Business and Personal.

The Charge for Insertion under this head is $1 a Line.

Notes & Queries

C. A. P. asks: How can I braze a broken cast iron vise?

H. asks: How can I make the best bleaching liquid for washing clothes?

J. W. R. asks: What is a good artificial bait for sunfish? "Grubs are scarce in my locality."

T. W. B. asks: As Professor Wise doubtless ascertained the tensile strength of the material composing his balloon, as well as the pressure to be borne by it (determined by the required weight to be raised), what was the amount of the explosive force?

W. H. B. asks: Is there a substance or combination of substances which is combustible, and easily ignited with a match, either with or without the use of a wick? It must produce as intense a heat as possible, be easily melted, and if poured in that state upon a flat piece of ordinary solder must adhere so firmly as, when hardened, not to become removed by ordinary handling or by transportation, and be reasonably cheap.

Answers to Correspondents

W. P. H.'s query is incomprehensible.—J. J. H.'s question is a professional one; he should consult some good engineer.—J. S. B. should read the description of lead pencil making on p. 84, vol. 27.

F. O. B. asks: Would it not be a good idea to place air pumps on a locomotive engine, so that, in descending a grade, instead of putting on the brakes of a train to arrest the motion, that the air pumps could be used to force air into the boiler, thereby increasing the pressure in the boiler and utilizing the power which is usually wasted in applying the brakes? And could not the steam cylinders themselves be used for that purpose? Answer: Both plans are old.

B. A. K. asks: Will a broad gage locomotive run 200 miles in a shorter time than one built on the narrow gage plan, each being built alike and proportioned to the gage, the broad gage, of course, being much the larger? 2. Does a broad gage locomotive carry more dead weight in proportion to its size than the narrow gage? Answers: 1 and 2. We can see that there might be differences between the performances of the two engines, but one would not necessarily have any advantages over the other.

F. O. C. asks: 1. Who was the first inventor and builder of the locomotive engine, and who laid down the first railroad? 2. Would a leaden tank do for storing muriatic acid in large quantities? 3. What metal is used in place of nickel in plating? Answers: 1. Cugnot, a Frenchman, built the first locomotive, in 1769. The Stockton and Darlington Railroad, in England, was built in 1825. This was the first. 2. It probably would. 3. Read the article on page 307 of our volume XXVII.

E. L. asks: What is the highest degree at which water can be boiled? If I have 15 lbs. of steam in a boiler and build a large fire in order to get it up to 80 lbs., is the water any hotter at 30 lbs. than at 15 lbs.? Answer: The boiling point of water depends upon the pressure to which it is subjected. See article on "Properties of Saturated Steam," on page 81 of our current volume.

G. asks: How can I calculate the horse power of engine? From what book can I learn all about engines and pumps? Answer: We cannot answer the question about horse power without more data. You will find rules given in former answers to correspondents. Probably the best book for you to commence with will be Bourne's "Catechism of the Steam Engine," which can be obtained from D. Van Nostrand. There are many things relating to engines and pumps that cannot be learned from books, and can only be discovered by observation.

C. G. H. asks: When out of sight of land, how will Professors Wise and Donaldson know in what course they are moving? The compass will point out the north; but as the balloon has no stem or stern, they can not tell which way they are going. Answer: Mr. Donaldson informed us that he proposed to obtain the course by dropping something from the balloon, and observing the direction with reference to that.

W. B. asks: If a horizontal pipe, of 6 inches inside diameter, about a foot long, having connected on one side a half or three quarter inch (inside diameter) pipe, standing erect, about 4 feet long: and at the other side simply a prop or bolt, which slides out in proportion to the water pressure from above, and pushes against an object in its immediate front: will there be a horizontal forward pressure, and none backward? 2. If so, how much, by a pipe 4 feet long and half an inch bore, standing erect, with a 6 inch bore of a foot long horizontal pipe? 3. If the water is forcibly driven in, will the force, resulting in the forward pressure, be equal to the force above expended, or greater? Answers: 1. There will be both a forward and backward pressure. The latter pressure can be resisted by a plug in the pipe. 2. The amount of this pressure will be about 49 pounds. 3. If the water is pressed above, the forward pressure will be increased.

