Machinery and Tools as they are.—Screws and Screw Cutting.

(Continued from page 163.)

The processes hitherto mentioned, exact the continual attention of a skilled artizan, and were they the only means of obtaining screws, would render this invaluable instrument exceedingly expensive. There are, however, more economical methods of producing it, sufficiently well adapted for cutting ordinary threads, and of these the most simple and common is that which cuts the bolts or nuts by dies and taps, employing untrained manual labor for the task, and having the work held firmly in an ordinary vise, whilst the cutting tool is made to revolve and also traverse up and down. When this plan is adopted, it is usual to cut a steel screw in the lathe; this is converted into a tap by the removal of parts of its circumference, in order to give to the exposed edges a cutting action, whilst the circular parts that remain serve for the guidance of the instrument within the helical groove or hollow thread that it is required to form. The taps (for generally two or three are employed) are then hardened and tempered, when they form tools well adapted to cut internal threads as in nuts, for the tap, being of a taper shape, the end enters the nut, and, by turning the tap, using at the same time a slight downward pressure, it forces its way down, cutting a thread as it progresses. This operation furnishes a ready mode of obtaining a counterpart tool adapted to cut corresponding external threads on bolts, for if a steel plate is tapped with slots cut through the threads, and then hardened and tempered, the means of cutting a bolt is afforded. For small works the internal threads are made of fixed sizes, and in thin plates of steel, which are called "screw plates;" for larger works the internal threads are cut upon the edges of two or three detached pieces of steel called dies; these latter are fitted into grooves within "die-stocks," and have various other contrivances that admit of the approach of the screwed dies, so that they may be applied to the decreasing diameter of the screw from the commencement to its completion. The die-stock, in its most general form, has a central rectangular aperture, within which the dies are fitted, so as to admit of compression by one central screw. In general only two dies are used, and a notch is made at the central part of each die, so that the pair of dies present four arcs. The formation of these parts has given rise to much investigation and experiment, as the two principal points aimed at require directly opposite circumstances. For instance, the narrower the edges of the dies or the less of the circle they contain, the more easily they penetrate, the more quickly they cut, and the less they compress the screw by surface friction or squeezing. But on the other hand, the broader the edges of the dies or the greater part of the circle they contain, the more exactly do they retain the true helical form, and preserve the general truth of the screw. A contrivance to practically overcome the defects of both methods is now frequently employed; three dies are used, one embraces about one-third of the circle, the other two much less, and the latter are simultaneously advanced by a double wedge and nut. The large die serves to commence the screw and the two others act alternately, one during the descent, and the other when the stock ascends. By another arrangement one of the stock handles is made to move slightly in a groove formed in the stock, a narrow die is fixed in this handle so that it can bear hard against the bolt, and act like a turning tool; the other die, which is much larger, serving as a guide. In the more simple and primitive method, four planes were filed upon the screw intended for a tap, but this exposes very obtuse edges, which can hardly be said to cut, but which merely indent and burr. A better plan would be to file only three planes, but even then the cutting angle is too great; it is, however, more common to make the tap with three elliptical flutes, which form sufficiently near approximates to the desideratum of radial cutting edges. For screwing large numbers of bolts, the "bolt screwing machine" is generally employed, which is a combination of the ordinary taps and dies, with a mandrel driven by steam power. In one apparatus the mandrel revolves, traverses, and carries the bolt, whilst the dies are fixed opposite to the mandrel, or else the mandrel carries the tap, and the nut to be screwed is grasped opposite to it. In another machine the mandrel does not traverse, it carries the bolt, and the dies are mounted on a slide, or else the mandrel carries the nut, and the tap is fixed on the slide. The tap or die gives the traverse in every case. The "screwing table" is a useful modification of this machine, but is intended to be worked by hand. A long spindle runs loosely in two bearings, one end terminating in a small wheel with a winch handle, the other in a pair of jaws closed by a screw, these retain the bolt whilst the dies are fixed in a vertical frame. An instrument somewhat similar is used by gas fitters, the spindle is however, hollow, to allow long pipes to pass. The formation of metal screws for wood-work is well known to be an important part of manufacturing industry, and has, therefore, caused the introduction of much ingenious self-acting machinery. In this instance the screws are made out of wire, and the various operations of forming the blank, turning and preparing it, cutting a slot in the head and forming a thread, are all done with extreme rapidity by separate machines. The screwing operation is, however, essentially the same in theory as by the modes just indicated, for in all a slow traversing movement is taking place during the time of the more rapid rotating action, so that, in the case of screws for wood, the blank, which is firmly held by a spring clamp, might have the longitudinal motion in addition to revolving, or the cutting tool or die might traverse. In either case, the effects would be the same, and the arrangement is simply a question of expediency and economy. In addition to those already enumerated, various other methods have been used for making screws, and much ingenuity has been employed in effecting this purpose. The threads of wrought-iron screws have been forged whilst red-hot, between top and bottom swage tools having helical surfaces like those of screw dies; screws have been twisted whilst red-hot, out of rectangular bars, by means of the tail vice and hook wrench, as in making screw augers. Screws intended for ordinary vises have been compressed whilst cold, somewhat as with die-stocks; the lever is, in this case, very long, and the die a square block of hardened steel, with an internal square thread screw left smooth or without notches. The thread is partly indented and partly squeezed up, the diameter of the iron cylinder being less than that of the finished screw, this action severely tests the iron.

Other plans for making screws of malleable cast-iron, have been invented, and much ingenuity exercised in the moulding processes. The peculiarities in these latter are, that the core for the hollow worm or box is made in a brass core-box divided longitudinally into three parts; which are filled separately, and closed together with a stick of wood in the centre, to stiffen the core and serve for the core print. The core box is then connected by rings, like the hoops of a cask; this completes the core, which is removed, dried, and inserted in a mould made from a model of the exterior of the box constructed as usual.

In moulding the solid screw, the moulding flask is a tube with a cap having an internal thread, exactly liko that of the screw; the tube is filled with sand, and a plain wooden rod, nearly equal in diameter to the axis of the screw, is thrust in the sand to form a cavity. The screwed cap is then attached to the flask, and a brass screw, exactly like that to be cast, is guided into the sand by means of the screw-cap, and taps a thread in the sand mould very accurately. The screw-cap is then removed, and the second part of the flask, in which the head of the vice-screw has been moulded, is fitted on, and the screw is poured. After having been cast, the screws and boxes are rendered malleable in the usual way except that they are placed vertically, in general the box is slightly corrected with a screw-tap.

There are many other methods of forming the screw according to the purpose for which it is intended, as instanced in the screw joints of water pipes, and in the variety of appliances for which this tool is employed.

(To be Continued.)

Wrought-Iron Direct from the Ore.

MESSRS. EDITORS—The article published in your valuable paper of the 3d inst., being so worded as to convey to those not acquainted with the subject, the idea that Mr. Jas. Renton, of Newark, has just discovered a new principle or process, to manufacture wrought-iron direct from the ore, without previously smelting the ore in a blast furnace, to convert it first into pig, I have given below a recapitulation of the principal facts, historically recorded, having a bearing on this matter, and showing what has been done so far to bring this desirable process to perfection:—

In 1729, experiments were made in England, and have been noticed by the celebrated Swendenborg, in his treatise on the manufacture of iron. Previous to 1790, trials were made by Wilkinson, at the great iron works of Creuzot, in Burgundy, belonging to Louis XVI. In 1794, Mushet took the matter in hand, and made many experiments throwing much light on the theory of the process. About the same time the brothers Frerejean, of Lyons, made trials on a large scale at their iron works, in St. Etienne, France. In 1812, Hassenphratz published his "Siderotechnie," in four quarto volumes, in the third of which, on page 104, he gives an interesting account of the state of the matter, at that time, and strongly recommends intelligent iron-masters to persevere, in their efforts of finding a practical process to attain a result, the success of which he considered fully warranted by a sound theory. (There is a copy of the "Siderotechnie" at the New York Library). More recently Kaarsten has also given his opinion of the subject, in his work on iron. In 1833 Mr. Geissenhaimer took out a patent in the United States for the same purpose. In December, 1837, Mr. Clay took out his patent in England; of this Mr. Green, of the Boonton Iron Works, New Jersey, took an assignment, and with some modifications of his own, made many trials and a good deal of iron; Mr. Brevoort, the then manager of those works, was also much engaged in these trials. October 11th, 1838, Mr. Chas. Sanderson, of Sheffield, England, took out patents in England and the United States, and made both wrought-iron and steel, and fine cutlery, by this process. In December, 1842, C. S. Quilliard, of Rondout, took out two patents in the United States for the same object. In 1844, Mr. Broadmeadow took out two patents from the United States. Since that time many others have taken out patents, in particular four gentlemen from Newark, viz., Messrs. Dickerson, Salter, Ogden, and James Renton, each separately. No claim for principle or theory of the direct method, can now be established, that has been well understood for years; it is only for some very particular apparatus, furnace, or mode of proceeding, on which claims can now be made.

If Mr. Renton has really discovered, lately, something new, so much the better, I entertain no jealousy; I want the process to succeed, no matter by whom brought to perfection. But this much I may say, that Mr. Renton's first patent was for a furnace in which there was nothing to claim, but an exceedingly complicated contrivance, which disclosed very little practical experience in the iron business.

C. S QUILLIARD.

Rondout, Jan 23, 1853.

[It appears from the above communication that what we stated concerning Mr. Renton's improvement has been misunderstood by our correspondent. It was never supposed by us, nor claimed by Mr. Renton, that a new discovery has been made, all that he claims, in his patent, is simply the practical application of the theory, and certain improvements in carrying it out.

Ship Canal.

A project for a ship canal, connecting the waters of the Chesapeake and Delaware Bays, is now before the Maryland Legislature. The bill before the Maryland Legislature provides for the construction of the canal from some convenient point on the Chesapeaks Bay to the Delaware line; said canal to be at least 100 feet wide upon its surface, and 60 feet wide at the bottom, wherever practicable.—The capital stock of the company is to be $3,000,000.

Volcanoes, their Causes.

The general theory embraced by some leading men of science in reference to the cause of volcanoes, is that they are the smoke pipes of the great fire in the interior of this earth. They believe that we are living on the top of a huge white-hot cauldron, and that the volcanoes in different parts of the world are merely vents of this internal fire.

The following are the views of Prof. Silliman, of Yale College, on the subject embraced in a lecture recently delivered in this city:

The internal heat of the earth is proved by direct experiments. A gentleman is still living in Paris, who first called the attention of geologists and philosophers to this subject. He was one of those scientific men who accompanied Napoleon to Egypt, when he went on that great expedition—for Napoleon took with him not only the weapons of war, but he took a much more important cohort—that is, men of science, and art, and literature, able to explore and examine all the antiquities of the most important and venerable country. A great literary work resulted from this expedition, which proved to the world that the interior of the earth was in a heated state, bringing together facts already known, in regard to mines and springs. This general principle announced, has been followed up repeatedly by very deep borings, called artesian wells. The very deep well in Paris had been worked upon for seven years, without reaching water, when Arago came forward and gave the government assurance that if they would continue their work, and go through the beds of chalk, they would, in all probability, find water. They continued their work till they got down through the chalk, when the water rose up in a great volume of twelve feet. This water still flows there, and doubtless will continue to flow to the end of time.—This water was found to be very hot. Many other artesian wells have been made all over Europe, for various purposes, and the uniform result has been that we find the earth increasing in heat the lower we go down. Add to this the testimony of those who work in very deep mines, and we ascertain the fact that the rate of heat increases about one degree for every fifty feet of descent; so that, if we were to go down two miles, we should find boiling water; and at ten miles we might reasonably expect to arrive at ignited rocks. Is all then beneath us on fire? I am not prepared to say, with some, that this is the case, although there is strong evidence to justify such a theory. Witness the geysers of Iceland—where hot waters are gushing up from the earth age after age, and century after century. The result of all observations on springs, goes to show that they are thermal—that is, of a higher temperature. The Azores present a very important fact in example. The hot springs of Lucca, in the Apennine Mountains, are large spouting springs, of a high temperature, so copious, that they may be relied upon for hot baths all the year round. Another case is the hot springs of Bath in England. These are the more remarkable as there are no volcanoes in the British Islands. We know that from the time of the Romans these waters have never ceased to gush up in vast abundance.

The hot springs of the Rocky Mountains are also very important, and the great salt lake in Virginia is very hot. Taking the artesian wells and the thermal, we have, from these sources, the best evidence of the heated temperature of the internal portion of the earth, and this is placed beyond all question by the great volcanoes in the world. And here we have decisive evidence that the heat which will melt the solid rock is not connected with any external cause; for, among the cold, icy mountains, there are volcanoes bursting up to the height of 12,000 feet.

In Spain and South America we find great volcanoes bursting out. The fact is, the world is on fire. It has always been on fire. It was kindled at the time of its creation, and has been burning ever since.

[Dr. Antisel, of this city, recently delivered a lecture, in which the same views are developed; the substance of it we will present next week; as he embraces the electrical theory, he certainly militates against the nebular theory. Both agree as to the internal heat, viz., that we live on the top of a furnace.