TIN PLATE INDUSTRY.—THE PROCESS OF MANUFACTURE.

In the last issue of the London *Iron Exchange* received at this office is an interesting history of the manufacture of tin plates from about the year 1600 up to the present time. Omitting the historical portion of the writer's account, we extract from the article a description of the methods now employed in the manufacture of this useful article.

The British Association have recently visited the Dyferyn Iron and Tin Plate Works at Swansea, situated on the river Tawe, with a view of informing themselves regarding the practical workings of this important industry. The same association met at Swansea 32 years ago, since which time great advances have been made in the processes of manufacture. From the 40 mills now running within a radius of 3 miles in the Swansea valley about 20,000 boxes of finished tin plate are turned out weekly, or 1,000,000 boxes annually, which is estimated to be equal to about one-third of the entire export.

But how tin plates are made is information likely to most interest the reader:

In the first place, says the writer, we have what is termed bar iron, several feet long, about 7 inches wide, and from ½ to ⅝ of an inch in thickness, rolled according to the plates required at so many pounds per foot. It is cut in what may be termed a jack-in-the-box or steam shear, say about 19 pounds, to a piece which will eventually be rolled into 16 sheets of 20 inches long by 14 inches wide, 112 of such sheets forming a box, and weighing when tinned nearly 1 cwt.

This piece of iron is first placed in a reverberatory furnace, heated to redness, put through the chilled rolls, and rolled in what is termed thick, five times; reheated and rolled in singles twice; doubled, reheated, and rolled, three times; doubled, reheated, and rolled, twice; doubled, reheated, and rolled in eights, twice, until they are stretched out to the required length and thickness. The length of the bar exceeds by about one inch the width of the sheet to be made, so as to allow for the shearing process, and the bar is therefore rolled with its axis parallel to that of the rolls. Great attention is necessary in the construction and management of the mill furnaces, so that the heating of the bar and sheet for rolling may be effected with the utmost regularity, and without the formation of scale on the surface of the bars or sheets; for when scaling takes place from the draught in the furnace being too keen or the heat raised too high, the quality of the iron is injured; the scale, if subsequently rolled into the iron, leaves a rough surface on the plates in the after process of separating and pickling. The plates are then sheared, and the rough edges taken off. The iron of 19 pounds or thereabouts makes 16 sheets, which, being cut in half, leaves 8 sheets in a piece closely wedged. Girls with small iron hatchets open or separate them. They are then termed black-plate. From one ton of bar iron about 16¾ cwt. of black-plate is made; the loss is termed shearings, and is worked up again in the forge fineries. The plates are next sent to be pickled, *i. e.*, immersed in heated dilute sulphuric acid, known as oil of vitriol.

This process is done by aid of a patent, known as Hutchings' patent pickling machine. The plates are placed in a brass cradle or receptacle, lifted by a hydraulic, then dropped down into a round wooden or lead tank containing the o. v., the cradle is then made to revolve by means of steam power, to enable the liquid to rush between the sheets, which revolution is retained. They are lifted again by the hydraulic, dropped into a tub, a little apart from the last, containing water only, the cradle revolving as in last tub, so that the water may rush between the sheets to cleanse or wash away all trace of the acid, when taken up again the plates are clean and bright as silver. They are next subjected to a bright red heat, which lasts from 12 to 24 hours, in closed iron annealing pots in a reverberatory furnace; they are well covered on the top to prevent the plates from being burnt; the heat is kept as high as it can be without softening them to such a degree as to cause them to stick so fast together as to prevent their separation when cold.

They next pass singly through cold rolls, three, four, or more times, as may be deemed requisite. These rolls are highly polished, and must be set in accurate order to give the plates a perfectly flat set and well polished surface. Again they are annealed or softened at a lower temperature than the first, as their surfaces would be damaged by being in any degree stuck together. Pickled again as before, excepting that the liquid is considerably weaker than previously, placed in cast iron troughs containing clean water renewed by a stream constantly flowing through, they are then taken in hand singly, and scoured if necessary with sand and hempen pads before being delivered to the tinman.

