F. L. G. asks: What should be the dimen- ons of a pleasure boat, to use an engine and boiler of orse power? What size and pitch should the wheel ve? Answer: About 25 feet long by 5 feet beam; di- eter of propeller 20 inches, pitch 2 feet.

V. G. says: A friend says that he has a mmon suction pump that on some days draws water feet and upwards, perpendicularly. I say that no such mp ever did or will do it. Answer: You are right.

W. E. says: I have a wash pipe 1 inch in meter leading from a wash basin, having a common g, and protected by the usual cross bars. The pipe ead, and has become stopped by some object, I think ouse. How can I clear it out without taking it down? uld oil of vitriol do it, without destroying the pipes? swer: Use a solution of caustic potash.

W. B. G. asks: Are not conical bullets for ié and other rifles made by punching, and how fast they be made by the machines now in use? Answer: machine in use at our arsenals was invented by a kman named Snyder, in the arsenal at Watervliet, . We think it makes about 40 bullets a minute, but not quite certain. Some of our readers will doubt- correct us, if we are in error.

. L. O. says: I have a 2 horse power en- working under 15 lbs. steam. The water in our hy- t pipe indicates 20 lbs. pressure; the engine is used for 2 hours per day. Could I use the hydrant water ad of steam in my engine? I think the amount of r used is cheaper than coal. Answer: Probably you l not make the change, with the present arrange- of valves.

L. C. asks: What will produce a very t permanent red color on leather, to be polished a hot iron? Answer: Scarlet morocco as and roans yed with cochineal.

B. G. asks: 1. How can I give a fine blue h brown color to small articles made from sheet 2. How, also, can articles made from sheet brass onzed? Answers: 1. After the articles are tem- , polish them, and heat to color, over a spirit lamp, harcoal fire, or a lead bath. 2. See p. 331, current ue.

F. B. asks: What is the lifting power of , the shape of which is an inverted isosceles trian- 10 feet perpendicular, surmounted by half a circle et diameter? Answer: We published on p. 331, it volume, a table of the force of the wind, at dif- velocities. Knowing the weight of the kite, and ection which the wind has, you can calculate the power.

F. asks: How can I make Babbitt metal? r: Melt 4 lbs. copper, add by degrees 12 lbs. best os. regulus of antimony, and then 12 lbs. more tin. , or 5 lbs. of the last quantity of tin have been reduce the heat to a dull red and add the re- er.

. A. asks: 1. How much power will it cut a plate of iron 1½ inches thick? 2. What the effect of expansion and contraction on the at St. Louis, Mo.? Answers: 1. The resistance ght iron to shearing is about 45,000 pounds per inch, on an average. 2. The effect will probably ise and lower the crown of the arch a little, if le structure is rigid.

I. asks: What is the difference in cot- tween ordinary and middling, for instance), and t detected? Answer: The classification of dif- rades of cotton is made according to length and of fiber, and is expert work.

. D. T. asks: Why is it that the sun and when first appearing over the horizon, seem ian when in the zenith? Is it owing to the pe ondition of the atmosphere near the earth? : Yes.

says: Chemistry teaches that, when a of hydrogen and oxygen contains common air y nitrogen) it will explode when ignited. There- e water for charging boilers were drawn from om of a deep tank, the superincumbent column would weigh more than the air (or more than 15 to the square inch) and all air would be ex- I think that all surface ground water con- losives in solution. In the tank containing ere should be arranged some flat vessels con- lumina or the like incombustible substance; explosives would be neutralized, the water ified for that purpose. Answer: We believe mmittee of the Franklin Institute made experi- this subject in 1837, and determined that ex- ompounds, other than steam, were not formed boilers.

R. asks: What is oil of citronella? Citronella is an oil procured by distilling the *andropogon schœnanthus*, which grows wild abundantly in Ceylon, whence this oil is chiefly

says: In Culpepper's "Complete here is mention made of a plant called Christ's of course is the vulgar or local name. What tanical name of that plant? Answer: You refer to the flower of the bush known as orn, or *paliurus aculeatus*.

asks: Is the ocean level? How much he city of New York than Liverpool? An- evel line is one that coincides with the gener- the surface of the earth, which is that of an eroid. The surface of the ocean would be an low tide, were it not for the wind. As it l varies in different locations. The difference e level of New York and Liverpool, if any, is .

