It appears to be an excellent improvement.

Improvement in Power Looms—By Andrew Allen, of Wilmington, Del.—This improvement is applicable to the weaving of ginghams or other fabrics in which filling threads of different colors are employed. It relates to the mechanism by which the lifting and dropping of the shuttle boxes for the purpose of changing the shuttles so as to change the color of the filling. Drawings would be necessary to illustrate the operations of the parts.

Improvement in Grain and Grass Cutters—By Wm. H. Hovey, of Springfield, Mass.—Consists in covering the sickle bar with a shell or shield through which the cutting teeth only project, so as to prevent the sickle from being choked or clogged by straw, grass, or other obstructions. This is a good idea

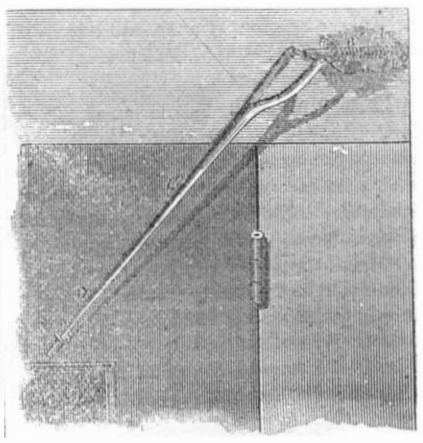
A peculiar device is also employed for raising and lowering the sickle so that it may pass over the obstructions, and likewise secured at varying hights from the surface of the ground as occasion requires.

Improvement in Calendar Clocks—By Edward Allen, of Glastenbury, Conn.—This invention relates to an improvement in the calendar mechanism which is the subject of letters patent issued to John Williams, dated Sept. 19th, 1854. The lever described in the specification of said Williams, through which the wheel of thirty-one teeth for showing the days of the month is caused to receive from the twenty-four hour wheel the overleaping movement necessary at the end of the short months, depends upon the force of gravity for its operation, and so will only operate in one position of the clock: on that account it is only applicable to upright clocks. This improvement consists in a new method of giving the necessary movement to the said lever, by which it is made capable of operating in all positions and is therefore applicable to marine clocks.

Furnace for Repairing Railroad Rails—By James McLellan, Detroit, Mich.—The upper part or tread of the rail is generally the first to give out. It laminates and breaks off into splinters, becoming so bad in time that a new rail must be substituted. Heretofore it has been impossible to repair the old rails by welding, owing to the fact that when placed in the fire the whole mass becomes equally heated, and, under the hammer, the thin neck part is crushed.

The present improvement consists in an improvement in the furnace so that only the tread part of the rail, where the welding is required, shall be heated. This is done by providing a hollow cast-iron holder, so formed as to receive the lower part of the rail and protect it from the fire, while the upper part of tread projects above the holder into the fire. The holder is filled with water so as to insure the cooling of the lower portion of the rail By the use of this improvement it is said that damaged rails may be very cheaply repaired. It appears to be a valuable invention.

Improved Door Spring.—By D. G. Smith, of Carbondale, Pa.—In this improvement the inventor makes a very ingenious application of the universal joint, and produces a door spring, at once cheap, simple, and good. The small frame piece, A, is screwed to the jamb, and holds the spring shaft, B, which connects with the forked lever, C; the extremity of the latter rests in a hook at D, on the door.



When the door opens, B, is partially turned and with it the spring. The spring in its reaction causes lever D to press upon and close the door. The operation is such that the lever presses with greatest force to shut the door when it is widest open, and again when it is nearly shut; so that the tendency of the spring is to keep the door always closed. Some springs relax when the door is nearly shut, leaving the acquired momentum to carry it the remainder of the distance; where such springs are used the door is apt to stand partly open, when at rest, especially if there are any currents of air about. Such is not the case with the above invention. This spring costs only a few cents for its manufacture, yet it is strong and apparently very durable.

To disconnect it from the door it is only necessary to lift the end of the lever, C, out of the hook, D, and allow it to hang down by the side of the door. Patented. Address the inventor for further information.

Floor Clamp for Carpenters—By H. M. Oliver, of Whitneyville, Conn.—Consists in the use of