Science and Art.

To Manufacture Acetates of Lead.

Brown Acetate of Lead—Crude pyroligneous acid is much used for the manufacture of brown acetate of lead, in the following manner. The redistilled pyroligneous acid is saturated in a tub with litharge, and the oxyd of lead not dissolved allowed to subside; the clear liquor is decanted off into a copper boiler, and evaporated, until a drop, let fall upon a cold stone, crystallizes or sets hard, which may take place at sp. gr. 1·980; about three times its weight of water is now added while boiling, the solution being constantly stirred. By this treatment a considerable quantity of pyrogenous matter may be skimmed off as it rises to the surface.—When this is removed, the evaporation is continued. If the solution be still too much colored, more water must be added. Practice soon enables the workman to know when the evaporation is sufficiently advanced. A common test is to rinse the ladle which is used to skim off the tar from the solution, through the liquid, and observe how many drops of solution fall from it before it assumes a stringy appearance; if ten or twelve only fall, then it is sufficiently strong. Another plan is to take the specific gravity of the liquid, which may be considered fit for crystallizing when the density is above 1·980.

The liquid is now run into the crystallizing vessels, which may be made of sheet iron, and are generally 5 feet by 3 1-2 feet, and 6 inches deep, the sides being beveled, or sloping outwards from the bottom.

After becoming sufficiently firm, the sugar of lead is taken out by inverting the vessel on a cloth, and is subsequently dried.

White Acetate of Lead—In preparing this salt, acetic acid is saturated in a tub with litharge; every degree of Twaddel's hydrometer shown by the acid must be raised to 15 degs. Tw., by the addition of litharge—*e. g.* acetic acid of 2 degs. Tw. would be stirred with litharge until the solution of acetate of lead marked 30 degs. Tw. The solution is made in the cold in a wooden tub, and constantly agitated until it acquires the requisite strength. At this point, and while the liquid shows a slight acid re-action, the tub is covered up to allow the impurities to settle. The solution is then transferred into a copper boiler, and evaporated down to about 160 degs. or 180 degs. Tw. at boiling heat. The pan is again covered up for the subsidence of any impurity; the liquid then drawn off, poured into earthenware vessels holding about a gallon each, and allowed to crystallize. The crystals are drained, dissolved in a quantity of water merely sufficient for this purpose, and re-crystallized. These crystals are dried at about 80 or 90 degs. F.

A piece of lead, added to the solution while evaporating, throws out any copper which it may contain, while it assists in preserving the copper boiler from the action of free acid.

According to Dr. Ure, 112 lbs. of good Newcastle litharge, with 127 lbs. of acetic acid of sp. gr. 1·057, yield 180 lbs. of sugar of lead. A tun of Welsh litharge, with the acid from a tun of acetate of lime, produces 28 to 30 cwts.; or a tun of best Newcastle litharge, with the acid from 1 1-2 tuns of acetate of lime, produces 33 cwts. of acetate.

In Germany, thin sheet lead, or the residues from the white-lead manufacture, are exposed to the alternate action of air and strong acetic acid, in a series of vessels ranged one above another. The acid being first introduced into the uppermost, is allowed to flow consecutively into the lower vessels, remaining about half an hour in each. The metal, under these circumstances, becomes speedily oxydized at the expense of the air, much heat being generated, and after having passed twice through eight of these vessels filled with lead, the acid is sufficiently saturated with the oxyd of the metal to be evaporated, and the salt crystallized.