W. C. B. asks: 1. What is the limit of the hight to which a siphon will draw water, or what is the highest point at which it can be worked? Will it do any good to let the pump down in the ground 10 feet, and let the pipe run over the top of the hill on the surface of the ground? Answer: From 30 to 32 feet is the greatest hight in practice, and any lift above 28 feet causes great difficulty. If the pump is lowered, the whole pipe must be lowered as well, to get the benefit of the decreased lift.

E. G. F. asks: Is there a book devoted exclusively to stationery and portable engines, their construction, management, etc.? Answer: Yes. See catalogues of some of the leading publishers who advertise in this paper.

A. L. K. says: Is it possible to produce an artificial frost over an area of some square miles? Answer: Not in the present state of science.

S. J. O. asks: Where can I obtain the "Table of Change Wheels for the Screw Cutting Lathe," recently reviewed in your columns? Answer: We are unable to add any information to that already published in our notice of the work.

M. O'R. asks: 1. Where can I find a description of Professor Boyle's experiment or device for correcting the form of lenses, to which experiment or device allusion is made on page 43, current volume. 2. Is there any method or process for depositing nickel on glass, similar or analogous to the process by which silver is deposited on glass? I want to get a bright metallic coat of pure nickel on glass, which may be polished for reflecting purposes. Can it be done, and how? Answer: 1. Professor Boyle arranged a pair of six inch achromatics as a binocular telescope. The novelty of his machine for local retouches consisted in the employment of a lozenge-shaped local polisher instead of the usual round one. Robert Browning of London makes silvered glass mirrors, and sends a pamphlet for a shilling. Mr. Clark tried one of his 13 inch specula and found that the diffraction around the three strips of steel supporting the diagonal mirror caused the image of a star to appear with six wings. 2. Professor Draper has completed with his own hands a silvered glass mirror, twenty-eight inches in diameter. It is supported on an india rubber air cushion. Professor Smith recommends nickel-plating cast iron specula, but these require careful annealing. The silver coating tarnishes wherever the air contains compounds of sulphur. In towns, therefore, the silver coating of glass mirrors should be nickel-plated by the battery after polishing.

J. F. S. asks: Would the collection and condensation of the gas or gases arising from hot muriatic acid, after it has done its work in clearing tin scrap, be patentable? Answer: Whether your method is new depends upon how you collect and condense the gas. If you condense by means of an ordinary condenser or worm, or receive the gas into cold water, there is nothing new in it. But this plan of collecting and saving the hydrochloric acid gas might be combined with your process of cleaning tin scraps and be patentable, as might also improved machinery for effecting either result. Improvements for preventing the escape of gas into a room would also be patentable.

C. E. F. asks for directions for preparing cupro-ammonium. Answer: Ammonio-cupric oxide or cupro-ammonium consists of a solution of cupric oxide or black oxide of copper in aqua ammonia. It may be produced by precipitating a solution of a copper salt, as the sulphate, by strong ammonia, and then adding ammonia in excess so as to dissolve the precipitated oxide. In this case, however, it is not pure, as the acid of the copper salt, when the oxide of copper is precipitated, combines with the ammonia, forming an ammonia salt, which remains in solution. To form pure ammonio-cupric oxide, dissolve pure black oxide of copper in the strongest aqua ammonia.

W. R. asks: Is there any kind of air pump that will produce a stronger pressure of air against any object than a good strong wind? If so, how much would such an air pump weigh, and how heavy an engine would it take to run it? Could they both be taken up in a balloon? Would it be practicable thus to drive a balloon against the wind? Answer: Such air pumps are made, but the machinery would be too heavy to be practicable for use in a balloon.

W. B. asks: Why do music boxes squeak after they have been cleaned? The noise is not in the running machinery, but in the steel reeds which the pegs of the roller strike on. Answer: Probably the noise is due to friction between some of the reeds and pegs.

A. asks: Why cannot we do away with sails on lake boats, and run them with windmills, so constructed as to work a screw? Answer: The idea is old and impracticable. By no manner of device can you make the wind drive a boat directly against the wind. You can sail obliquely, and for this purpose the ordinary sails would give you more propelling power, in a more convenient form, than any windmill.

G. V. H. says: My house is stone, with walls 18 inches thick. The roof is tin, with ordinary pine sheathing, and I shall ceil it with pine. What material would be best to put in between the roof and the ceiling to keep the upper story cool in summer and warm in winter? Would sawdust answer the purpose? Answer: Sawdust filling in this case is objectionable: first, on account of its tendency to induce decay of the timber, either rot or dry rot; second, because it will decay itself and find its way through the joints of the boarding, thus filling the rooms with dust and deteriorating the air. The usual course in such cases is to suspend strips at from one to three feet below the roof joists and at about two feet apart, and to put the ceiling upon these, thus depending upon a large air space between the ceiling and the roof, as a non-conductor of heat. The strips are made firm by being braced at short intervals to the joists; and if a plastered ceiling is required, a series of narrow cross strips are nailed to the others at 12 inches apart, to which the lath are secured.

R. B. C. says: In regard to D. B. M.'s answer to inquiries respecting a noon mark, I wish to ask: 1. Why do the observations have to be taken 12 hours apart? 2. How am I to tell when it is noon? Is it when the shadows of the two plumb lines coincide? 3. What kind of an almanac will tell how much the sun is fast or slow? 4. Can you give a rule for calculating the true meridian from the results obtained by the plumb line arrangement? 5. Is there any more reliable apparatus for determining the meridian than by using plumb lines? Answers: 1. No. In 11 hours and 58 minutes, the north star completes half a revolution about the pole. The pole star is on the meridian about seventeen minutes after the plumb line covers both it and Alioth, (*epsilon Ursæ Majoris*) fifth star of the Dipper, beginning with the pointers. The plumb lines may also be ranged with the north star at its greatest eastern or western elongation. Then, if the lines are 100 inches apart, one of them must be moved two and six tenths inches to range with the pole. 2. Look at the almanac for "sun at noon mark," which is the required correction. 3. A "newspaper almanac." 4. The plumb lines are placed in the true meridian, that is, they range due north and south. 5. Yes; by using the solar compass, transit, etc.

G. R. asks: Is there any difference made, in the amount of water discharged by an hydraulic ram, by increasing the size of discharge pipe from one inch to one foot in diameter? The fall to the ram is 10 feet; hight to raise, 60 feet. Of course the size of pipe (1 inch) is already sufficient to allow a discharge of fifty times more water than is elevated by the ram. Does the size of the pipe, by exposing more or less surface to water, offer more or less friction, and thereby vary the amount discharged? Answer: Unless the supply pipe is very long, a diameter of one inch will probably give better results than a diameter of one foot. This is on the supposition that the ram is properly designed for a pipe one inch in diameter.

W. G. A. asks: Would not one bumper on a railroad car do as well as two bumpers? Answer: No. One might but not as well as two.

J. W. H. asks: 1. How can I determine when water is foaming in a steam boiler? 2. What is generally used for cementing gristmill stones, and for fastening smaller sized stones in iron cups? 3. I have a 30 inch corn mill. The top stone is broken in two in the center, and the cement, from exposure to the weather, has rotted. I made a thin solution of plaster of Paris, set the burr or stone, and then poured the solution around the burr in the cup. It is a failure and does not become hard. What shall I do? 3. Can you give me instructions how to temper mill picks? Answers: 1. Violent foaming is sometimes shown in the glass gage. It is generally indicated by trying the gage cocks, and observing whether solid water or a mixture of steam and water issues therefrom. 2. Set the stone in the cup, filling up the back with a cement composed of plaster of Paris. Fill the interstices between the stones with a cement composed of powdered alum and a powder made from small pieces of the millstone. 3. Picks are frequently tempered in brine.

D. B. says: Suppose I have a steam cylinder, with 50 inches area, and 20 lbs. constant pressure, and insert two pistons, admitting steam in center between the pistons, so that they are both forced outwards, would each piston overcome a resistance of 1,000 lbs. (less friction), or the two only 1,000 lbs. collectively? Answer: Each would exert a pressure of 1,000 pounds.

C. M. N. asks how to precipitate sal ammoniac and nitrate of silver. Answer: The latter can be precipitated by hydrochloric acid or any chloride. If in a solution by itself, it will crystallize out on concentrating the solution by evaporation. The two salts cannot exist in the same solution, as the sal ammoniac would precipitate the silver. Sal ammoniac is precipitated by the bichloride of platinum in concentrated solutions. If C. M. N. will give a more precise explanation of what he wants, we may be able to assist him.

W. M. F. asks: 1. What is the use of a storm glass? 2. How is it used? 3. Should the long and narrow bottle be full, or does it make no difference? 4. How can I tell the approach of a storm by the use of the storm glass and thermometer combined? 5. How can I make muriate of ammonia? 6. How can I make malic acid? Answers: 1, 2, 3, 4. It is not necessary that the phial should be full. When the liquid is clear it is a sign of fair weather. If the solid particles rise in the liquid, it signifies rain. Before a storm or very high wind, the liquid will become thick. 5. From the ammoniacal liquors formed in the manufacture of coal gas. 6. It is generally obtained from the berries of the mountain ash. You would do well to consult some standard work on practical chemistry, as we have not space to give details of manufacture in these columns.

G. B. D. asks: 1. What is the most economical speed in feet per minute to run a rotary steam engine, which is constructed on the old plan of hollow shaft and arms, through which the steam passes, exhausting at the curved ends of said arms, always in an opposite direction? 2. What percentage of economy can be realized from the above plan, compared with the best form of reciprocating engine? 3. Would there be any gain of power if the steam, in exhausting from the curved arms, came directly in contact with the inner ratcheted face of another wheel, causing it to revolve in the opposite direction, the two emitting their power by means of one cross and one straight belt, leading to another shaft at suitable distance? 4. What is your opinion in regard to a series of feet being connected to each other by means of links or hinges, their inner faces being provided with rollers, the whole forming an endless traction device, revolving around an endless track and propelled by engines mounted on the frame? Some twenty patents have been allowed to different inventors for certain improvements on this form of traction engine during the last 12 years, and yet there seem to be none in use, either because the whole machine combined is too complicated, or the connections, being constantly exposed to grit and dirt, are not durable. Suppose these revolving feet to be 4 feet x 14 inches each, and they are so connected that one does not leave the ground until the next one relieves it; if we construct a traction engine with two traction wheels 6 feet diameter by 2 feet face, both being secured to one shaft which is driven by engines of the same power as the ones employed to drive the endless traction machine, which of these plans will draw the greatest load at the same speed, and which would be the most practicable for every day use? 5. What is the object in the rubber tire used on road steamers? Is it to give increased traction or is it for the purpose of relieving the body of the machine of the shock or concussion which would occur if the wheels struck a stone or other obstacle? Answers: 1. Generally speaking, the most economical speed for an engine depends upon its mode of construction, system of counterbalancing employed, etc., and no rule can be given that will apply to every case. 2. We have no record of tests that will enable us to answer this question. 3. If applied on the principle of the compound engine, there might be a gain. 4. Traction engines are largely used in England, and their introduction into this country is now fairly accomplished. There are several forms of traction wheels in use which have more adhesion than the engines of the machines can overcome. 5. Mainly for the purpose of gaining adhesion.

N. A. P. says: Two forms of screw propeller are tried on the same vessel, each screw or wheel being of the same diameter, and the pressure of steam in each trial being 60 lbs. It is found that, with wheel A, 4,000 revolutions are required to propel the vessel 1 mile in 8 minutes: while with wheel B, 3,000 revolutions make the 1 mile in 8 minutes. Is there a difference of power actually expended? If so, what? Does the furnace consume more fuel with wheel A on the shaft? If so, how much more? Answer: If we understand your question rightly, wheel B has 25 per cent more efficiency than wheel A, and consequently 25 per cent less fuel is required with this wheel.

A. F. B. says: 1. Is the pressure of steam on every square inch of the flues the same as it is on the shell of the boiler, or has steam the same pressure towards the center as it has from the center of the boiler? 2. Is the law that action and reaction are equal and in opposite directions applicable to the first query? Answers: 1. Steam presses equally in every direction. 2. Yes.

J. G. D. T. asks: 1. Does gunpowder, when ignited within an enclosure (as in a gun barrel, for instance) create pressure by producing air? 2. If so, is there a gradual expansion of its atoms, so as to create a gradual force? Answers: 1. The solid grains of the powder are converted into gases, principally nitrogen and carbonic acid. 2. There is an expansion, commencing with a pressure of nothing and rapidly increasing.

A. M. B. asks: Is it an uncommon occurrence to launch steam vessels with their engines and boilers in? Was not the Dictator launched with her machinery complete? Answer: It is not usual. The Dictator and most of the monitors were launched with their engines and boilers in.