Notes & Queries

1.—Will some one give me a good and simple recipe for making tracing paper and cloth?—T.W. M.

2.—How can I make a varnish that will be transparent, and so hard that it will not scratch? It is to be used on paper and cardboard.—T. C. T.

3.—Can there be an ink manufactured of any particular color that will not be visible to the naked eye on a particular colored paper, and yet be discernible through some particular colored glass?—H. K. J.

4.—What chemicals are used in boiling water to kill moss and at the same time to dye it black? The moss grows here on the trees, and is used for filling mattresses.—G. G. L.

5.—Please give me a recipe for making "Alaska scenery," namely, white formations (in water), which, in size and form, have a resemblance to mountains, etc. I have seen them in druggists' windows in different parts of the city. Can the "Alaska scenery" be colored red, yellow, blue, and green?—G. W. H.

6.—The preparation and dressing of furs seem to be held a secret from the general public and an entire monopoly, from the Hudson Bay Company's trade to that of manufacturing the furs into garments. Can any one furnish particulars of the best and simplest methods of such preparation, and also any improved scientific methods adopted by those who so far monopolize the trade? What is the most elaborate work on fur dressing?—H. I. R.

7.—I can tin wrought and malleable cast iron by first placing the iron in a pickle of oil of vitriol, then I wash it off and dip it into muriatic acid, and then into molten tin. I always have good success with malleable cast and wrought iron, but cannot make the metal adhere to ordinary cast iron. Will you please inform me what different process I need to use for the latter?—C. H. B.

Answers to Correspondents

L. A. B.—See our editorial article, "Losses of Power in the Steam Engine." You are nearly right in your estimate of average leverage of cranks; the figure is 0·7854. There is no loss of power arising out of the employment of the crank.

S. L. P., of N. J., says there is a question between himself and friend in respect to two examples of masonry, one of which is built on straight lines and the other in form of an arch, the longitudinal space covered by the walls being exactly the same. One claims that the quantity of masonry in each example is the same, the other, that the arch contains the greater quantity. Answer: The arch, supposing it to be in the form of a half circle, contains fifty per cent more masonry than the straight wall.

A. P. M. says: Is the friction greater on journals three feet in diameter or journals one inch in diameter? The length and quality of the bearings, the weight upon the journals, and the number of revolutions are the same in both cases. For answer, see editorial remarks, on another page, entitled "Friction of Journals."

C. W. S. asks: At what speed or how many feet per minute a circular saw should run, for sawing zinc plates one half inch thick, and brass bolts or bars of three inches diameter? Answer: About 1,000 revolutions per minute for a six inch saw will do.

W. H. L. says: What is the difference of cost in running a car by horse and steam power? Answer: The estimated prime cost and running expenses for a first class two horse street car in this city, interest, wear and tear, driver, conductor, stabling and all the expenses included, is $8,150 per annum. The same estimate for the running of each dummy or steam street car is $7,178, showing an economy of almost $1,000 a year in favor of steam.

B. says: The SCIENTIFIC AMERICAN in an article headed "Scientific and Mechanical Possibilities" says on page 329, volume XXVII.: "Heat increases about one degree for every fifty feet that we penetrate the earth." A California paper of November 8 has the following: "The greatest blow ever given to the hot liquid theory of the interior of the earth was that demonstrated by the artesian well at St. Louis, which developed a temperature at the depth of 3,800 feet which was too cold to be determined by any instrument of science at the time in use for such a purpose." Will you please to explain whether the above article is erroneous? Answer: The statement which you quote from the California paper of Nov. 8, is absolutely false, and is either the result of some most remarkable misunderstanding, or is one of those unpardonable misstatements which are sometimes purposely introduced by dishonorable persons into newspapers, and which have done a vast amount of mischief by misleading the public. Experiments give varying results. Some indicate an increase of 1° Fahr. for each 50 feet of descent, while others show an increase of 1° Fahr. for each 100 feet. All concur, however, in exhibiting an increase of temperature as the earth's crust is penetrated. Estimates of the thickness of the earth's crust have been frequently made It is not more than a few hundred miles, and may be less than one hundred. Below it, the temperature must be uniform, or nearly so, since there, all ordinary earthy matter and common metals are liquid. "It is not impossible, nor is it improbable, that there may be a central solid mass of alloyed metals whose melting point is too high to allow even a temperature higher than that of a blast furnace to fuse it."*

