Notes & Queries

J. N. F. asks: Is there any cheap white metal, of which castings can be made, that will not melt and that can be furnished as cheaply as common gray iron? Something similar to white wire clothes line is wanted.

E. E. M. asks: If a glass tube ½ inch in diameter contains 1 lb. of mercury, what would be the pressure on a piston fitted to such a tube for every degree of heat applied?

J. F. C. says: I wish to kill some large trees before cutting them down. What solution can I use for the purpose?

R. H. A. says: An oscillating piston, 2 feet long by 1 foot wide, vibrates on a rock shaft within a properly constructed chamber. Where, in its length, is the location of its average power? The speed, of course, is an element in the calculation, but does not vary the point of average delivery, be it much or little.

G. J. says: I heard a man say a few evenings since that he was the party sent by a firm in England to fit up the first self acting lathe, drill press, and slotting machine that was in any of the Eastern States. What makes me doubt him is that he is a man not over 50 or 55 years of age. Can you give the name of the party who first had the above-mentioned in that section of the country, where they came from, and who fitted them up? [We must ask some of our readers to answer this question for our correspondent, and thereby settle a question about which there is a great deal of dispute. There are many claimants even for the invention of the slide rest. It was described in a patent by Sir Samuel Bentham of England, in 1793, but is claimed to have been first introduced by Mr. Henry Maudsley.]

Answers to Correspondents

S. asks what is the best and simplest mode of measuring power? Answer: There are quite a number of dynamometers in the market, for measuring the power transmitted by a shaft or pulley. Where it can be applied, the ordinary Prony brake is the best. The power of an engine can be determined quite accurately by the use of the indicator. As you do not give particulars, we cannot tell what is the best method for you to employ.

C. H. A. asks: Should a tightening pulley be placed as close as possible to the driving pulley, without regard to the relative size of the driven pulley, or near the smaller of the two pulleys, whichever that may be, in order to increase the amount of contact? It is conceded that, in case of the driving pulley being the larger and the belt being liable to slip on the smaller, the tightener should be put about midway between them. But it is asserted that it consumes more power when placed near the driven than when close to the driver. Is it so, and, if so, why? Answer: The loss of power occasioned by the use of a tightener is the power required to bend the belt under that pulley, and to drive the pulley. It would appear, then, that by placing the tightener near the smaller pulley, there is a greater loss than when it is close to the larger, since the belt requires to be more bent in the former case. This would indicate that the best place to put a tightener is as close to the larger pulley as it can be arranged, to have it work satisfactorily.

J. B. T. asks: Why is it that engineers, firemen and conductors, jumping from moving trains, invariably jump in the direction of the moving train? I say that there would be less danger in jumping in a contrary direction from a vehicle whose speed is equal to that at which a man might jump, which, by the way, is greater than most people are aware of. Supposing I am able to jump at the rate of 10 or 15 miles per hour; if I jump from a moving vehicle of the same rate of speed, in a contrary direction to the moving train, one motion destroys the other and gravity brings me in a vertical line to the earth. Answer: Our correspondent forgets that, although he might be able to jump at the rate of a moving vehicle if starting from a position of rest, it would be very different, if he were to attempt to do the same thing from the vehicle when it was in motion. His body would then be in motion, and it would be necessary to overcome the inertia or resistance to motion in a contrary direction. The amount of work necessary to be overcome would be half the mass of his body, multiplied by the square of the velocity of the vehicle. We imagine that it is because they have found, by experience, that they cannot make one motion destroy the other that conductors and others jump off in the direction of the moving vehicle.

