THE MANUFACTURE OF TIN PLATES.

The different processes of the manufacture of tin-plate may be described most properly in seven distinct stages. The first begins with the bars of iron which form the plate; the last terminates with an account of the process of tinning their surface. The description is somewhat technical; but a glance at the following heads will enable the reader to comprehend the whole process:—

1. *Rolling.*—The first and most important point requisite to the production of the *latten*, or plates of iron, previous to the operation of tinning them. For this purpose the finest quality of charcoal iron is invariably employed, which, in its commercial state, generally consists of long flat bars. These are cut into small squares averaging ½ inch in thickness, which are heated repeatedly in a furnace, and as repeatedly passing through iron rollers. A convenient degree of thinness having been obtained, the now extended plates are "doubled up," heated, rolled, opened-out, heated and rolled again, until, at length, the standard thickness of the plate has been reached.

2. *Shearing.*—A pair of massive shears worked by machinery, is now applied to the rugged edges of this lamellar formation of iron-plate. It is cut into oblong squares, 14 inches by 10, and present the appearance of a single plate of iron, beautifully smooth on its surface. A juvenile with a knife soon destroys the appearance, however, and eight plates are produced from the slightly coherent mass.

3. *Scaling.*—This process consists in freeing the iron surface from its oxyd and scoriæ. In the old method this was effected by first immersing the plates in a diluted acid, and then, by exposing them separately, bent in the shape of a drain-tile, to the heat of a flame; but this process, alike tedious and expensive, has long been superseded. After an application of sulphuric acid, a number of plates, to the extent, we shall say, of 600 or 800, are packed in a cast-iron box, a number of which are exposed for some hours to the heat of a furnace. On being opened out after this, the plates are found to have acquired a bright blue steel tint, and in addition to be absolutely free from surface impurities.

4. *Cold Rolling.*—It is impossible that the plates could pass through the last fiery ordeal without becoming disfigured. The cold rolling process corrects this. Each plate is separately passed through a pair of hard polished rollers, screwed tightly together. Not only do the plates acquire from this operation a high degree of smoothness and regularity, but they likewise acquire the peculiar elasticity of hammered metal. One man will cold roll 225,000 plates in a week, and each of them is, on the average, three times passed through the rollers.

5. *Annealing.*—This process is also a modern improvement on the manufacture: 600 plates are again packed into cast iron boxes and exposed to the furnace. There is this difference in the present process from that of scaling—that the boxes must be preserved air-tight, otherwise the contained plates would inevitably weld together and produce a solid mass. The infinitessimal portion of confined air prevents this.

6. *Pickling.*—The plates are again consigned to a bath of diluted acid, till the surface becomes uniformally bright and clean. Some nice manipulation belongs to this process. Each plate is, on its removal from the acid, subjected to a rigid scrutiny by women—their eyes, we presume, are the sharpest—whose vocation it is to detect any remaining impurity, and scour it from the surface. These multifarious and torturing operations, it will be seen, are all preliminary to the last, and the most important of all—that of tinning. Theoretically simple, this process is practically difficult; and to do it full justice would carry us beyond our limits. We shall however, mention the principal features.

7. *Tinning.*—A rectangular cast iron bath, heated from below, and calculated to contain 200 or 300 sheets, and about a tun of pure block tin, is now put in request. A stratum of pyreumatic fat floats upon its surface. Close to the side of this tin pot stands another receptacle, which is filled with melted grease, and contains the prepared plates. On the other side is an empty pot, with a grating; and last of all there is yet another pot, containing a small stratum of melted tin. Let us follow the progress of a single plate. A functionary known as the "washerman," armed with tongs and a hempen brush, withdraws the plate from the bath of tin wherein it has been soaking; and, with a degree of dexterity only to be acquired by long practice, sweeps one side of the plate clean, and then reversing it, repeats the operation. In an instant it is again submerged in the liquid tin, and is then as quickly transferred to the liquid grease. The peculiar use of the hot grease consists in the property it possesses of equalizing the distribution of the tin, of retaining the superfluous metal, and of spreading the remainder equally on the surface of the iron. Still there is left on the plate what we may term a salvage; and this is finally removed by means of the last tin pot, which just contains the necessary quantity of flued metal to melt it off—a smart blow being given at the same moment to assist the disengagement. The "list-mark," may be observed upon every tin plate without exception. We may add here, that an expert washerman will finish 6,000 metallic plates in twelve hours, notwithstanding that each plate is twice washed on both sides, and twice dipped into the melted tin. After some intermediate operations—for we need not continue the consecutive description—the plates are sent to the final operation of cleaning. For this purpose they are rubbed with bran, and dusted upon tables; after which they present the beautiful silvery appearance so characteristic of the best English tin plate. Last of all they reach an individual called the "sorter," who subjects every plate to a strict examination, reject those which are found to be defective; and sends those which are approved to be packed, 300 at a time in the rough wooden boxes, with the cabalistic signs with which the most of us have been familiar since the days of our adventures in the back-shop of the tinsmith. Vessels of tin or of tin plate have rarely been found among Greek and Roman antiquities, although there can be no doubt that the art was at least understood by the ancients. The modern process, our guide informed us as we walked home to dinner, was an importation from Saxony; and it was first introduced into this country at Pontypool, in Monmouthshire, early in the last century.—*London Builder.*

CHINESE GREEN FROM BUCKTHORN.

