

IMPROVED ENGRAVING MACHINES.

We illustrate herewith two specimens of a series of machines, designed and constructed by Mr. Ferdinand Lotz, of Offenbach, Germany, for the use of engravers, and having a very wide range of application, as they are intended for the production of line engraving, producing enlarged or reduced facsimile copies, and for making copies of reliefs of all kinds. Fig. 1 is a machine employed for engraving reliefs, medallions, etc., either the same size as the original, or enlarged or reduced. With it straight and curved lines in various com-

binations can be produced. The different natures of lines are formed by the use of change wheels, the forms of which vary with the design to be engraved. One of these wheels is shown mounted in place; and it will be seen that bearing upon it on the upper side is a steel point, to which motion is imparted as the wheel revolves, the motion of course varying with the form of the wheel. This movement is then transferred from the arm carrying the steel point, through a set of levers to the bar carrying the diamond point, shown resting on a lithographic stone. For ruling straight lines the upper rack, shown in the engraving, is dropped, throwing out of gear the parallelogram which transmits motion to the carriage. The latter is then moved to the left hand side of the frame. By turning the crank handle, shown in the engraving, motion is imparted through the gearing and rack and pinion, to the slide rest carrying the diamond point holder, and a line is drawn upon the stone. On turning the lever in the opposite direction, the graver is raised out of the way. The slide rest is provided with a self-acting feed, which can be graduated with the utmost nicety. Sliding blocks are placed on the frame to regulate the travel of the carriage. Thick lines may be produced by giving the screw spindle, upon which the lateral motion of the graver depends, one twenty-fourth of a turn. The lines are then so close together as to appear as one, but dark lines may also be produced by loading the cutter bar with shot, and thus increasing the pressure. In copying reliefs, it is necessary to move the carriage to about the middle of the machine, and to connect it with the pantograph shown in the engraving. The steel point actuated by the design wheel, and that part of the machine transmitting the motion thus applied to the steel point, have to be removed.

with the atmosphere, two or three distinct layers of scale form on the surface, and, unlike the skin upon cast iron, can be readily detached, as by the bending or by hammering the metal. The outer layer of this scale is more highly oxidized than the inner, and is slightly redder in tinge from the presence of a variable excess of ferric oxide over that contained in the inner layer. The oxide occurring in the outer scale is fusible only at a high temperature, is strongly magnetic, and slightly metallic in luster; while the inner layers are more porous, dull, and non-metallic in luster, less brittle cases, and recourse must be had to scrapers and hard brushes to remove the scale or rust. Having obtained a clean surface, the question arises what paint should be used upon iron? Bituminous paints, as well as those containing variable quantities of lead, were formerly considered as solely available, but their failure was made painfully apparent when the structures to which they were applied happened to be of magnitude, or subjected to great inclemency of weather or to constant vibration. Recourse has, therefore, been had to iron oxide itself, and with very satisfactory results. Iron

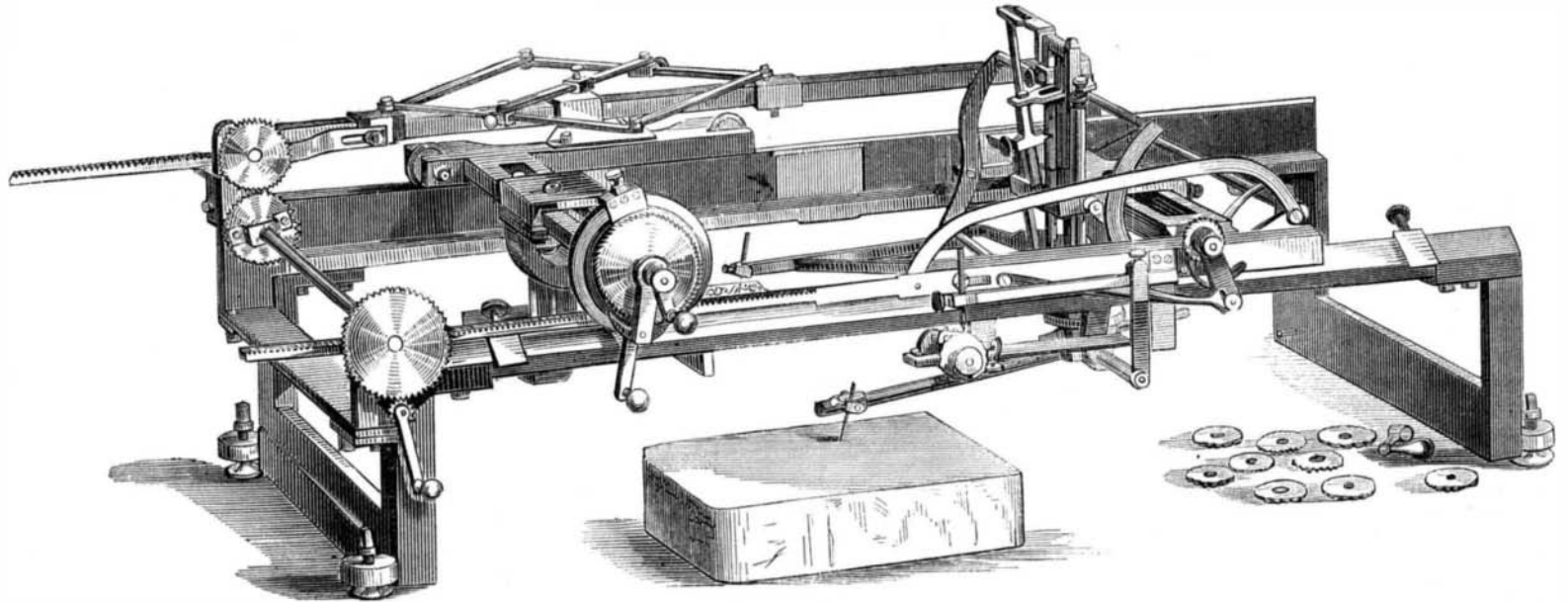


Fig. 1.—LOTZ' ENGRAVING MACHINE.

and also less powerfully magnetic. It will be seen that the iron has a tendency to rust from the moment it leaves the hammer or rolls, and that the scale above described must come away. One of the plans to preserve the iron has been to coat it with paint when still hot at the mill; and although this answers for a while, it is a very troublesome method which iron masters cannot be persuaded to adopt, and the subsequent cutting processes to which it is submitted leave many parts of the iron bare. Besides, a good deal of the scale remains, and until this has fallen off, or has been removed, any painting over it will be of little value. The only effectual way of preparing wrought iron is to effect a thorough and chemical cleansing of the surface of the metal upon which the paint is to be applied, that is, it is to be immersed for three or four hours in water containing from 1 to

oxide paints are made of two qualities. The first quality is the best adapted for iron work, and is made by purifying the oxides and placing them in retorts, when the various colors are mixed with them. They are altogether submitted to seven distinct processes in the course of manufacture. To insure large surfacing qualities, or the power of covering a large area with a small quantity of paint, the ingredients should be reduced to an impalpable powder before they are mixed with the oil; and after mixture in first quality paint, they are ground for seven or eight hours. The second quality have their colors chemically combined by mixture, and are not so carefully prepared, although they are excellent for common work. A pound of iron oxide paint, when mixed ready for use in the proportions of two thirds oxide to to one third linseed oil, with careful work, should cover twenty-one square yards of sheet iron which is more than is obtained with lead compounds. Oxide of iron paint endures a very great heat without material alteration, and keeps both its color and preservative qualities well. The author is of opinion that, when used under proper supervision, no better protection can be found for iron structures than oxide of iron paints. There is this difference to be noticed between the painting of iron and wood, that, with the former, when a painter comes to spots of rust that cannot be removed, he should endeavor to incorporate them with the paint rather than paint over them. The repainting of iron involves carefully washing down and removing all dust, dirt, and so on from the entire surface, every particle of rust being scraped and chipped off, the work receiving from two to four coats in oil, properly applied. The author would observe, in conclusion, that the real value of any paint depends upon the quality of the linseed oil, the quality and character of the pigment, and the care bestowed on the grinding and mixing; and as all this is entirely a matter of expense, cheap paints are not to be relied upon. He is convinced that the superiority of most esteemed paints is due to the above causes rather than to any unknown process or material employed in the manufacture, and their comparatively high price corroborates this opinion.

The original is fixed upon a cross plate below the carriage, in the position indicated on the engraving, and the steel point is then carefully carried over each part of the original, the motion being transferred to the diamond point.

The horizontal spindle of the carriage, to which the original is secured, carries at one end a ratchet wheel and crank, and by this combination the points are shifted through the space of one line, so as to occupy fresh ground. In reducing or enlarging originals, a suitable connection is made between the carriage and the pantograph.

In forming straight and curved or wavy lines, a design wheel of the required pattern is fixed in the position shown, and operates as already described.

Fig. 2 represents an adaptation of the same principle, and is intended chiefly for engraving bank notes, checks, etc. With this, reductions or enlargements can be made, by the aid of the pantograph attached to the instrument.