P. asks: 1. What is carbon disul- Can I make a liquid of transparent color to e hands when bruised, so as to form a false swers: 1. Carbon disulphide is a compound and sulphur, made by passing the vapor of er fragments of red hot charcoal in a porce- d condensing the gaseous product. It is also lide of carbon, and sulphuret of carbon, and of carbon. 2. Collodion is used for the pur- ention. This is made by dissolving gun cot- oxylin, in a mixture of ether and alcohol. It er for you to purchase the collodion already a druggist, as its preparation involves skill specially in making the pyroxylin, which, s an explosive substance.

., asks: 1. Have the Bessemer steel he satisfaction to railroad managers antici- considered, over a first class iron rail? 2. e silicon rail compare with the Bessemer in wers: 1. Yes. 2. So far as we know, very de of the silicon steel have been laid down, as not been enough time to enable a compar- ade.

D. B. P. says: I wish to run a woven iron wire cylinder in water, and to protect it from corrosion. Tinning does not answer the purpose, and galvanizing fills up the meshes. Can you suggest a remedy? The cylinder will be subjected to some wear. Answer: You might overcome the difficulty by constructing the cylin- der of wire cloth with a larger mesh than you require, so that, when it is galvanized, it will be of the proper size. Or you might have the cloth made of galvanized wire in the first place.

B. and P. say: We have to use swamp water for our boiler; it forms a soft muddy scale, easily scraped off, but it has to be done often. What is the best thing to hold it in solution that it may be blown off? 2. Water collects in our steam heating pipe and, freez- ing, bursts, or cracks it. What is a good cement for the cracks? Answers: 1. Probably your best plan will be to filter the water, before it enters the boiler. There are feed water heaters in the market that are said to remove all impurities which are held in solution. 2. We expect the best plan will be to renew the pipe. But you might try a cement made of red and white lead and fine iron borings. Put this over the crack, cover with a piece of tin, and wrap strongly.

F. N. says, in reply to A. R.'s query in re- gard to the locomotive, that air can be pumped in the boiler to almost any pressure where there is power suf- ficient to draw the engine; of course the engine is re- versed. I have frequently seen engineers oil their throttle valves by reversing their engines for a few sec- onds while rolling down hill just after tallowing the cylinders, when there was, perhaps, a pressure of 140 pounds of steam on the boiler. A. R. seems to think that the air would escape by the way it entered. The throttle valve prevents this by acting as a check.

T. B. J. says, in reply to L. W.: Brass can be stained a permanent dark brown by placing it in a mixture of iron scales 1 lb., arsenic 1 oz., muriatic acid 1 lb., and holding a piece of sheet zinc near it in the solution.

G. M. says, in reply to A. D., who asked for a remedy for snails other than salt: Put ashes with the seeds into the ground, or outside of them, wherever the snails may be found.

F. V. F. says, in reply to G. W. C.'s ques- tion as to two locomotives: If the wheels were of the same size on the two locomotives, it is evident that they would both reach the foot of the incline at exactly the same instant; but the wheels being of different diame- ters, it is equally evident that nothing can influence the relative motions of the locomotives on the incline except the friction of the two sets of wheels, which friction is found by experiment to be inversely proportional to their radii. Hence, since the radii of the two sets of wheels are to each other as ⅔ is to 1, the friction being inversely proportional to the radii, we have S : L :: 1 : ⅔, in which L and S indicate the large and small wheels re- spectively. Also, in the case of the smaller wheels, in consequence of their making a greater number of revo- lutions during the descent than the larger wheels, the rods, shafts, links, etc., attached to them would move faster, and hence increase the friction. I conclude from these facts that, since the locomotive with the four foot wheels has a little more than ½ as much friction as the other locomotive, the last mentioned locomotive will arrive at the foot of the incline in a little less than ⅔ of the time that it takes the other to arrive there.