**Professor Thurston.*

M. H. W., of N. Y., H. C. K., of Mass., and others, write us in reference to our reply to the question of R. and W. about the fly wheel. The subject seems to be one in which many of our readers are interested, and we will endeavor, in a nearly issue, to state the principles involved in such manner that all may understand the difference between a "standing" and a "running" balance and between the case which we specified and those presented by our correspondents. We will here simply remind them that we stated that "if the wheel is accurately balanced, and is perfectly symmetrical, it does not necessarily produce unsteadiness *in the shaft*." H. C. K. has experimented with molding machines, grindstones and planing machines and has been annoyed by unsteadiness of movement simply because, although, in good standing balance, there was a lack of symmetry. His method of securing a running balance is a method of securing symmetry. By symmetry is meant such an arrangement of heavy material that each particle is balanced by another, equally heavy and equally distant from the center of motion. In such a case only can we get a perfect standing and a perfect running balance at the same time. A standing balance, otherwise, will not be a running balance, nor is a running balance necessarily a standing balance.

P. R. S. says: I think of putting in a 10 horse power steam engine. I will have to dig 20 feet and get very hard water, or put in a cistern and use water from roof. Can you tell me how much water I would have to use per hour in my boiler to get 10 horse power, and how will it work to run the escape pipe down into the water in the cistern? Would it not condense it so that there would be but little loss? Answer: A moderately good boiler driving an ordinarily good 10 horse power engine would require about a hundred gallons of water per hour. A bad boiler and inefficient machine might use nearly double that quantity, while the best boilers and very best known portable engines may be expected to run regularly at 10 horse power on fifty gallons per hour. Your arrangement of exhaust would not be satisfactory. It would only heat the surface, and if carried down under water would subject you to serious loss by back pressure.

E. T. Q., of N. H., says: I observe in your paper for Dec. 21, 1872, a reply to R. and W., in which you affirm that a balance wheel perfectly symmetrical and accurately balanced, keyed firmly upon a shaft in any position, "does not necessarily produce unsteadiness in the shaft." I am unable to understand how your reply can be correct, unless you have some unusual meaning for the expression "unsteadiness in the shaft." Will you explain more fully, and will you also state whether a shaft carrying a perfectly symmetrical and accurately balanced wheel, keyed firmly at an angle of 45° to the shaft, will saw rapidly without jumping from its bearings if not held down? Answer: Already answered elsewhere. We were probably not sufficiently precise in our language. The shaft would leave its bearings if unconfined, and driven at sufficiently high speed. It would not necessarily give trouble in all cases.

E. B. M. says: I notice that some of your correspondents recommend tan bark to clear a boiler of scale. Will it be injurious to our boiler to use water strongly impregnated with old sour liquor from the vats of a tan yard, the liquor being conducted directly from the vats, after being exhausted of its strength in tanning skins, to the feed water of the boiler? Answer: Water strongly impregnated with old sour liquor from a tannery would, in time, corrode your boiler and might do serious injury. If you cannot elsewhere obtain pure water, try it cautiously. Vegetable acids attack iron as do mineral acids, although you may find the solution so weak as not to have any appreciable effect in a long time.

W. E. H. says: Given two boilers, each 3 feet diameter, cylindrical, one 6 feet and the other 12 feet in length, all other things equal, is there any difference in the pressure per square inch required to produce rupture? Or in other words, does the length have any thing to do with the bursting strain? Answer: The length of a steam boiler has no effect either to increase or diminish its resistance to bursting pressure.

