

the other three being intended for the reception of the purified liquor to be supplied to the scrubbers in which the gas is purified. It was supposed at first that there might be some deposition of tar in the pipes leading from these tanks or divisions, and the pipes were therefore led into another similarly divided tank sunk in the ground, other pipes leading from the divisions of this tank to the scrubbers. The sunk tank was intended to receive any tar which might drain down; but it has proved to be quite unnecessary, and has, indeed, occasioned some trouble from leakage taking place through the divisions separating the compartments.—*Mechanics' Magazine*.

Separating Phosphorus from Metals.

It is well known that phosphorus is a substance which prevents the production of pure qualities of iron and other metals, and all attempts to remove the same have hitherto failed. Mr. Carl H. L. Wintzer, of Hanover, has found that chlorine gas and chloride of calcium are adapted to obtain the desired result. Chlorine gas, as a simple element, does not decompose, and chloride of calcium is the only combination thereof which, at the different degrees of temperature which occur in practical metallurgy, neither volatilizes nor decomposes unless another agent be introduced. Other known combinations of chlorine, as chloride of magnesium, decompose even at the boiling point of water; chloride of sodium becomes volatile at a comparatively low temperature.

Mr. Wintzer therefore employs chlorine gas and chloride of calcium for the removal of phosphorus, in processes of melting ores and in the treatment of metallurgical products. He makes use of this gas and the salt in blast furnaces, as well as in the process of puddling, refining, and recasting, and in any kind of furnace and in all processes of melting, applying the gas direct or adding the prepared salt (chloride of calcium) in any convenient form; or employing solutions containing muriatic acid, with the simultaneous use of lime or calcareous substances, by which process chloride of calcium is formed at the moment of its application. Through the effect of chlorine gas and chloride of calcium on phosphatic ores and metals, volatile combinations of phosphorus are formed and thereby the phosphorus is removed. The process is as follows:—In smelting an ore of iron or other metal containing phosphorus as an impurity, the operator charges into the smelting furnace with the ore, chloride of calcium in the proportion of from five to twenty-five parts by weight for each part of phosphorus found by analysis to be contained in the ore, and in other respects the smelting operation is conducted in the ordinary manner. The resulting metal will be found much more free from phosphorus than if the ore had been smelted without the addition of chloride of calcium. In place of adding the chloride of calcium direct, lime and muriatic acid may be mixed separately with the ore, or may be otherwise applied in combination. It is more convenient, however, to employ chloride of calcium ready formed. Or, in place of employing chloride of calcium, chlorine gas may be used; the gas may be mixed with air and forced as a blast through the ignited charge in the furnace, or the gas itself may be blown through the melted metal after it is tapped out of the furnace. The quantity of chlorine thus applied should be from three to fifteen times the weight of the phosphorus contained in the ore or metal. Chloride of calcium or chlorine may be applied in a similar manner when remelting iron or other metals, when it is desired to separate phosphorus therefrom. Phosphorus can thus be separated from all metals to which a strong red heat can conveniently be applied; more especially, however, it is applicable to the treatment of iron and copper.—*Mechanics' Magazine*.

Punched Tubes and Gun Barrels.

The manufacture of punched steel tubes and gun barrels by Messrs. Deakin & Johnson's process, is likely to become a most important industry. The principal gun-barrel makers of Birmingham are now advertising that they are prepared to make fifteen thousand of these gun barrels weekly, and Messrs. John Brown & Co., of Sheffield, have nearly completed the erection of very heavy machinery

for rolling the tubes, after punching, into barrels and jackets, for 7-inch rifled cannon. It is but a short time since even the most enterprising steel masters believed it to be impossible to punch a 10-inch hole down through an ingot two feet six inches in diameter and four feet high; yet this has already been accomplished, while, as for gun barrels, a single tube, of dimensions sufficient for the manufacture of four regulation barrels, is punched almost at a blow. The material employed is Bessemer steel, and it is indeed a question whether any other steel would permit of this mode of manufacture. With the least imperfection of the ingot, it cracks open or flies to pieces under the punch, and thus only perfect material can pass. As to the endurance of barrels made by this process, one test made at Birmingham, some time since, showed that a barrel of the Enfield pattern, punched from Bessemer steel, withstood, without injury, single charges of sixteen drams of powder and twenty-five Enfield bullets. The latter were forced into a continuous bar of solid lead when fired, yet the bore of the barrel remained intact.

The best gun barrels are now made of Marshall's iron, which is sold in skelps about 8 inches long, 5½ wide, and ¾-inch thick, at, we believe, £28 per tun. Bored and ground and with the "lump" forged on, these barrels go into the gun trade at a cost of about 10s. 6d. each. Yet from "greys," "reins," or other faults, from sixty to seventy, and sometimes even two hundred out of every thousand, are rejected at proof. With the new punched steel barrels, which are at least one half better than iron, and which can be profitably made at the same price, there are no defects whatever in the metal, since no defective ingot will withstand the punch. Messrs. Deakin & Johnson's process is equally adapted to the manufacture of hollow steel shafts for marine engines, railway axles, etc. A hollow axle thus punched and rolled, and 5½ inches in external diameter, has been tested upon three-foot supports, by a weight of 16 cwt. falling 26 feet, the blows beginning, however, with a 5-foot fall, rising progressively 5 feet at each blow. Under the highest fall, the axle was finally deflected 7½ inches, but no sign of fracture was shown.—*Engineering*.

MISCELLANEOUS SUMMARY.

It is stated, with how much truth we are unable to say, that an Austrian chemist, M. Leinelbrock, has discovered a method of inclosing electricity in small glass capsules which will explode under the influence of the slightest shock. The capsule, for the purposes of a projectile, is inclosed in a steel case, shot from a rifle, and when stopped by the body of a man will explode with sufficient force to kill. The statement appears to be somewhat "fishy." One would suppose that the shock of driving the projectile from a gun would be greater than that of being brought to a rest by the flesh of an animal. If the explosion took place anywhere it should be in the gun barrel.

A PRACTICAL saw maker of San Francisco has solved the difficulty of sawing a section of the big tree in Calaveras county to send to the Paris Exhibition. By his plan, two cuts are to be made on the tree, three feet apart, as deep as the saw will allow; the wood between the cuts being split out by wedges, angles are left which can be sawed and wedged as before. By the labor of two men the section can be ready for transportation within a month's time. The whole expense need not exceed five hundred dollars.

THE cost of living in New York at the present time is almost incredible, and it is astonishing where all the money comes from to support such extravagance. Furnished houses in fashionable avenues rent for \$1,000 per month. A family living at one of our large hotels pay \$700 per week for rooms and board. The average price for large rooms and board in the principal hotels cannot be less than \$150 per week.

THE manufacture of the wire for the Atlantic cable kept two hundred and fifty hands employed for eleven months, supplying over thirty thousand miles.

To fix labels on tin, use French polish, or a solution of shellac in naphtha or alcohol.

THE *Journal of Applied Chemistry* gives the following recipes in reply to correspondents:—

To detect copper in pickles, put some of the pickle, cut small, into a vial with 2 or 3 drs. of liquid ammonia, diluted with one-half the quantity of water. Shake the vial; when, if the most minute portion of copper be present, the liquid will assume a fine blue color. Or immerse a polished knife blade; the copper will deposit upon it.

To remove fruit stains from napkins, etc., let the spotted part of the cloth imbibe a little water without dipping, and hold the part over a lighted common brimstone match at a proper distance. The sulphurous acid gas which is discharged soon causes the spots to disappear. Or, wet the spot with chlorine water.

THE big Horsfall gun, which was built at the Mersey Steel and Iron Works in 1856, and presented to the British Government, is to be mounted at Tilbury Fort, to command the mouth of the Thames. It was a solid forging of wrought-iron, bored out. The dimensions are: length, 15 feet 10 inches; diameter at the breech, 3 feet 7 inches; diameter of bore, 13.014 inches; weight, 53,846 pounds. The trunnions are forged on a separate ring, which is secured to the gun by a key.

COLT'S Works in Hartford, Conn., have contracted with the Government for the manufacture of one hundred of the Gatling guns. This gun is made of two sizes, one about that of the ordinary rifled firearm, and the other carrying a ball about one pound in weight. It is a revolving piece of six barrels, and proved in the late Government experiments to be the most destructive engine of war at moderate ranges hitherto employed.

WE have always maintained that the taxation necessary to pay the current expenses of the Government and the interest of the public debt should be raised upon articles of luxury, and that all necessary articles of consumption should be exempt so far as possible. Hence we are pleased to chronicle the fact that a large tobacco establishment of this city paid the enormous tax of \$1,200,000 on their business during the past year.

PROF. PLATFAIR, at the meeting of the British Association, stated that at the Riddings Colliery, there was a furnace 40 or 50 years old, the walls of which he found to be lined with plumbago three or four inches thick, which he attributed to the operation of the heat on the iron, but could not fully explain the mystery.

AN express train carried the twenty millions of thalers which form the war indemnity Austria must pay Prussia. The whole amount was paid in silver. It was loaded by the tun and took twenty men six days to count it. Ten clerks, twelve tellers, and thirty-six gendarmes accompanied the train.

THOMPSON'S CONNECTING LINK.—In No. 9, on page 142, current volume, is an engraving of Thompson's Link, the description of which speaks of it as cast iron instead of malleable iron. These links are made of malleable cast iron or forged wrought iron.

SIR ISAAC NEWTON is said to have worn in his finger ring a loadstone weighing three grains, and capable of sustaining over two hundred and fifty times its own weight.

A NOVEL anchor was lately tested in Baltimore harbor, triangular in shape, having six flukes, working on pivots, and when one side is imbedded the upper part closes, thus, it is claimed, preventing fouling.

THERE are 137,000 persons in Brooklyn who do business in New York. The difference between the number of people that reside in New York, and those doing business there, is 197,000.

A LETTER received in Boston says, Monsignor Columbo, the only living descendant of Christopher Columbus, intends visiting America next year.

THE quantity of glass necessary for the Exhibition Palace, in Paris, would cover twenty acres.

A PILL-BOX factory of Bristol, Vt., uses three hundred cords of birch wood per annum.

BLACK tea of fine quality flourishes remarkably well on the coast of Georgia.

SPECIMENS of salt from the Salt Mountains, in Nevada, have been received in Washington.