New Inventions.

Manufacture of Aluminum.

When the metal aluminum can be manufactured so cheap as to allow of it being employed in the arts like copper, we are of opinion that it will lead to many mechanical improvements, on account of its lightness and anti-corrosive qualities. We are led to hope that it will soon become cheaper, from a short article in the last number of Silliman's *Journal* from its Paris correspondent, J. Nickles. He says :—

"We have more than once spoken of the efforts employed to render the preparation of aluminum an industrial operation. Dumas has just announced to the Academy that this problem is now solved. He has stated that the manufacture is actually carried on by workmen in a small shop in the Faubourg St. Jacques, at Paris, connected with a manufacture of chemical products. The methods have been contrived by H. St. Claire Deville and Morin. It is necessary always to decompose the chlorid of aluminum, and decompose it by sodium, in order to obtain the aluminum.

This chlorid is now made by the direct use of kaolin or even of clay. The chlorid was difficult to manage in a large way, because, after having been formed in vapor. it was often condensed in snowy crystals, rendering it necessary to collect it in chambers and detach it mechanically from the surfaces it coated. There was, first, a loss of the chlorid, the condensation being incomplete; second, danger for the workmen exposed to the respiration of the vapors; third, an enhancement of cost from the interruptions in the operations.

The improvement consists in submitting to a current of chlorine a mixture of alumina, charcoal, and chlorid of sodium; this affords a double chlorid of aluminum and sodium which is volatile and liquifiable, running like water and becoming solid with cold. The preparation goes on uninterruptedly, proceeding with simplicity and regularity, and exacting no other care than what is necessary for the production of the chlorid, the renewal of the preparation for decomposition, and the substitution as soon as cooled, of earthen pots, in which cakes form from the double chlorid that flows in a continued stream.

The chlorid is decomposed in a reverberatory furnace, into which, mixed with bits of sodium, it is introduced. The re-action of the two substances takes place after a few moments, but so quietly that it may be done on a large scale without danger. It leaves the aluminum in plates, globules, or a powder It is separated from the common salt either mechanically or by means of water."

Further Experiments with Bessemer's Iron Process.

Dr. Stephenson Macadam read, at a late meeting of the Scottish Royal Society of Arts. some reports of experiments, which go to show that the process is ruinous to the metal when carried on for a long period, but may be of service in partially decarbonizing the pig, in which case its use is analogous to that of the common finery fire.

A furnace was charged with 1492 lbs. of No. 2 pig iron, and the air forced in at a pressure decreasing gradually from 15 to 5 lbs. per square inch, for 89 minutes, after which the scintillations still continuing, the furnace was tapped and the iron run into molds. The quantity thus molded together, with what was thrown out by the violence of the ebullitions, was only 630 lbs., showing 862 lbs. to have disappeared in the operation. On attempting to roll the metal it was "hot short," and no subsequent effort at annealing it was successful.

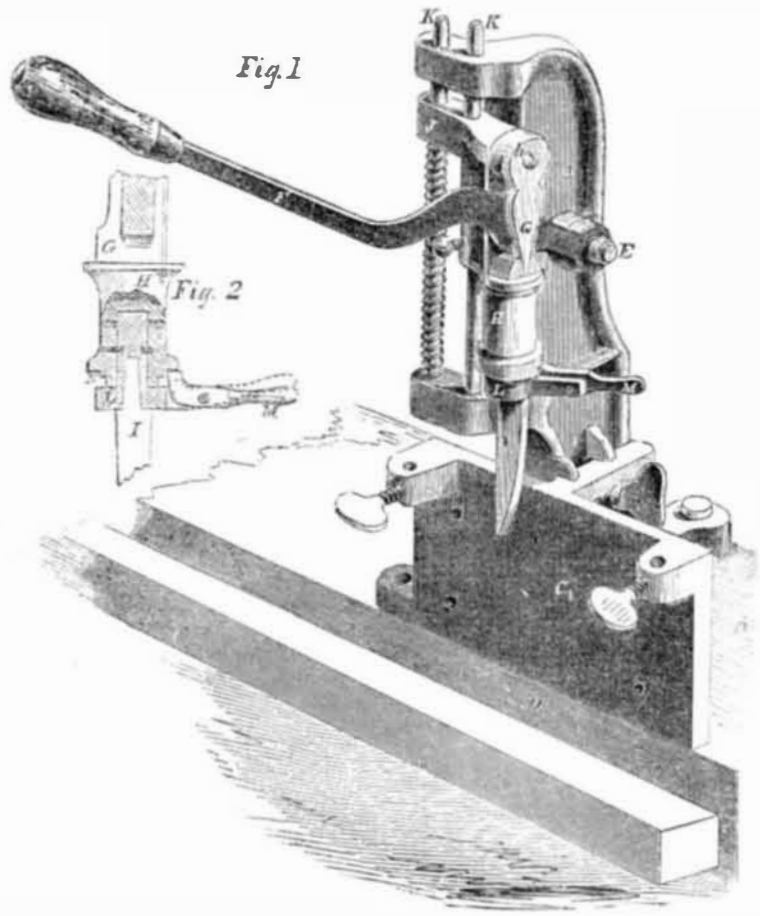
Another furnace was charged with 784 lbs. of No 1 pig, and treated as before, but tapped after 30 minutes. The product or bloom was capable of being rolled, but was still, after re-heating and re-rolling, very crystalline and brittle. This iron was pronounced "cold short."