The famous Chinese green or *lokao*, when upon silk, is the finest green yet known, and is principally remarkable for its brilliancy when seen by candlelight or gaslight. The Chinese have produced this dye for some time past, but their process has remained a secret until very lately. The subject has been investigated by some very celebrated chemists, and it results from their labors that we can not only produce the dye as the Chinese do, but can in a great measure explain its formation. It was first of all discovered that the lokao was obtained by the Chinese from two species of exotic buckthorn (*Rhamnus*), with the bark of which a sort of decoction was made with lime, &c., and that the fabrics, on leaving the bath, were exposed on the grass to the action of light and air. Since these facts were known, experiments have been made upon the colors furnished by our common buckthorn (*Rhamnus frangula*, and *R. cathartica*); and the result has been that these plants, like the Chinese species, can be made to furnish a green color, produced by the action of light, and doubtless identical with the lokao. The bark of the purgative buckthorn is boiled for half-an-hour with a sufficient quantity of water. After cooling, the clear liquor is decanted off, and to it is added its own volume of lime water; the next day a saturated solution of alum is poured in, and twenty-four hours later some carbonate of soda. After an hour or two of quiet, the clear liquor is decanted or filtered off. The solution is then fit for dying green; it is of a yellow color, and when exposed in shallow basins to the action of the sun, it deposits the lokao, which, like that of the Chinese, is soluble in acetic acid, by which means it may be purified, as it is precipitated again by ammonia. The substance which gives birth to this green dye is an unknown colorless body, which, by the influence of light, becomes green. In France, 10,000 francs were offered for the production of lokao, but I do not think the prize will be awarded, as the subject has been investigated by so many scientific men, and with such remarkable results, that the 10,000 francs could only be divided among them, and the sum is too small for such a division.

An admirable quality in colors such as those just spoken of is, that, being produced by the direct agency of light, they cannot be decomposed or spoiled by exposure to it, as is the case with many of our most costly dyes produced by other means.—*London Photographic News.*

AMERICAN TELESCOPES—THE TWIST IN THE GRAIN OF TREES.

MESSRS. EDITORS:—From your "Notes and Queries," upon page 206 of the present volume of the SCIENTIFIC AMERICAN, it appears that F. F. (of Kansas) wishes to learn where he can get a good astronomical telescope at a low price. Perhaps my experience will help him. After protracted inquiries, I purchased one of Mr. Henry Fitz, residing at No. 237 Fifth-street, in your city. He made me a beautiful achromatic instrument, having a heavy brass body of four inches aperture and five feet focal distance, *equatorially* mounted, with one *pancratic* terrestrial eye-piece and four celestial eye-pieces, a glass prism for vertical and elevated objects, sun shade, &c., for $240. The price, with a wooden body, would have been only $225. These are about *one-half* of the usual prices for similar telescopes made in London and Munich. The telescope which Mr. Fitz made for the Ann Arbor (Mich.) Observatory, of 12-inch aperture, cost $6,750. The Munich instrument at the Mount Adams Observatory (Cincinnati, Ohio) cost about $10,000, and is nearly the same size. For further particulars in regard to the Fitz telescopes, I would refer your correspondent to Burritt's "Geography of the Heavens," pages 317 to 321 (edition of 1858). I may add that Mr. Fitz is more particular to do his work well than to have it finished at the exact time promised.

By the by, Messrs. Editors, it seems to be a new idea to you, that the twist of trees *generally* turns in the same direction as the sun. My observation has been more particularly upon pines. Chip a pine at the stump hight, and if it twists or winds with the sun, leave it, for it will not do for shingles; the higher up you try it, the more you will find it to wind. On the contrary, if it winds *against* the course of the sun, the twist will run out in some 10 feet, and the grain then either continues straight to the remainder of the length, or perhaps even turns and winds *with* the sun, near the top of the tree. This is a fact which is no less true than curious.

J. H. ANDREWS.

Almont, Mich., April 21, 1860.

TO COAT IRON WITH BRASS.—There are two processes by which this operation may be accomplished. One is to cleanse the surface of the iron perfectly from grease and oxyd, and then to plunge it into melted brass. The cleansing is best done first with a ley of soda, or potash and water; when placing the iron for a short time in weak sulphuric acid and water, the metal being bright, may then be dipped into the fluid brass, and the thin coating of brass, thus adhering to the iron, afterwards polished and burnished. The electropying process is, however, now mostly adoped by manufacturers. A solution of brass is first made thus:—Three quarters of a pound of cyanide of potassium, one and a half ounces of cyanide of copper, and three quarters of an ounce of cyanide of zinc, dissolved in one gallon of clear rain water, to which finally add one and a half ounce of muriate of ammonia (sal-ammoniac). This liquid is then to be used hot (not scalding, say 180° Fah.) in this manner; the iron to be coated is attached or connected with the zinc end of a battery of moderate power, and a piece of good brass is fastened in like manner to the opposite pole; both the metals are then to be immersed in the hot brassy solution, and there left undisturbed for such time as is deemed necessary, and the iron will become coated with brass of a thickness according to the time it is left in the solution. Burnishing and polishing are afterwards required, according to the particular nature of the work. The texture and tone of color of the brass vary with the temperature of the solution and quantity of materials employed, &c. By a small jet of gas or other contrivance, the liquid must be kept hot during the whole process.—*Septimus Piesse.*

PATENT REFRIGERATORS.—For some time past a suit has been in progress before Judge Pitman, in the United States Circuit Court of Providence, between J. C. Schooley, of Cincinnati, and Charles Winship, of New Haven, for an infringement of Schooley's patent refrigerator. The case was warmly contested on both sides, as it involved important interests to both parties. Judge Pitman has decided the case in favor of Winship, and affirms the validity of his patent, which was secured through the Scientific American Patent Agency.