Now comes the last process. The sheets are iron only so far. They next reach the tin house, and are placed in a trough containing clean water, ready for the tinman, as he is termed, who then picks them up and puts them singly in a grease pan containing palm oil, to soak, and after being there for a short time the tinman places the sheets in a large iron pot containing molten tin, with a covering of palm oil. Here it unites with the tin, to which it has a strong affinity. When he has performed his part the plates are handed over to the next man, called a washman, whose pot contains pure molten tin; after they have soaked in his pot a little, he raises them with a tongs on to the hob as he requires them, brushes the surface of both sides of each sheet, and after dipping them into another pot containing molten tin again, they are sent through rolls which work in a large pot containing palm oil, and the speed at which the rolls move regulates the quantity of tin to be put on each sheet. They are afterward raised from the rolls (under which they have been passing) by a youth, called a riser, handed to two young women, who rub them in bins or boxes containing bran, one after the other, which takes off the grease; another girl, called a duster, gives them a further polish with a skin duster, and takes them to the assorting room, where every plate passes inspection, and, if not up to the mark, is sent back for rectification. After passing through that ordeal they are counted and weighed by young women, made up into boxes according to the different sorts, handed to boxers or packers, who pack them in elm boxes, marked by branding irons as per order, and finally placed in the railway truck to be forwarded to their various destinations. It may be a surprise to some to know that a tin plate passes through about thirty hands from the bar to the railway truck, but is handled no less that 105 times. Such is a simple account of tin plate making.

MECHANICAL INVENTIONS.

Mr. Elijah Cravens, of Osage Mission, Kan., has patented an improvement in the class of automatic car couplings in which each drawhead is constructed with a horn and provided with a pivoted draw bar or clevis, which, when two cars meet, drops over the horn on the opposite draw head and thus locks the cars together. The improvements relate to details of construction and a peculiar combination of the various parts, which render it practical and efficient.

Mr. Charles A. Tucker, of Brooklyn, N. Y., has patented an improved nut lock, designed especially for securing nuts on bridge bolts, carriage bolts, and the like.

Mr. Frank P. Simonds, of Natick, Mass., has patented a simple device for treeing boots, which is rapid and efficient. The device operates by two eccentrics, which are oppositely arranged in respect to each other, and are connected with a strap which is drawn over the boot on the tree with a reciprocating motion.

An improved barrel making machine has been patented by Messrs. David Murray and Thomas W. McGregor, of Rushford, Minn. The object of this invention is to provide in a single machine the several mechanisms and devices for trussing and working the ends of barrels, kegs, etc., preparatory to receiving the heads.

Mr. Albert T. Bleyley, of Conception, Mo., has patented a car coupling, so constructed that cars of the same height or different heights will couple themselves when run together, and which can be uncoupled from the tops of the cars.

Mr. William Brown, of Fort Cameron, Utah Ter., has patented a hollow iron railroad tie, of rectangular cross section, having a concave bottom, and having end ledges formed on its top to prevent the spreading of the rails.

Researches on Batteries.

The author has found two methods for obviating the inconvenience that chemical action in batteries is never entirely arrested when the circuit is open. One of these methods is based upon the absorbent power of animal charcoal, and is applicable to all the cases where the depolarizing liquid is a metallic salt. He has constructed a sulphate of copper battery, in which the copper solution cannot be diffused through the zinc. He takes an ordinary Calland element, at the bottom of which is placed a stratum of powdered copper sulphate, covered with bone-black, washed, and powdered. The zinc is placed in the upper part of the jar, and is separated from the copper sulphate by the bone-black. The element thus arranged resembles a Minotti battery, in which bone-black is substituted for sand. The zinc remains entirely unaffected. The second method, more general than the first, consists in taking as a depolarizing body a liquid which gives a precipitate on mixture with the liquid which attacks the zinc. The diaphragm separating the two liquids is thus rendered completely impermeable. The precipitate formed in its pores must be a conductor of electricity and must be capable of electrolysis.—*A. D'Arsonval.*

Improvement of the Bunsen Battery.

This improvement, made by Mr. Azapis, consists chiefly in replacing the acidulated water in which the zinc is immersed by a solution of about 15 per cent of cyanuret either of potassium, of caustic potash, of sea salt, or of ammonia salts. The liquid in the porous vessel which contains the carbon plate remains the same as usual. This improvement has the advantage that, while the intensity of the current is the same as in the Bunsen element, the zinc plates do not need to be amalgamated, and the consumption of zinc is considerably less, while the constancy and the durability of the current are remarkable. A battery improved in such a manner, which consisted of 25 elements, and in which ordinary ammonia salts were employed, was used without interruption for four days in succession, and during the evening for the purpose of producing an electric light. Another advantage of the battery is that it gives out very little odor.

The Exportation of Apples.