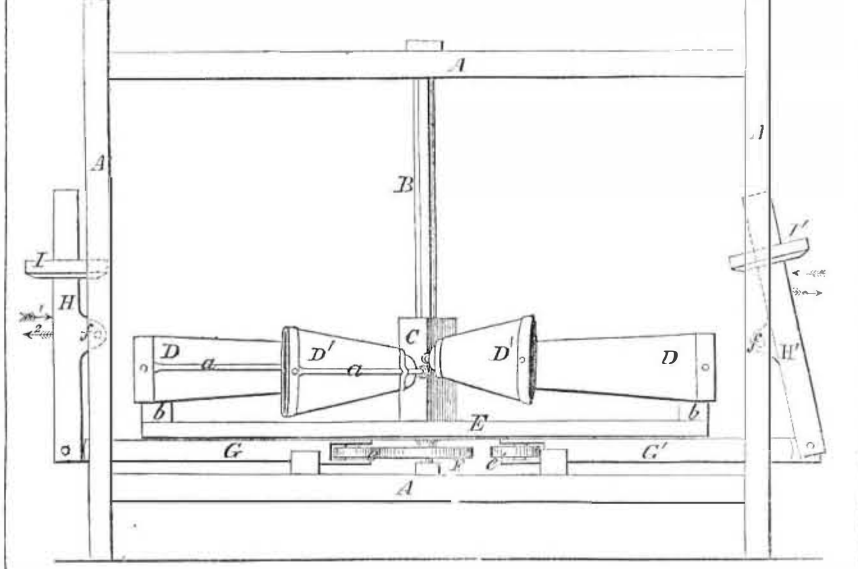
A patent was also secured some time ago for passing the vapor of the acid into close vessels containing a number of perforated shelves on which litharge was spread. In passing through these the acid becomes saturated with the oxyd, and the solution of the acetate falls down and is concentrated in other vessels by the heat of the waste steam which issues from the top of the litharge chambers.

[The above is derived from the recent edition of Knapp's Technology, and to it we will add some remarks on the uses of sugar of lead.

The brown sugar of lead is used in great quantities as a drier for coarse paints, and as a mordant for dyeing orange color on cotton. It is boiled with the oil for paint at the rate of one pound to the gallon of oil, and to this 1-4 of a pound of the sulphate of zinc is added. Oil thus boiled is mixed with any common paint, and applied to the inside of buildings. In dyeing orange color, it is boiled with litharge for about half an hour, then some flour of lime is added, the whole stirred up well, and then used as the mordant or preparation of the cotton, to receive a liquor of the bichromate of potash. Two pounds of the brown sugar of lead, and one pound of litharge are used for every pound of the bichromate of potash (chrome.) After the cotton receives its *chrome* it is run through a vessel containing warm lime water, when its color changes from a yellow to a beautiful orange.

White sugar of lead is also used as a drier for paints the same as the brown acetate of lead, but only for light colors. In the art of dyeing it is used as a mordant for dyeing *chrome yellow*. Six ounces of the sugar of lead, and two ounces of the bichromate of potash will dye a beautiful light yellow on ten pounds of cotton. Mixed with the bichromate of potash, the lead and chromic acid unite, and form a yellow precipitate called "chromate of lead," which is much used as a paint. The white sugar of lead is used as a wash in surgery, and when mixed with sulphuretted alcohol, it forms what is now known by the name of "Twiggs' Hair Dye." Taken internally, the sugar of lead is a poison; it should, therefore, never be kept in a house where there are children, because it has a sweet taste, and may be mistaken for white sugar. The "sulphate of sodium" is used as an antidote for the sugar of lead when taken into the stomach.

IMPROVED TIDAL WATER WHEEL.



In level portions of the country, where the streams are sluggish, and it is difficult to form dams of the requisite hight for common water wheels, it often happens that horizontal wheels, if properly constructed, can be so placed as to render available whatever of power there is in the current; the rise and fall of the tides also furnishes a useful power, which might be advantageously employed in very many localities, by the application of the proper apparatus. The improvement illustrated by the accompanying engraving is designed to serve this purpose, the machine being so contrived as to operate successfully at all stages of tides, high or low, and in all streams of water whether sluggish or fast. It is the invention of Mr. Richard L. Nelson, of Ocala, Marion Co., Fla., and was patented Nov. 13th, 1855.

The wheel consists of a series of floats, D D', radiating horizontally from a hub, C. The hub rises and falls vertically on the shaft, B, to suit the varying tides, and, at the same time imparts rotary motion to B; the power is transmitted from B to other mechanism in the usual manner. The floats, D D', are attached to the rods, *a*, and these are so fastened in the hub, C, as to turn, partially, at the proper moment, and so allow the feathering of the floats.