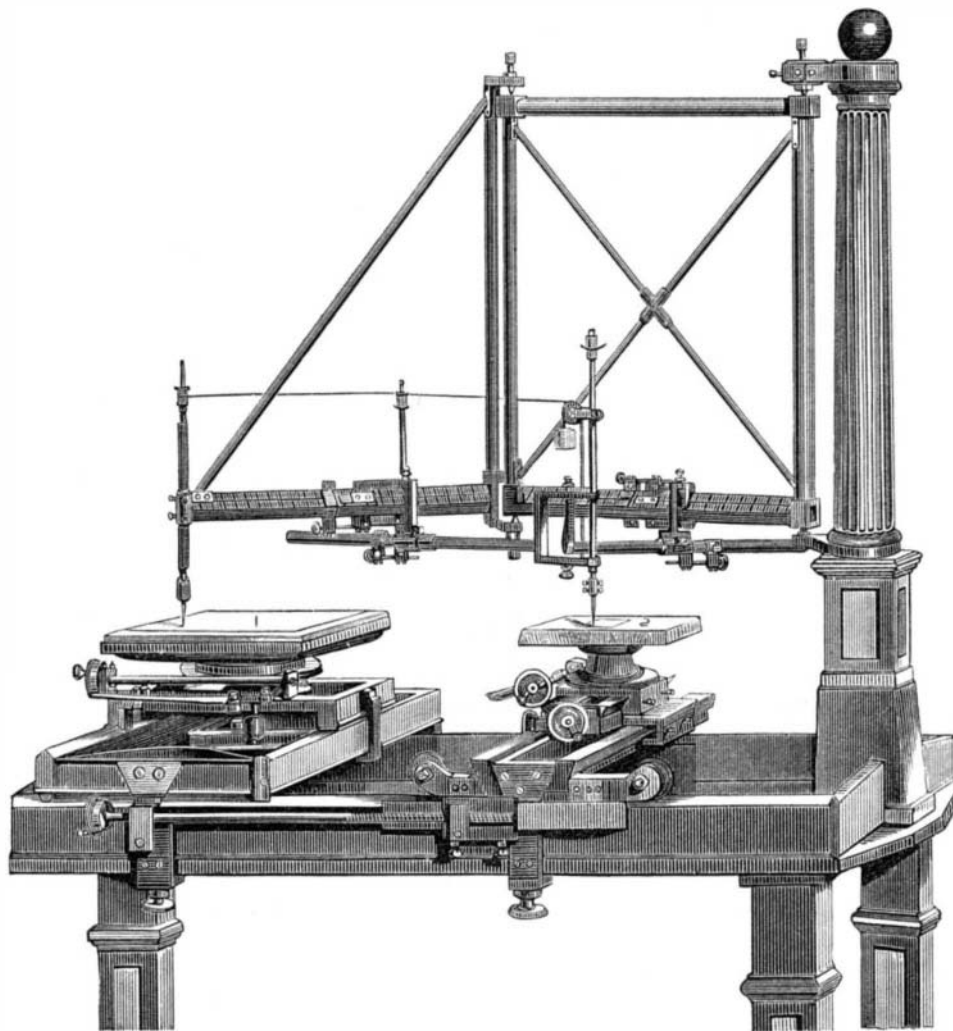


Fig. 2.—LOTZ' ENGRAVING MACHINE.

2 per cent of sulphuric acid. The metal is afterwards rinsed in cold water, and if necessary scoured with sand, put again into the acid bath or pickle, and then well rinsed. If it is desired to keep iron, already cleansed, for a short time before painting, it is necessary to preserve it in a liquor rendered alkaline by caustic lime, potash, soda, or their carbonates. Treatment with caustic lime water is, however, the cheapest and most easy method, and iron which has remained in it for some hours will not rust by a slight exposure to a damp atmosphere. Although desirable, this method of cleansing the surface is impracticable in the majority of

mounted on a 1 inch steel arbor, and are located three on each end, a cone pulley by which the speed may be regulated being placed in the middle. They are as follows: One wheel of 1 inch square face, one of 3/4 inch square face, another 3/4 inch round face, constituting one set of three. The other set includes a wheel of 1/2 inch square face, and another of 1/2 inch round face, and a 1/2 inch saw gummer. An adjustable rest at each end enables the operator to grind a perfectly true bevel of any degree required. The machine is already in use in several establishments, and is proving itself a convenient and useful invention.

Painting of Wrought Iron.

Mr. E. Spon, in a paper read before the Society of English Engineers, says:

In considering the painting of wrought iron, it must be noticed that, when iron is oxidized by heating in contact