One of your correspondents, Le R. F. G., of Mass., maintains, or strives to maintain, that the part of a moving locomotive wheel in contact with the rail does not, "for the time being," move forward. I am inclined to the opinion that, for the following reasons, no part of such wheel is devoid of a forward movement: 1st. If we closely watch a wheel while turning forward, it "seems" as though no part was stationary even for an instant. 2d. If the top part of a wheel has a forward movement dependent upon the progress of the wheel upon the rail, and independent of its motion upon the axle, it "seems" to me that every other part of the wheel must have a forward movement also, because no part of the wheel has a backward movement, and all parts are so connected with the top as that if one moves the other must. If a locomotive wheel, four feet in diameter, with No. 1 marked on its highest part, and No. 2 on the part in contact with the rail, revolves one quarter round, it will bring No. 1 two feet in advance of the axle; and as the axle has moved forward nearly three feet, or one quarter of the wheel's circumference on the rail, No. 1 will be near five feet in advance of the position it first occupied. And as the movement of the wheel one quarter round places No. 2 two feet behind the axle, which has moved near three feet forward, it places No. 2 near one foot in advance of the place it started from. And as the descending movement of No. 1 is equal to the ascending movement of No. 2, it results that No. 1 has moved more than three times faster than No. 2. If we take two wheels an inch in diameter, with a mark on the circumference of each, and hold one stationary in one hand while we take hold of an axle passing through the center of the other, we will find, on putting the marked places together and revolving the one on the axle around the other that the one revolving turns once, and only once, around on its axis.—S. S. G.

To J. E. S., query 1, page 378.—After more than twenty years experience in the use of rubber belts I find iron hooks to be the most convenient and most durable splice. Cut the two ends of the belt perfectly square, and punch the holes for the hooks on an exact line. For heavy belts use two rows of hooks. In this way each hook will have the same strain. Do not depend on your eye for punching the holes on a line, but first mark a line with a square and then punch the holes, not too large for the hook. Now about dissolving rubber in spirits of niter. There is no such thing as dissolved rubber in the true sense of the word. With essential oils it can be expanded, and it has the appearance of being dissolved, but such solution will not saturate. Shellac gum copal, pitch and rosin may be dissolved and mixed so that fibrous materials may be saturated with them, but rubber separates from its so called solvents, or rather the solvent evaporates and leaves the rubber in a thin film on the surface over which it is spread. Neither will fire melt it, for at melting heat rubber will decompose, making a tremendous smoke and leaving very little residuum. Rubber is a unique substance. About vulcanized rubber, there are many mistaken notions abroad. The process of vulcanization is simply submitting the rubber to heat (steam or hot air) in such a manner that the heat can be regulated and controlled as to time and degree. I have heard vulcanization compared with the burning of bricks, but there is no similarity in the processes, for the bricks are brought in contact with the fire. Rubber treated in that way would decompose.—A. E. V E., of Mass.

By my query, page 340, Volume XXVII., I wished to find out if J. W., or any one else, knows any practicable way to shift a belt from a loose pulley at the driven end, provided, of course, that the belt is not in motion. There are plenty of mechanics who are ready to adopt any evident improvement when putting up machinery. I think some of them could be fooled several dollars worth with such advice as J. W.'s, page 292. J. E. S., page 378, intimates that it is not good practice to make the loose pulley much smaller than the tight one. His experience must differ very much from mine, though in my other article my language implied more than I meant when I said a difference of an inch is no hindrance to the shifting of the belt. The plan recommended by Mr. Coleman Sellers of making the hub of the loose pulley longer than the face is a good one, and in addition the face should be made very high in the middle, so that, if the hub wears so as to allow the pulley to tip to one side, the belt will keep as near as possible on the middle of it. When a loose pulley tips, so that the shifter has to be depended on to keep the belt from running off, the friction on the shifter wears the belt very fast. When the driven pulley is placed over the driver, a properly made tightener is in most cases preferable to a loose pulley. Some light machines, as a saw table, with the driving shaft directly below, can be set on guides and the tension of the belt made by moving the machine. This plan works exceedingly well. The tension of the belt can be, as it can also with the tightener, regulated to a nicety, which is very desirable as it saves unnecessary straining of the belt and saves much time in lacing it, and the belt is not wearing while the machine stands still.—W. G. B., of Mich.

To J. E. S. query 1, page 378.—For lacing rubber belts use calf skin, tanned as for boots. Cut lengthwise the skin, and take out the stretch with water instead of oil. My experience is that one such lacing will outlast two of the oil tanned, and will not spoil your belt.—H. D. I.

[OFFICIAL.]

Index of Inventions

For which Letters Patent of the United States were granted.

FOR THE WEEK ENDING DECEMBER 10, 1872,

AND EACH BEARING THAT DATE.

SCHEDULE OF PATENT FEES:

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