Below the floats there is a large ring, E, upon which, at suitable places, the upward projections, *b*, are placed, for the purpose of feathering the buckets; the latter, as they come around, strike the projections, and change from a vertical to an edgewise position, and *vice versa*. The ring, E, rises and falls, but does not turn with the hub, C.

Another peculiar feature of this invention consists in a self-acting brake, for regulating the velocity of shaft B. This shaft is furnished at its lower end with a pulley, F. There are two horizontally sliding bars, G G', furnished at one of their ends with friction pulleys, *e e'*, and connected at their other ends with levers, H H'. The latter are pivoted at *f*, and have buoys, I, near their upper extremities, which rise and fall with the tide. When the current moves in the direction of arrow 2, the lever at the right hand will be thrown in by the force of the water against its buoy, and the friction wheel, *e'*, will be drawn away from contact with F, as shown; but the current will act in the reverse manner against the float and lever at the left side of the machine, the tendency being to force the lever, H, outward, and consequently to cause its bar, G, to advance and press its friction roller, *e*, against pulley, F. This pressure, which is in proportion to the velocity of the water, will always regulate the speed of the shaft, B. When the direction of the tide changes so as to flow in accordance with arrow 1, the action of the levers, H H', is reversed. A shows the frame to the machine.

This invention, as already intimated, is susceptible of a very extensive application. The expense of construction is quite small, and can hardly fail to serve a highly useful purpose. For any further information address the inventor.

A Great Iron Steamship.

The Liverpool papers are unsparing in their praise of the *Persia*—the new steamship belonging to the Cunard line—which had recently arrived at that city from Glasgow, Scotland, where it was built, to take up her place for running between this port (New York) and Liverpool. We may soon expect to see her, when we will be able to describe her from personal examination. She is the largest merchant steamship afloat, and is said to have sailed from Glasgow to Liverpool in ten hours, making an average speed of sixteen knots per hour. If she could maintain such an average speed across the Atlantic—3000 miles—she would make the voyage in less than eight days A voyage across the ocean in mid-winter will test her powers.

Stormy Sundays.

There were recently stormy Sundays in New York for six weeks; and these storms had been periodic—returning regularly every seven days—commencing on Saturday evenings. Four storms were accompanied with rain, and two with snow and very high winds. Dr. Perkins, of Newburyport, Mass., who records the state of the atmosphere at certain hours of each day, is to make returns to the Smithsonian Institute in Washington, accounts for these periodic storms on the supposition of atmospheric waves, according to Espy's theory. We have noticed for some years that Long Island is subject to very high winds, and these gales are always most violent during night, especially between the hours of half-past seven and ten. The wind generally commences to blow from the North-east or South-east, accompanied with snow or rain, and shifts round ending with a northwester, to clear up the atmosphere.

Round and Long Heads.

Prof. Retzius, of Stockholm, in Sweden, denies that high skulls betoken high intellect, it being supposed by many that they do. He had visited the schools in England and Sweden and could not find one person in a hundred that did not possess the elongated skull and prominent occiput. In Sweden there are persons who have short high heads, but they do not resemble the real Swedes, and are allied to the Laps or Fins. He asserts that if Sclavonians belong to the Caucassian race, as is generally asserted by phrenologists, anatomy is of no use to ethnologists. The Poles and Bohemians belong to the round headed nations, and have produced many eminent men.

The Anglo Saxons have long skulls, so had the ancient Celts; the modern natives of Ireland have round heads, unlike the ancient Celtic skulls. The old Romans had long high skulls. The skulls of the ancient Mexicans are of the Mongolian type. The Indians on the western part of our continent have short heads; those on the eastern part have long heads.

Old Babylon.

Dr. Oppert, of France, has spent two years on the site of old Babylon, examining the cuneiform inscriptions on the bricks and slates He states that this famous old city, in the days of its grandeur and power, covered rather more than an area of 200 square miles, being about two and a half more than the site of London. But all this space was not inhabited, there being immense fields to supply the city with corn and pasture in case of siege.