

F. M. S. asks: In the manufacture of gun cotton, is the use of chemically pure acids imperative? A. No. The commercial acids are frequently used.

G. A. P. says: I am running a grist mill with two sets of bevel gears, using about 30 horse power. I wish to throw the gears out and use a belt.

D. N. C. R. asks: About what size would a boiler require to be run an engine 300 revolutions per minute, the size of the cylinder being 5 inches stroke and 3 inches diameter? A. It would probably require from 35 to 40 square feet of efficient heating surface.

J. F. D. asks: How can I make small articles of india rubber? Is there a book on the subject? A. Hancock's "Manufacture of India Rubber" will give you considerable information on the subject.

A. S. S. asks: Is this the correct way of finding the actual horse power of a high pressure steam engine? Diameter of cylinder 7 inches, length of stroke 1 1/2 feet, revolutions per minute 80, with steam power on piston at 60 lbs. per square inch, and allowing 1 1/2 lbs. per square inch for friction: 1 x 7 = 49 x 56 = 2744.

S. asks: 1. How thick would iron have to be to withstand a pressure of 30 lbs. to the square inch? A. It would depend upon the form of the vessel.

W. L. P. asks: 1. Who was the engineer of the Suez canal? A. Ferdinand de Lesseps. 2. What is its length, breadth, and depth? A. About 100 miles long, 300 feet wide at the top, 100 to 150 feet wide at the bottom; average depth 24 feet.

C. W. A. asks: 1. How many grains of chloride of gold will a given number of grains of metallic gold make? A. This is found by first adding together the combining weights of chlorine and gold, and dividing the result by the combining weight of gold alone.

E. R. W. asks: What two substances, elements or compounds (ice and snow excepted) possess the least amount of friction when brought into contact with hard substances? A. It is not possible to answer this question in its present very general form, because it is necessary in the first place to know how the substances are to be brought in contact, and secondly, what the hard substances are, for much depends upon the adaptation of lubricating materials to the circumstances under which they are to be used.

J. H. S. asks: What do the words sin., cos., and tang., and the sign Σ, in algebra mean? A. Sin. = sine of an arc or angle. Cos. = cosine. Tan. = tangent. Σ = the sign of the summative, and means that terms of a series are to be added together.

L. P. C.—For replies concerning the assignments you mention send your address to Munn & Co., and send ten dollars.

S. M. M. asks: Is there an instrument by which any mineral of value in or under the ground may be found? If there is anything of the kind that you know of, please inform me.

G. S. D. asks: Is a process by which milk can be preserved for several weeks, the cream separated and churned at convenience into an extra quality of butter free from incipient rancidity, therefore little prone to deterioration, patentable? A. Probably it is.

E. L. asks: How or where are the wires concealed or put out of sight in connecting an electric burglar alarm with the doors and windows of a dwelling house? A. In new houses, the wires are frequently placed behind the plastering.

F. H. B. asks: What will remove ink and fruit stains from paper, linen, etc., without injuring the fabric? A. For ink, rub the spot with a weak solution of oxalic acid.

J. F. asks: What is the correct theory about the formation of ice? Does it form from the bottom of the water or from vapor escaping and congealing on the top? A. It forms at the top, by the production, at the freezing temperature, of innumerable crystals, which interlace one with another until at last there results a solid mass.

W. H. W. M. asks: 1. Can sugar and sirup be made from rags and sawdust by the aid of sulphuric acid? A. Yes. 2. By pouring sirup into the tea, the tea turns a black color; does it denote that the sirup is made from rags, etc.? Would the action of the acid in the sirup operate on the tannin in the tea, and produce the black color? Will not good sirup without acid affect the tea in the same manner? A. It is more likely that there was a trace of iron present, which formed a tannate of iron and caused the inky appearance.

C. O. E. asks: 1. How can I silver plate iron? How can I make the best silver solution for iron? A. Wash in weak lye to remove grease. Dip into weak aqua fortis to remove rust.

N. S. asks: 1. How can I seal the ends of small glass tubes? A. Use a blowpipe. 2. What is the process of silver plating? A. See pp. 299, 315, vol. 29.