R. A. C. says: 1. Last fall, while riding along in West Tennessee by a black locust thicket, I observed that the trees were killed, root and branch. Not a living sprout did I see. I enquired of the owner how he did this. He stated that on June 22 and 23 he skinned round the trees, taking the bark from the body of the trees all round, leaving a bare space about 12 inches long. He also said that willow trees could be killed in the same way. I chopped around some honey locust last August; and where the work was well done, the trees are dead: but I am still waiting to see if it is a fact that they are killed root and branch. Is this so? 2. How many lbs. of Pittsburgh coal will do the work of one cord of good oak wood, all things being equal? The object is economy in fuel. 3. Is the coal more liable to injure a heavy 2 flue charcoal iron boiler than wood? 4. What is the best known remedy for bleeding at the nose? Answers: 1. It is generally supposed that winter is the best season in which to girdle trees to kill them. We would be glad to hear from some of our readers who have cleared land by girdling the trees. 2. About 1,500 lbs. 3. The coal is not more liable to injure the boiler than the wood is. 4. Probably every one thinks his own remedy is the best, and we must ask our readers, who know of efficient remedies, to favor us with communications. The best remedy of which we have heard is for the person who is afflicted to lie down on his back, without a raised support for his head. Of course, this might not prove to be a universal cure, as specifics are exceedingly rare.

A. L. B. asks: 1. Is there any industrial school in your city or vicinity that prepares men for mechanical engineers without their taking full collegiate, scientific, or classical courses, and of a not very expensive character? 2. Can a man in New York earn sufficient money during the first year at the machinist's trade to support himself? 3. Is there any market in this part of the country for scrap tin? Answers: 1. You may take a free course in mechanical engineering at the Cooper Union, but the instruction is given in the evenings only. At the Stevens Institute, Hoboken, they take special students in mechanical engineering, as also at the Polytechnic College, Market St., Philadelphia. Write to any of these for catalogue and list of studies. 2. Probably not, if you are an apprentice and just beginning to learn the machinist trade. If acquainted with the trade, yes. 3. Yes.

N. J. F. asks: 1. What is the amount of power to be obtained from a flow of water through an orifice 1 foot square? The water is to be taken out of a canal whose surface is 13½ feet above the river, into which the water used for power is to waste. 2. What is the difference between fixing the measuring orifice (1 foot square) at the top of the flume and at the bottom of it? 3. Is the manufacture of red cedar into buckets or pails generally considered a paying business? 4. Is *arbor vitæ* timber as suitable for that purpose as the juniper of the Dismal Swamp? Answers: 1. With the measuring orifice at the top, the useful effect of the water will be about eight horse power. 2. When the orifice is at the bottom of the flume, more water will be discharged through it, and the useful effect of the water will be much increased. 3 Yes. 4. You can only tell by constructing a bucket of *arbor vitæ* timber, and trying it. Generally, the *arbor vitæ* tree is too small to be worked profitably for such purposes.

E. H. B. asks: 1. What is the commercial value of pyroligneous acid and of tar produced by burning charcoal in kilns? 2. What is the best method of securing and storing it for market? 3. What gases are generated by the slow combustion of wood in coal kilns? 4. Can clay pipes, burned like ordinary brick, be rendered sufficiently non-porous to hold and convey water under pressure: and what would be the best material to render the joints watertight? Answers: 1. It depends upon quality and distance from market. 2. When charcoal is burned in heaps, the acid cannot so easily be secured. Retorts are best adapted to the preparation of pyroligneous acid, but kilns or ovens built of brick, with a pipe for carrying off volatile products of distillation, can be employed. In Russia the wood is heaped up on a plot of ground which is somewhat elevated above the level of the soil, and is funnel shaped, the whole being constructed of clay and lined with roofing tiles, on which the tar collects and flows off into a vessel placed in the vault beneath. The wood, generally of coniferous trees, is heaped in 6 to 8 inch layers, and is first covered with hay or dung, next with a layer of a few inches in thickness of sand or earth. The wood in the heap is ignited at the bottom, where 40 to 50 apertures are left in the covering; these apertures being closed with wet sand as soon as the combustion of the wood becomes active and has spread through the whole heap. After 10 or 12 days the tar begins to collect and is removed daily. The smouldering continues 3 to 4 weeks, and the quantity of charcoal obtained is very small. Illustrations of the various forms of kilns employed will be found in Wagner's "Chemical Technology." It may be converted into acetate of lime before sending it to market. 3. The gaseous product of dry distillation is a mixture of inflammable gases, the most important of which are marsh gas and olefiant gas. Where wood is very cheap, illuminating gas is prepared in this way. 4. The chimneys are probably thicker in one place than in another. Try annealing by placing in cold water and slowly heating to boiling; and after boiling some time, cool slowly. 4. By glazing them in the usual way before burning, or by coating with water glass or asphalt, they will be rendered water tight. Try the experiment on a short distance first. Use hydraulic cement for the joints.

S. L. D. asks what is the best, cheapest and most easily applied substance for blasting. "The rock I want to blast is inside a mill; 20 feet above are machinery, millstones, etc.; the space is 10 x 40 feet, and is enclosed by strong stone walls. I have heard dynamite spoken of as cheaper, more powerful in its effects, and quite as safe as powder. Please inform me if this is so; also how to put it up. Should it be in waterproof cartridges? How is it operated, what quantity is used and how is it fired? Where can it be obtained? Answer: We cannot recommend dynamite as safer or better for your use than powder. It is put up in cartridges, but we are unable to designate dealers to whom you should apply. See notice under "Communications Received."

W. O. D. asks what preparation can be used to remove varnish from the surface of an oil painting without injuring the picture. "I know that it can be done." Answer: In order to remove the cracks often observed in old pictures, and which we presume to be your object, Van Pettenkofer has suggested exposure to the vapor of alcohol at the ordinary temperature of the air, the picture being placed in an air-tight box, at the bottom of which is a tray containing alcohol. In some cases, however, it is unsuccessful. One of the best solvents of dried paint and of boiled oil varnishes is a mixture of alcohol and chloroform.

T. W. S. asks what will prevent flour paste from getting sour, or arrest fermentation? Answer: Flour paste will not sour or ferment if a little alcohol be added to it. Carbolic acid will also preserve it, but to many people the smell of the latter is so objectionable that they prefer the more expensive alcohol.

M. W. B. says: I wish to know what will clean and polish the brass work on a locomotive better and quicker than the oil and emery generally used. Answer: Use oxalic acid, in the form of powder, applying it with a piece of dry waste. This is a poisonous compound.

W. S. J. asks: 1. Can I melt old rubber boots in a mixture of pitch, asphaltum and shellac; that is to say, will the rubber be dissolved when boiled in this mixture? 2. Can waterproof clothing (such as has been waterproofed with alum and sugar of lead) be ironed when damp to take out the wrinkles without spoiling the waterproof quality? Answers: 1. No; the rubber must first be dissolved in bisulphide of carbon, and as the quantity of rubber required is very small, it would be cheaper to purchase the crude caoutchouc before it is vulcanized. 2. No doubt it can.

W. & R. say: How shall we learn what the Whitworth screw thread is, so as to be able to make it with precision? Answer: See editorial pages of last week's issue.

W. M. W. would like to know a way of removing sperm (such as is used in making candles) from clothing. Answer: A hot iron and a piece of brown paper will soon extract the sperm. Benzine will also remove it, but it occasionally affects the color.

W. H. B. asks: Which is the most accurate, a long or short bubble in a common spirit level? Answer: The best length of bubble depends somewhat on the length or curvature of the tube, a short bubble being required for a tube with small radius of curvature, and increasing regularly in proportion with the increase of the radius of curvature.

N. S. asks: Is it dangerous and, if not dangerous, is it advisable to pump water into a boiler during the process of blowing off? Answer: It is not dangerous, under ordinary conditions: but it is not generally considered advisable to blow off while feeding a boiler, because, as feed and blow pipes are usually arranged, the clean water that is forced in by the pump is blown off, not having time to mix with the other water in the boiler.

T. J. says: Does water offer less resistance to one large ship than to an equal bulk comprised in several smaller ships of the same shape? Answer: The resistance of the water is made up of resistance to greatest immersed cross section and skin resistance, the latter depending upon the amount of wet surface. The large ship, having the bulk of several smaller ones could probably be arranged with less cross section and less wet surface than the sum of cross sections and immersed surfaces of the smaller vessels. You can readily make the calculation for any assumed dimensions.