Another trial with No. 1 pig, treated 24 minutes, gave a result similar to the last. Nos. 1 and 2 iron contain more carbon, are more fusible, and more valuable than numbers 3 and 4, which latter are generally selected for converting, by the ordinary process, into bar iron

One trial was made with No. 4 iron, but in 15 minutes the metal settled down in the furnace, and though it was immediately tapped, the iron would not run out, and the furnace had to be taken to pieces to liberate its iron prisoner.

As intimated above, good bar iron was made in the puddling furnace from iron which had been previously boiled a short time only in the Bessemer furnace. This latter experiment, as were most of the others, was at Coes' Malleable Iron Works, near Glasgow.

PORTABLE MORTISING MACHINE.



The accompanying illustration represents the portable Mortising Machine for which a patent was issued to J. R. Perry, on the 4th of November, 1856.

Fig. 1 is a perspective view, and fig. 2 is a vertical section through the center of the cutter stock.

A is a metal frame cast in one piece, with B, the bed. C is the clamp slide for regulating the work to be mortised on the bench, D. The lever, F, or handle, is secured by a joint pin, E, to the frame. G represents jaws through which the lever, F, passes, and in which it is attached to the cutter stock, H. These jaws are secured by a pin, *h*, to the slide, J, which moves up and down on the two fixed guide rods, K K. One of these guide rods has a coiled spring around it, the tension of which re-acts to raise or draw back the chisel after a down stroke is made.

L is the socket of the chisel, I; it is capable of being moved round, to change the position of the cutter. It has a dog, M, with a small handle attached by a fulcrum pin to a projection on the socket, L, as represented by fig. 2. The inner end of this dog or catch takes into notches, N, in the face of the socket and stock, and holds it in place when the chisel is cutting. To move the socket round, or partially so, to change the position of the chisel, the handle, M, is raised up, as shown by the dotted lines, fig. 1; this detaches its catch from the notch in the stock, H, when the socket and chisel may be turned, and then held fast at any point by pressing down on the handle, M. The socket of the chisel is united to the cylindrical stock, H, by a groove made on each, into which some soft metal is poured through a hole made in stock H, for this purpose. They are, therefore, united together in a most simple manner.

The tool or chisel, I, is operated in the usual manner—the work to be mortised being secured in the table D,—and the chisel has the capacity of being changed, rapidly and easily by handle, M, in any position.

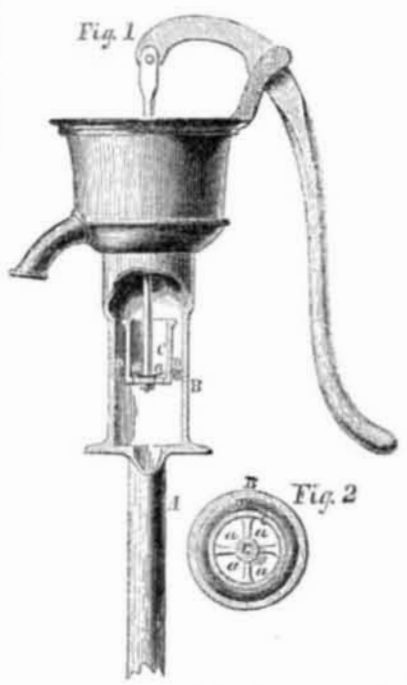
More information may be obtained respecting this machine by letter addressed to Mr. Perry at Port Clinton, Pa.

Elastic Ring Packing Pump.

The accompanying illustration is an elevation partly in section, represented by fig. 1, and a top plan view, fig. 2, of an improvement in Pumps, for which a patent was issued to John Underwood, of Lowell, Mass., on the 9th of December last.

The piston or plunger is of a cylinder form, with the valves inside; and surrounding the plunger as packing there is provided an elastic ring.

A is the suction pipe, and B the cylinder of the pump. C is the cylinder plunger, with valves, *a a a*, secured to the seat, E, of the piston rod, to which they are jointed. D is a ring of elastic packing surrounding the plunger and enabling the plunger to work air-tight in the cylinder, B. A valve is also placed over the exit of the suction pipe. These constitute all the parts to which allusion is required to understand the nature of the invention.



When the plunger, C, is forced down, the valves, *a a*, open, and the water flows up; when raised, the valves close, and the plunger then lifts the water. The elastic ring packing is kept in place by the form of the outside of the plunger, and it can roll up and down with the motion of the plunger, and maintain its position always air-tight. Being elastic, it accommodates itself to any roughness or inequalities of surface in the inside of the pump cylinder, or the outside of the plunger, and thus these two parts of the pump do not require to be turned in a lathe.

If any part of this pump should become deranged, it can be repaired or replaced with facility. This improvement is peculiarly applicable to pumps having stone-ware cylinders, (on which water has no chemical action) because they are generally rough inside, and soon wear out leather or metallic packing, whereas the elastic ring, D, accommodates itself to the inequalities of the surface, and is stated to be far more durable. The invention is applicable to all kinds of pumps, double and single acting, fire engines, etc.

The claim of the patentee can be found on page 115 present volume, Scientific American. More information may be obtained by letter addressed to Mr. Underwood.

Water in Gas Pipes.

A correspondent complains of water which collects in the lower bends of his gas pipes, and assuming the amount of water chemically combined with coal to be only three-fourths of one per cent., argues that water or snow must have been either intentionally or carelessly introduced in the retorts, to produce so large quantities. The evil is a serious one, compelling our large consumers, in some instances, to separate and empty their pipes at some points, every few days. It arises from the presence of small quantities of uncondensed steam or vapor in the gas, which is retained at the ordinary temperatures at which gas is washed, but is deposited when the temperature becomes very much lowered during extreme cold weather. In short, carburetted hydrogen, like atmospheric air, always holds in solution a certain quantity of water, increasing with the temperature. If a certain quantity of either, simply saturated at one temperature, be cooled in a close vessel, or by contact with a cold substance, as with a window pane or pitcher of ice water, it will deposit water, and the evil cannot well be remedied.

Speed of Circular Saws.

A correspondent residing in Ralston, Pa., informs us that in a mill in that place, in which he is interested, there are two circular saws; one thirty inches in diameter, for sawing shingles—speed 1850 revolutions per minute; and the other 34 inches in diameter, for sawing studding. This latter saw was at first geared to run at the rate of 950 revolutions per minute, a speed which was recommended by several machinists. At this speed it was incapable of performing a fair day's work: it turned out only about one-third the work of the shingle machine. The size of its driving pulley was increased to give it a speed of 1200 revolutions per minute, and it now cuts with ease three times the quantity of lumber in the same space of time; "there is no loss of time now experienced in backing out the saw to allow it to recover itself." He is of opinion that the most economical speed to run large circular saws, is from 12,000 to 14,000 feet per minute at their teeth.

Water-Proof Blacking.

There are many persons who cannot wear india rubber shoes on account of having very tender feet. To them a paste blacking capable of rendering their leather boots water-proof, is something of importance. A water-proof paste blacking, manufactured by J. Roemer, of Flushing, L. I., we have found to be a good article for this purpose.

Gas.

The Halls of the Montezumas are about being lighted with gas. The *Extraordinary*, published in English in the City of Mexico, notes the erection of a large establishment, in the outskirts, where gas is to be manufactured for the supply of the city, aided by all the facilities afforded by the most approved machinery, which latter was, at that date, (Dec. 6th,) on the road from Vera Cruz. The surplus beat from the gas works was to be employed in generating steam, which, in turn, was to be employed in driving various manufacturing machinery, so that the works are in fact already the nucleus of a small active village. A Dr. Naphegyi is the projector of this highly creditable enterprise.