Over 40,000 barrels were shipped to Europe from this and other American ports during the last week of September, and large quantities are expected to follow. It is a year of extra bearing in most parts of this country, while in England and other parts of Europe the apple crop is a failure. It is estimated that half a million barrels will be exported this season. Two years ago—a good apple year—333,000 barrels were shipped to Europe.

AMERICAN RAZORS.

Among the industries which have been transplanted to this country during recent years none has had greater prejudice in favor of foreign products to overcome, or has started from a higher level of practical excellence, than the manufacture of fine razors.

For twenty years or more the establishment of Mr. J. R. Torrey, 34 Southbridge street, Worcester, Mass., has had a national reputation for the variety and quality of the razor-strops it has turned out. More recently Mr. Torrey has formed with his son and Mr. Joseph Turner, a practical razor maker, the J. R. Torrey Razor Company, and organized under the most favorable conditions an establishment for the production of razors of the finest quality.

Here the steel in the bar, the horn and ivory in the raw state, are taken in hand, blades are forged and ground, handles are made, and every step of the work of producing finely-finished razors is going on under the same personal supervision. The making of the paper cases, their lettering in gold, and the etching of the razor blades, are all included in the work of the establishment. Hence our American cutlers are no longer obliged to send to Europe for razor blanks and handles, as they are now made of equal excellence on our own soil.

The methods and processes employed at Sheffield have been greatly improved upon, and the J. R. Torrey razors have taken high rank in competition with the best that Europe produces.

CREMATION OF THE DEAD.

Exactly how to dispose of the ashes of the dead in the most satisfactory manner, after cremation is accomplished, is still a question. The ancient practice was to deposit the ashes in a funereal urn, to be preserved in a tomb or other sacred place. This is also the modern custom. But if tombs are to be required then there is not much need for cremation, as the corpse may as well be buried in the tomb without cremation.

A recent American patent consists in providing a parlor bust of the deceased, cut in marble, and in making a hole in the back of the bust, wherein the ashes are to be deposited after cremation of the body.

A further improvement, suggested by one of our lady correspondents, is to prepare a wet mixture of cements for artificial stone or marble, and sprinkle the ashes of the deceased into the mixture, which is then to be cast or pressed into the form of busts, statuettes, or other objects. In this way various members of a family might possess enduring portions of the ashes of the departed one.

Pneumatic Tubes supersede Cash Boys.

The incessant calls for cash boys, which formerly made shopping in our larger establishments so wearisome, if not exasperating, were silenced and the terrors of shoppers greatly mitigated by the introduction of electric calls. An enterprising Philadelphian has gone a step further, and displaced the dusty skurrying of cash boys and cash girls by a system of pneumatic tubes. Under the new system an inspector and wrapper is stationed at each counter, who will receive with the money and goods the seller's check. While the goods are being wrapped up the cash with the proper vouchers will be transmitted to a centrally located cashier, who will return the change through the proper tube. There are two such tubes leading from each counter to the cashier's inclosure. One of the tubes is to carry the money to the cashier, and the other is to return the change and accompanying check to the counter again. The "carriers" which work inside of the tubes are little cylindrical boxes of sheet steel, lined with green baize, and protected at each end by diminutive felt cushions. Each carrier is of the exact diameter of a silver dollar, and is capable of holding thirty of the latter pieces or a much larger sum. By means of a steam engine and exhaust pump in the cellar, with proper attachments leading therefrom, the air is being constantly exhausted at the cashier's end of the tube and at the counter end of the tube of each pair; and when a "carrier" is placed in the mouth of either tube, it is immediately drawn to the other end, and is there delivered automatically by an apparatus devised for the purpose. This system not only saves time and noise, but the wages of an army of boys or girls, besides discharging a large amount of fresh air into the building, greatly improving the ventilation.

The Factory Laws in Switzerland.

A short time ago the Swiss Government enacted laws restricting the time during which the workmen might be employed in factories, and forbidding the employment of children under 15 years of age. It appears now that this law works so injuriously that the State counsel is embarrassed about it and advocates its abolition, as many Swiss manufacturers have founded new establishments abroad, while others are removing their old plant entirely in order to escape the restrictions imposed, especially the limitations of the hours of labor, contending that the capital invested does not yield sufficient returns when the factories have to be idle for 14 to 15 hours out of every 24. This objection could be easily met by employing two sets of workmen, each working 8 hours a day; while with three sets of hands the factory could be kept going night and day.

The restricting laws would ere this have been abolished were it not that the working classes are agitating against its repeal. The result of the struggle in little republican Switzerland is looked upon with interest.