M. J. S. asks: 1. How is the nitrate of gold produced, which is employed in electro-plating? Is it gold leaf dissolved in *aqua regia*? If not, what is it? 2. I have a very fine meerschaum pipe of which the amber is broken, and I cannot get one to fit it. Is there anything with which I can cement it or otherwise fix it? Answers: 1. A solution of gold in cyanide of potassium is used for electro-plating. When gold is dissolved in *aqua regia*, the chloride of gold is formed. Dissolve 7 grains of very fine gold in *aqua regia*, evaporate the solution to dryness on a water bath, and dissolve the residue in distilled water, then add to this solution some cyanide of potassium. (See also answer to W. A. B. in last week's issue.) 2. Ordinary glue, or a cement made as follows: Soak white glue in hot water; warm the jelly formed, add enough pulverulent slaked lime to give it consistency. The object to be cemented is to be slightly warmed. Another cement is shellac dissolved in borax.

F. E. C. asks: 1. How can I make a crucible for melting brass? 2. How can I make a mold for casting brass? 3. How can I cast lead pipes? Answers: 1. You can make the crucible of clay, and line it with fine coal dust, 2. Use ordinary molding sand, and either a metal or wooden flask. 3. For short pieces of pipe, use wooden molds and wooden cores. Make the core in two pieces, cut at an angle, so that it can be withdrawn from the casting.

H. H. asks: What is the best and surest means of cleaning old boiler flues from dirt and scales without removing them from the boiler? Answer: Our correspondent does not state the nature of the scale; but in ordinary cases we would advise the use of tannate of soda, which is highly recommended by many who have tried it.

P. T. R. asks: What kind of lenses and how many are used in a magic lantern, and how are they arranged in the tube? Can there be a lantern or camera made which will show any opaque object, such as a common photograph, a steel engraving or a coin, upon a screen, in its natural colors? If such a camera can be made, please give a description of it. Answer: One double convex lens is required in the tube. The magic lantern will show images of opaque objects with their colors on the screen, and beautiful effects are produced if the objects are strongly illuminated.

L. H. asks: How can I make a small engine to drive on a common road? How large a boiler and engine will it take to carry two persons? It one could be made, would it be against the law to drive it in the road? Answer: The engine and boiler should be designed to give a useful effect of about one horse power. Road steamers have occasionally been used in this country; and we believe no objection has been made by the authorities, probably on account of their novelty. You will find a very interesting paper on road steamers, by Professor R. H. Thurston, in the *Journal of the Franklin Institute*, for January, 1873. An abstract of the paper has been published in the SCIENTIFIC AMERICAN.

MINERALS.—Specimens have been received from the following correspondents, and examined with the results stated:

J. N. M.—Iron pyrites and sulphate of lime are the minerals you send—of no value. If a stream flows from the spring you can, by means of a water ram, send up water into your house, thirty feet high or more. Apply to prominent booksellers for works on cultivation of trees.

J. G. W.—It is galena or sulphide of lead, a rich and valuable ore, containing about 86 per cent of lead.

J. H. S.—Chiefly iron pyrites.

A. G.—Iron pyrites.

G. B. B.—Red hematite and sulphur. The value of the latter depends on its distance from a market.

J. J. T.—Red hematite, an ore of iron, valuable if no too far from coal mines and transportation.

G. R. E. G.—One specimen contains some iron pyrites quartz, etc., but nothing of value. The others are magnesian limestone and iron ore.

G. C. P.—The soft substance had become quite hard by the time it reached us, and most of it was infusible and insoluble, like quartz. It also contained some organic matter.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On the Solar System. By G. W. T.
On Propelling Fire Engines. By C. A. M.
On Plow Points. By P. F. B.
On Inserting Screws in Plaster. By W.A. A.
On Kingfishers and Fish. By D. S. H.
On Boiler Explosions. By J. E. E.
On Creeping Rails. By J. H.
On the Location of the Great Telescope. By S. H. M., Jr.
On the Value of Science. By J. M.
On the Purification of Rivers. By J. J. L.
On Tidal Action. By J. A. B.

Also enquiries from the following:

J. T. R.—J. M. W.—C. T. S.—G. M. V. P.—J. H.—E. C. D J. T. B.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal," which is specially devoted to such enquiries.