

SCIENTIFIC MECHANIC.

WORKING CAST STEEL.—We have recently obtained information on this subject, from the most skillful and celebrated workman in the United States;—Capt. J. Hill, of Billerica, Mass. We were a great deal surprised to learn the difference in the management of cast steel, on that of the German.—There is something yet remaining mysterious with regard to the nature and management of this article, which no cyclopaedia or other vehicle of intelligence have as yet developed. The process of manufacturing cast steel, it is not our purpose at present to describe; but it is evidently composed of refined iron and carbon in very nice proportions. In the process of shaping it into cutting blades and other articles, it is heated and hammered in the manner of other steel; when tempered for this purpose, it is first heated to a full cherry red, and plunged into water or cold. It may then be held over a moderate charcoal fire, until the colour of any part which has been filed or made bright after tempering, changes to a reddish orange color. This is the temper for cutting tools; but if a spring temper is required, it is heated over the charcoal till the color approaches a blue; or rather, blue inclining to red. In either case when the steel is brought to show these colors, it is to be plunged in oil,—common lamp or linned oil,—which will not affect the color. If the steel is to be rendered soft for turning or cutting, it must be heated to a full red, and left to cool partially ignited charcoal; in this way it may be made so soft as to be cut or turned into shape as easily as copper, or even common iron. But the most curious and peculiar process is that of welding. In welding iron, a white heat is indispensable, as every body knows; but not so with cast steel. When the steel is to be welded to iron, neither are to be heated above a full cherry red. The two articles to be previously lashed or gripped together, and in that condition heated; they have then only to be immersed in calcined borax; or to have the prepared borax (borate of soda) sprinkled over the joint, and are ready to adhere by being hammered together. The borax for this purpose, is to be prepared by being previously heated to a full red, and kept heated till it becomes a soft powder as a flower. What the chemical effect of the calcined borax on the metallic surfaces is, is not perfectly understood farther than that its affinity for oxygen is such as to deprive the jointed surfaces of any portion of oxygen which might prevent a ready union of the surfaces. When small pieces of steel are to be welded, they are to be heated to the full cherry red, and immersed in the calcined borax, and are then hammered together.—The most extraordinary point in this process is the fact that if the steel is but a little over-heated, it will immediately crack into fragments; but by a shifted process, and with the use of borax, the cracks and defects may be healed and rendered sound and solid. We have witnessed the fact, that by a judicious management, a fine tempered cutting edge of cast steel may be bent, warped and hammered, and its shape materially changed without breaking, or affecting the temper. More may be said on this subject in a future number; but we close for the present with the remark that, even Anderson & Co., the celebrated manufacturers of cast steel, are evidently unacquainted with all the uses of its peculiar properties.—*American Mechanic.*

[The calcined borax melts and forms a fluid glass, which prevents the access of the air. It is always used for this purpose in soldering gold and silver. Rosin is used for the same purpose in soldering tin. Heated metal exposed to the air becomes rusted.]

MANUFACTURE OF ELAINE AND STEARINE FROM LARD.

A patent has been obtained by Mr. J. H. Smith, of New York. The substance of his process is as follows:—Boil the Lard either by fire directly applied to the kettle, or by steam. When the latter is employed he uses a steam tube to descend from the steam boiler into the vessel, and coiled round on the bottom so as to present a large heating surface to the lard, provision being made to carry off the water and waste steam. It is usual to perforate the tube with numerous holes along the whole of that portion of it which is submerged below the lard, thus allowing the whole of the steam to pass into and through the lard. To operate with advantage the vessel should be of considerable capacity, holding, say, from ten to one hundred barrels. The length of boiling will of course vary according to the quality of the Lard. That which is fresh may not require to be boiled more than five or six hours, while that which has been long kept may require twelve hours.

It is of great importance to the perfecting of the separation of the Stearine and Elaine that the boiling should be continued for a considerable period.

Alcohol is employed, mixed with the lard in the boiler at the commencement of the operation. When the lard is sufficiently fluid, gradually pour and stir into it about one gallon of alcohol to every eighty gallons of Lard, taking care to incorporate them as intimately as possible; and this will cause a perfect separation between the Stearine and Elaine from each other, by the spontaneous granulation of the former, which takes place when the boiled lard is allowed to cool in a state of rest. Camphor is sometimes combined with alcohol, dissolving about one fourth of a pound in each gallon of alcohol, which not only gives it an agreeable odour, but appears to co-operate with the alcohol in effecting the object in view.

After the boiling has been continued for a sufficient length of time, the fire is withdrawn or the steam cut off, and the mass is allowed to cool sufficiently to be ladled or drawn off into hogheads or other suitable coolers, when it is to be left at perfect rest, to cool down and acquire the ordinary temperature of the atmosphere; and as the coolings proceed, the granulation will take place and become perfect. The material is then to be put into bags and pressed moderately under any suitable press, which will cause the Elaine to flow out in a state of great purity, there not being contained in it any perceivable portion of stearine, and this practice is to be continued until the Stearine is as dry as it can be made in this way.

The Stearine is then, by a very simple process, which we have not space to give at present, prepared to be made into candles, the Elaine being ready for use as oil.

We have seen some of these preparations, and they are fully equal to sperm oil and candles, and are much cheaper. The oil is sold at 75 cents per gallon, and gives a beautiful clear light, and emits neither smoke nor smell while burning. The candles also burn as well as the best sperm.—*Central New York Farmer.*

CHEAP ROOFS.—The simple mode of roofing outhouses by nailing thin boards on light rafters may be introduced to very great advantage, particularly in the country. It is only to subject the boards, before using, to the action of fire, by way of thoroughly seasoning them. Nail them on immediately, and cover them with sheathing paper and a dressing of tar; and a covering, almost for a lifetime, may safely be calculated upon. The rafters, three inches deep, one and a half thick; the boards half an inch thick, straightened on the edges and closely nailed.

The following composition for covering such a roof was employed at Wickham twenty years ago, and is at this present time as good as when first laid. The roof is nearly flat, having a run of one inch only to the foot, the boards being securely nailed and covered with a course of sheathing paper, such as is used under the copper-sheathing of ships, made fast by small flat headed nails. To eight gallons of common tar, add two gallons of Roman cement, five pounds of resin, and three pounds of tallow; boil and well stir the ingredients, so as thoroughly to incorporate them, and lay on the roof while hot, with a brush, spreading it very evenly; then sprinkle it while hot with sharp sifted sand, and when cold, tar and sand as before; after which, a single coat of tar once in five or six years will preserve the roof for an age.

To the above may be added, an incombustible impenetrable wash, prepared according to the following directions. Slake stone lime with hot water in a tub, covering it to keep in the steam; pass six quarts of it through a sieve, it being in the state of fine dry powder, and add to it one quart of fine salt and two gallons of water, boiling and skimming it. To every five gallons of this boiled mixture, add one pound of alum, half a pound of copperas; and by slow degrees half a pound of potash and four quarts of fine sharp sand. The mixture will now admit of any colouring matter that might be preferred, and is to be applied with a brush. It looks better than paint, and is as durable as stone. It will stop leaks in the roof, prevent the moss from growing and injuring the wood, rendering it incombustible, and, when laid upon brick-work, causing it to become impenetrable to rain or moisture.—*Farmers Cabinet.*

SICK HEADACHE.—Two tea-spoons full of finely powdered charcoal, drank in a half tumbler of water, will in less than fifteen minutes give relief to the sick headache, when caused as in most cases it is, by superabundance of acid on the stomach.—*N. Y. Her.*