A. G. Jr. says, in reply to J. N. Q.'s query as to coloring photographs: An exact representation of any transparent leaf or plant of any color or shade can easily be made by obtaining direct from the leaf a carbon negative, then using tissue, of the color desired, for positives. You can obtain, from the following so- lutions and their admixtures, almost any shade of blue, green, yellow, and brown. Solution No. 1, to be used as a bath: Dissolve 2 ozs. lead in nitric acid, and evaporate to dryness. Then dissolve 2 ozs. of the resulting nitrate of lead in rain or distilled water, in a glass or porcelain vessel. In another, dis- solve 2 ozs. of the ferricyanide of potassium (red prus- siate of potash), mix the solutions, and filter into a suitable bath. Then float, upon this, either plain or albumen paper, and dry in the dark. Then use a paper, or carbon, or ordinary photographic negatives as J. N. Q. describes. After finding the proper time to expose (and a few experimental failures will soon do it), immerse in the following solution to make a dark green leaf: bichro- mate of potash ½ oz., perchloride of iron ½ oz., water about one pint. For red: sulphate of copper 1 oz., water 1 pint. For brown: weak solution perchloride of iron and a little sulphate of copper. For dark brown, more iron and less copper.

E. J. O. says, in reply to J. N. N.'s query as to a common house fly, surrounded by a kind of opaque vapor, after death: It is a mold or fungus, and is caused by the bite or sting of the mosquito. I have watched the combat, and the mold or fungus is deposited during and immediately following the death struggles of the fly.

W. E. H. says, in answer to W.'s question as to mensuration of circles: I use rules that are not given in school arithmetic books: To find the cir- cumference of any circle: Multiply the diameter by 9 $\frac{5}{10}$ and divide by 3. To find the area of the same circle: Take $\frac{7}{8}$ of the square of the diameter. Having the circumfer- ence, to find the diameter: Divide the circumference by 19 and multiply the quotient by 6.

J. C. S. says: "When our belts slip, we pour castor oil on them just in front of the pulley, and the effect is always satisfactory; we also use tanner's or neats' foot oil on the outside of the belts. We run the grain side of our belts next the pulley, preferring always to use, for our own purposes, large pulleys and long belts, keeping them soft and pliable, and having them loose as possible."

C. H. R. says, in reply to C. C.'s question on page 250, current volume: The answer is: 12,533 lbs. less friction, which in this case would be over ½, and also less an amount in proportion to the distance the pin for the sheaves is placed from the ends of the lines.

C. M. N. says that A. M. can solder brass to brass by taking a piece of the brass to be soldered and adding a little silver while melted in a crucible. One eighth part of silver will do, and it will melt just as the piece to be soldered begins to flow. Two parts brass and one of silver is a good solder for brass, iron or steel.

J. E. E. says, in reply to C. C.'s question on page 250, current volume: Disregarding friction (which will be about ½), the pressure on W will be 72,833 lbs., four times the power (less friction) given by the use of the four pulleys.

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

R. W. H.—Your specimen is tripoli, of value as a polishing material.

H. S.—The black material is carbonate of iron.

J. J. T.—Galena or sulphide of lead, a valuable ore of lead, consisting of lead 85 and sulphur 13 parts, the remainder being oxide of iron or other impurity, with sometimes a little silver. Lead is obtained from it by roasting in a reverberatory furnace, and smelting the residue with coal and lime.

M. E. B.—Nos. 1 and 3 are trap rock, of no value. No. 2 is trap with spangles of plumbago, and perhaps some galena, disseminated through it.

J. T. C.—No. 1 is a vein of trap, of igneous or eruptive origin. No. 2, hornblende. No. 3. This is possibly metal- liferous at some depth.

COMMUNICATIONS RECEIVED.

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

On River Navigation. By G. W. I.

On Sexadigitism. By W. T. R.

On Ecclesiastical Bickerings. By J. R. P.

On Insect Nests. By A. B.

On Snake Poisons. By T. J.

On Flying Spiders. By E. F.

On Water Gas. By A. A. H.

On the Proposed Great Telescope. By W. M.

Also enquiries from the following:

W. A. B.—S.—E. N.—S. B. H.—J. P.—B. W. W.—J. C. —T. C. C.—G. S.—C. E. B.—J. W. P.—S. N.—A. L. B.— P. L.—J. M.—F. C. D.—J. A. V.—F. D. B.—J. P. L.— C. W.—M. F.—H. Z. T.—D. T. T.—J. M. S. Jr.

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.

[OFFICIAL.]

Index of Inventions

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November 4, 1873,

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APPLICATIONS FOR EXTENSIONS.

Applications have been duly filed, and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

27,043.—LOCK FOR UMBRELLA STAND.—A. M. Foote. Jan. 21

27,185.—SOLDERING IRON.—A. Burbank. Jan. 28.