A. B. C. asks: How can I make a cheap and efficient induction battery for medical use? A. By wrapping a coil of stout insulated wire around a core of soft iron, and connecting the ends of this wire with a galvanic battery.

D. B. W. says: In the SCIENTIFIC AMERICAN, December 5, 1873, I find a recipe for making a rubber cement by dissolving rubber in benzine, which falls to work; the rubber does not dissolve.

E. B. asks: Is there a sure and simple test for distinguishing between genuine and artificial butter? A. There are sure tests, but they are too complicated for anyone but a practical chemist to apply.

H. W. J. says: 1. I wish to make a telescope with a four inch lens, 72 inches focus. What must be the size of my eyepiece? What can I see with such a telescope? A. You can apply an eyepiece of one inch focus; but unless the object glass be achromatic you cannot employ the full aperture, nor in any case have a very satisfactory field of view.

P. H. M. asks: Is the cause of the existence of the Gulf stream known? If so, what is it? A. It is caused by the heating of the waters of the Atlantic ocean under the equator, which makes them lighter, and causes them to flow over the top of the water lying to the northward, this water flowing in below towards the equator.

F. C. B. asks: Is there any process to restore blackberry wine or any other liquid that has become musty by putting it in a musty barrel? A. Mustiness in wine, it is said, may frequently be removed by violently agitating the wine for some time with a little coarsely powdered charcoal, freshly burnt, or even some slices of bread toasted black.

E. S. M. says: I am about to construct a reflecting telescope, the mirror being formed by silver chemically deposited upon glass. Can you give me some recipe for a solution to deposit the silver in a proper form? A. There are various methods of depositing silver upon glass.

G. E. R. asks: What substances are used with extract of logwood to make a cheap red color? A. In a decoction of three pounds sumac, the goods are steeped over night, and then spirited at 2° Twaddle; wash and work through a decoction of three pounds Lima wood and one pound logwood for thirty minutes, then raise with a gill of red spirits; work for fifteen minutes more; wash out and finish.

S. asks: What colored light is best for persons to read by, and how can I impart that color to lamp chimneys? A. Blue. It can be painted over with a thin coat of Prussian blue.

H. R. R. asks: 1. How can a handsome purple color be made for druggists' show bottles? A. Make a solution of permanganate of potash in distilled water. 2. Can I make two different colors in the same bottle, that is, two colors that will not mix, as, for instance, red and green? A. Aqueous solutions alone will not answer. Dissolve some sulphate of nickel for the green, and upon this pour some oil colored with cochineal.

F. P. C. asks: Is there any satisfactory way of testing adulteration of linseed oil with cotton seed oil? If so, what? A. We are not aware of any reliable experiments on this point. Consult some good practical chemist.

W. says: I have bought 100 square inches of water, to be taken from the raceway under a 2 feet head. When the water is used, the surface in the pond and raceway lowers about 4 inches.

V. T. asks: How can I make a fuse that will burn at the rate of about 200 feet per minute, and that will take fire at a temperature of about 150° or 200° Fahr.? A. Consult the specifications of the recently patented fire alarms.

J. B. asks: How is a person affected by laughing gas? Is it injurious? How is it administered? A. Taken in moderate quantities, it exercises a strong influence upon the muscles which are brought into play when there is laughter; but in larger doses, of five gallons and upwards, it produces unconsciousness and insensibility to pain.

N. S. asks: 1. How can I seal the ends of small glass tubes? A. Use a blowpipe. 2. What is the process of silver plating? A. See pp. 299, 315, vol. 29.

E. C. M. asks: 1. Are the Cornwall (England) tin mines the only ones in the world? A. No. 2. Is it true that one has been discovered in California? A. Yes. For answers to your other questions see books on metallurgy, frequently advertised in our columns.

W. R. asks: 1. How many figures denote a billion, and how many a trillion? A. A billion is 1,000,000,000. A trillion is 1,000,000,000,000,000.

F. H. S. says: 1. I want to cast a small steam engine of brass; what is the composition that the founderies use to put in their flasks? Can I melt brass in a common stove? A. A good composition is 7 lbs. copper, 3 lbs. zinc, 2 lbs. tin.

G. N. K. says: We wish to heat a factory (30x80 feet and four stories high) with exhaust steam and are advised to put in 4-inch tin pipes, one tier in each room, painting those where the most heat is wanted some light color, and where less heat is wanted, a dark color.

C. V. asks: If an engine crank pin suddenly breaks, thereby destroying the connection between piston and crankshaft, what will follow? A. The piston would strike against the cylinder head; and if the latter be not strong enough to resist the blow, it would be broken.

A. O. B. says: In answer to a correspondent, you say that "eyestones are not alive." I think so too, but would like to know why they move about when placed in strong vinegar.

E. says: I have a double acting engine of one nominal horse power, speed 300 revolutions per minute. What would be the proper width of belt to connect engine to line shaft? A. Probably about an inch.

W. H. G. asks: Why is it that oxygen and hydrogen, when mixed in certain proportions and ignited, explode? The product is water, but does not an expansion take place? A. When these gases unite, the volume of the combination is much less than the original volume of the gases; so that a vacuum is produced, into which air rushes with great rapidity.

P. O. T. asks: Will a leaden ball, if thrown into the sea, sink to the bottom? If not, why not? A. Yes. 2. What is the depth of the deepest sea soundings? A. About 30,000 feet.

H. T. L. asks: Is there any chemical compound that will unite with or dissolve the albumen on albumenized paper? A. If the albumen is that of the white of eggs, it may be dissolved in alcohol containing a little alkali in solution.

"Erfinder," St. Louis, Mo.—Please send your name and address.

P. W. L. says, in reply to the query: "Can the four roots of the following equations be obtained: x^2+y=7, and y^2+x=11?" Certainly they can, and are as follows: x=2 and y=3, or x=3+13i+12j, and y=-2-905-118+

H. D. M. says, in answer to N. F. T., p. 123, vol. 30: It is the soot on the bottom of the kettle that prevents it from burning the hand. It will prevent it only for a short time, probably until N. L. T. thinks it quits boiling. A bright bottomed kettle will burn the instant it touches the hand.

E. says, in reply to M. who asked for a good metal for models: Melt 6 lbs. tea lead, 1/2 lb. tin, and 1/2 lb. antimony. This will be a good stiff metal.

E. S. says, in further explanation of the board question, propounded by D. M. A. (see p. 91, vol. 30): Let W and w equal the two widths. Then will (W^2 - w^2)^(1/2) = the width of the board at the dividing point.

Application to your question: ((12^2 - 4^2)^(1/2)) = (80)^(1/2) = 8.9442

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

J. A. S.—Rounded fragments of quartz, the one of a yellow color being ferruginous quartz.

J. C.—This product appears to be a fair specimen of lard. To determine whether it is adulterated or not will require a chemical analysis. Lard oil is a commercial product and burns well in lamps if the wick tube be kept cool.

S. B.—The shining particles are mica and are mixed with rounded fragments of quartz.

M. McK.—It is white sand of superior quality, and is useful for making glass.

COMMUNICATIONS RECEIVED.

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

On Healing Wounds by Charcoal, etc. By P.

On American Inventions in Europe. By H. S.

On Pavements. By S. S.

On Detecting Gold and Silver in the Earth. By G.

On the Curvature of the Earth. By G. E. W.

On the Thousand Feet Tower. By E. C. M.

On American Silk Manufacture. By H. C. F.

Correspondents in different parts of the country ask: Where are cotton seed linters sold? Where can the seed and cuttings of sumac be obtained? Who sells machines for making broom handles? Who makes the best clothes wringer? Who makes waterproof gloves, for use in handling strong lyos, etc.? Who makes a cider press that will get four gallons of cider from a bushel of apples? 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

February 10, 1874,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Table listing inventions and their patent numbers, including items like Abdominal supporter, Air, navigating the S. Franck, Air, cooling, J. Parissette, Axle clip, J. Ives, Baller, P. Miles, Bale tie, J. W. Hedenberg, Bale tie, cotton, H. Estes, Bale tie, cotton, H. Estes, Bale tie, cotton, J. E. Lea, Barrel hoop, L. Reed, Basket, H. C. Jones, Basket former, A. F. Scow, (r), Bed bottom, T. S. Judd, Bed bottom stretcher, H. D. Goldsmith, Bed, sofa, J. F. