J. & T. G. say: In burning bricks, we find that, by mixing anthracite coal dust with the clay, the bricks are liable to swell, many of them presenting the appearance of large doughnuts. When broken, they have a dark gray metallic appearance, and are hard and brittle. It is usually said, when this happens, that the fire has been pushed too rapidly. No doubt this is true to a certain extent; for if the fires are kept low until bricks are well heated, there is little or no danger of it happening. But it is not absolutely true, because bricks that are in immediate contact with the fire will usually escape this swelling, while others, farthest removed from it, will swell. We think that it is caused by want of a sufficient amount of air to support combustion properly. Our chief reason for this view is that much of the coal in these swelled bricks is not consumed, and yet their appearance indicates that the inside of them must have been in a molten state. They look as if the material of which they are composed had been in a boiling condition, so great has been the heat generated within them. Moreover, in the individual brick, the swelling is greatest at the center; and when set close together, they will swell, while all the bricks around them that are set with space between them will be free from swelling. This exists in various degrees in in some bricks; it can hardly be seen in others, as above stated. The discoloration of bricks where they rest on each other, is another objection to the use of coal dust. Hence we cannot use it in our front or pressed bricks. Those parts of the brick where they rest on each other will be of a purple color, while the rest of the brick will be red. What we want to know is: Can any substance be mixed with the coal dust and clay that will supply the place of oxygen for the coal dust, so that it will not swell or discolor the bricks while burning, or cause them to become discolored when exposed to the weather? When we speak of coal dust, we mean the refuse of the coal yards. If this were ground fine, we think it would lessen the liability to swelling, but would not prevent the discoloration. A. The swelling of your bricks is due probably either to the escape of moisture in the baking, or the gases generated in the combustion of the coal. The red color of bricks is due to the red oxide of iron, which is formed during the intense heat of the kiln Where they press against one another the heat is less in tense, and not sufficient to cause complete decomposition of the iron compound and the formation of the red oxide. This is the cause of the purplish color where the bricks were in contact in the kiln. There is no cheaper source of oxygen than the atmosphere. Grinding the coal very fine might obviate some of the difficulty.

F. E. says: 1. I have two small rooms, about 14x15 feet, which are separated by a closet 5 feet wide. I keep in each room a stove, but I think that perhaps one stove could heat the two rooms, if a drum could be put in one room and the pipe from the stove in the other room be led through into the drum. I wish the drum to be as near the floor as a stove. In order to do this, the pipe from the top of the stove must be lowered about 2 feet, instead of going upwards. Would the draft of the stove be the same? Would the escaping heat of the stove sufficiently heat the room by going through that drum? Is so, of what size and how constructed should the drum be? 2. By what kind of an attachment or connection, can a lever and a wheel be so arranged that, by turning the wheel always in one direction, the lever would move up and down? 1. Probably such an arrangement would answer. Any reliable stove dealer will fit it up for you. 2. A cam and yoke would effect the desired object.

T. D. Q. Jr. says: 1. I have usually cleaned my miniature engines with emery cloth: what is the best way to clean out any emery which may have fallen into the cylinder, steam ways, etc? I usually pour alcohol or benzine to kill the oil, and then let running water through. Is there anything better? 2. Is water, charged with oxalic acid until it will take up no more, too strong for cleaning brass? 3. Is it necessary to clean and polish with whiting, or will leather alone be sufficient? 4. What is about the proportion of muriatic acid and alum in gold coloring? Will the brass require to be washed with water when colored with muriatic acid and alum? 5. What kind of bronzing can be easily applied to brass like that used on gas fixtures? 6. What kind of gilt wash can be easily and firmly applied to iron? 7. What coloring or lacquer is applied to the brass snaps and window raisers which we see in cars, and which look as if they were taken out after being cast, the rough edges filed off, and then dipped into something? What is a good lacquer to apply to brass, already polished, to keep it bright? A. 1. Take them apart, cover the pieces with oil, and wipe clean. 2. We think not. 3. The addition of whiting will probably be an improvement. 4. 6, 7. You will find directions about gold coloring, on page 13, current volume. 8. 5. See p.351, vol. 29. Dissolve 8 ounces of seed lac in one quart of alcohol.

J. B. G. asks: In an article in your No. 24, volume 29, on the ventilation of the Senate Chamber, it is said that the exhaust apparatus takes the air from the upper part of the room, which is contrary to the philosophy entertained by many in this part of the country. Indeed, all the buildings I know of have the air taken from openings in the floor, the idea of course being that the vitiated air, being heavier than pure air, is more easily taken from the floor; besides the warm air from the registers, rising immediately to the upper part of the room, is not drawn out before having performed its work. What is your opinion? A. It is impossible to give a general rule as to where the foul air of a room is to be drawn off, independently of all other considerations. The air may be heated before it is forced into the room; and if a current is established from the bottom, there is no objection to removing the air from the top.

H. J. asks: 1. Is it common for persons to lose their memory by fright? I was blown up on a steamboat some years ago, but not injured. and have not had my memory since. 2. I was on board a boat and she was blown up; I am positive there was a full supply of water in her boilers. There were some persons standing within 3 feet of the boilers, and some immediately over them. Some 25 were killed and wounded, yet no one was scalded. What became of the water? A. 1. Such action occasionally takes place, but we hardly think that it is common. 2. The hole may have blown out in the lower part of the boiler.

B. F. T. asks: Has any person a patent on the application of paper pulp to heated surfaces, as non-conductors of heat, as on steam boilers, pipes, etc? A. Can India rubber be dissolved in water so as to be mixed with other substances and become dry and hard? A. 1. We believe there is such a patent. 2. No.

R. H. asks: How is paper prepared so that, when written with an iron stylus, the electrical current will discolor it? A. Dip common printing paper in a solution of ferrocyanide of potassium. The passage of electricity through the paper, thus prepared, makes blue marks, the salt being converted into Prussian blue.

N. O. J. asks: 1. If I have a round timber, out of which I want to cut a rectangular beam, how can I find the sides of the beam expressed in function of the diameter of the timber? 2. What is the formula for the expansion of water by heat? 3. In Ganot's "Physics" there are the following formulas, by Dr. Matthiessen: $Vt=1-0\cdot00000253\ (t-4)+0\cdot0000008389\ (t-4)^2+0\cdot0000000\cdot 7173(t-4)^3$ between 4° and 32° C'. and $Vt=0\cdot999095+0\cdot00000534724\ t^2+0\cdot00000001126\ t^3$ between 30° and 100° C.; but it is not explained what t is, and w and t. A. The side of the greatest square that can be inscribed in a circle is $0\cdot707$ of the diameter. 2. The first formula may be thus translated: If we call the volume of a given weight of water, at a temperature of 4° centigrade, unity, the volume at any other temperature, t, between 4° and 32°, is equal to one, minus $0\cdot00000\cdot253$ times the given temperature, diminished by 4, $+\ 0\cdot0000008389$ times the square of the given temperature, less $4, +0\cdot00000007173$ times the cube of the given temperature, less 4. The translation of the other formula is similar. Vt in the first member of the equation means the volume at the temperature, t, which temperature is to be substituted for t in the second member.

A. R. asks: How small in size did Newton say that our globe could be pressed or squeezed to free it of its molecules? A. We do not remember that Newton ever made such a statement.
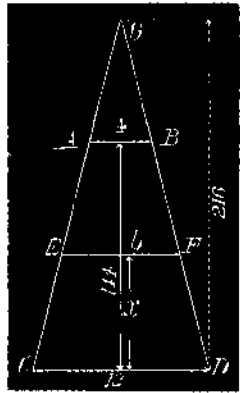
P. P. asks: What is the principal difficulty in running band saws in ordinary lumber mills, and why are they not used more extensively? Is not the power required to drive a band saw less in proportion to width of kerf, the rate of sawing being the same? A. The band saw is comparatively a recent invention, but already it is being largely introduced. We do not think there are any great difficulties in its use. The power required is not less than with a properly arranged saw of the ordinary kind.

W. R. G. asks: 1. In calculating the power of water wheels, is there anything allowed for friction? A. Generally, yes.

R. S. F. asks: Is there such a thing as a recording dynamometer for use on steam engines, water wheels, and other motive powers? A. We believe there are such machines, but they have not come into general use on account of their complications, expenses, etc. The field is still open for the inventor who can produce a better device.

D. M. L. asks: 1. How is the monthly average of a thermometer obtained? On some days, at the hour of observation, it indicates above zero and at others below. 2. What is the mean average of the following record for ten days: 1st, 10° above; 2d, 8° above; 3d, 3° below; 4th, 4° below; 5th, 2° above; 6th, 5° above; 7th, 1° below; 8th, 9° below; 9th, 9° above; 10th, 4° above. A. 1. Take the algebraic sum of the readings, and divide by the number. 2. The mean temperature, as shown by these observations, $= (10^\circ + 8^\circ - 3^\circ - 4^\circ + 2^\circ + 5^\circ - 1^\circ - 8^\circ + 9^\circ + 4^\circ) + 10 = 2\cdot2^\circ$ above zero.

D. M. A. says: A board is 12 feet long and 1 inch thick. At one end it is 4 inches wide, at the other end 12 inches wide. Where must this board be cut into between the end so as to have the same amount of lumber in each piece? A. Let A B C D represent the board. Suppose the problem to be solved, and that E F, or b, drawn at a distance, x, above C D, divides the board into two equal parts. It is thus required to find the value of x. It is easy to see that if the sides of the board were continued upwards until they met, as at G, the length would be 18 feet. We then have a triangle, G C D, with a line, E F, parallel to the base, C D. Hence $216:216-x.:12:b$, and $b=12-\frac{x}{18}$. Having found the top and hight of the piece, E F C D, we can calculate the area, in terms of the sides, and make this equal to half the area of the board. Then $\left(12-\frac{x}{36}\right)\times x=576$. Solving this equation for x, we find the hight above C D, at which the board must be cut, is 4 feet, 7 inches, nearly.

A. L. asks: Can you tell me how to stain hard wood in imitation of ornamental kinds? A. This subject is a very complicated one, and a full description of the processes would occupy too much of our space. Your best course would be to obtain a good book on the subject.

M. asks: What is a good metal that can be melted over a charcoal fire, be easily dressed up for making models, and will be quite stiff when cold? I have been using lead, tin, and antimony, but think that perhaps I do not get right proportions. A. Increase the lead to make the alloy softer, and vice versa.

A. B. P. asks: How can I make an amalgam for an electrical machine? A. Take zinc 1 oz., grain tin 1 oz., mercury (hot) 3 ozs. Stir well together, and powder when cold. Mix with a little tallow.

A. Z. B. asks: 1. What treatment should paint brushes be subjected to so as to keep them from getting hard and matted together after using? A. Soak in linseed oil and wash the oil out with soapy water.

F. A. R. asks: 1. What are the meanings of the terms, golden number, solar cycle, and epact, found in an almanac? 2. How is coal tar made? 3. How is apple whisky made? A. 1. The cycle is the period of time after which the same days of the week recur on the same days of the year. This period of the sun (solar cycle) is 28 years, and of the moon's changes 19 solar years. The golden number is the number of the year in the cycle. To find the golden number add 1 to the date, and divide by 19. The remainder is the number. Thus $1874+1=1875\div19=98$ and 13 remainder. The epact is the moon's age at the end of the year; and if we take the epact corresponding to the year's golden num" ber, we can obtain the dates of the new moons, and thence the dates of Easter, Lent, and Whitsuntide. 2. It is a by-product of the distillation of coal, as in making illuminating gas. 3. By the distillation of cider.

L. J. O. asks: What are the use and meaning of the marks over certain letters, as in Professor Orton's letters? A. The marks you refer to are the accents on the letter n (ñ) in the Spanish language. The effect of the accent is the same as if g were before the n in French, as in Bologna (pronounced Bolonya). Thus in Spanish, cañon is pronounced canyon, peñas, pen-yas, etc,

J. S. asks: What has become of the boiler testing board? "I sent them a safety valve for trial, and would like to know what they are doing." A. They have suspended operations until spring.

S. H. asks: On what day of the week did September 21, 1817, fall? A. Sunday.

P. asks: How can I remove oil from a printed paper? A. Apply powdered French chalk, made into a paste with water and allowed to dry on the spot.

F. A. B. sends the following recipe for blackboard composition: Alcohol, ½ gallon; gum shellac, ¼ lb.; lampblack, ¼ lb.; Venice turpentine, 4 ozs. Dissolve the shellac in the alcohol, and add the other ingredients. If it gets too thick, thin with alcohol.

P. P. P. asks: 1. What makes a person shake when having a chill? 2. What causes the cold and hot feelings during a chill? 3. When death is caused by a congestive chill, what part of the body is so affected that it causes death?—G. B. asks: 1. How is the deep scarlet color of the geranium flower produced on wax? 2. How can I prevent white wax from turning yellow?—S. B. R. asks: How can I dye furs ?—A. G. P. asks: Which is the largest pump in the world?—J. S. asks: Can anyone estimate the annual cost of the artificial light used all over the world ?—T. F. asks: How can I remove the smell of cod liver and castor oils?—J. H. asks: How is a hygroscope (a paper altering its color with the humidity of the atmosphere) made ?—G. P. Z. asks: Is there any remedy that will remove hair from any part of the face, without leaving any permanent mark or signs of its application?

COMMUNICATIONS RECEIVED.

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

On a Specific for St. Vitus' Dance. By A. S.
On the Phonetic System. By A. F. S.
On a Mathematical Discovery. By T. F.
On Ventilating a Church. By R.
On a Theory of the Origin of the Solar System. By C. D.
On Lunar Acceleration. By J. H.
On Minerals in Tennessee. By A. D. M.
On Steam Power in Philadelphia. By L. B. Jr.

Also enquiries from the following:

T. R. & S.—C. T.—J. J. K.—J. D. B.—G. W. B.—S. M. D.—Z. T. D.

Correspondents in different parts of the country ask: Who makes the best breech-loading shot gun? Who sells machines for making buttonhead rivets? Who makes kilns for burning charcoal? Who makes mill-stone dressing machines? Makers of the above articles will probably promote their interests by advertising, in reply, in the SCIENTIFIC AMERICAN.

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

FOR WHICH

Letters Patent of the United States

WERE GRANTED IN THE WEEK ENDING

January 6, 1874,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]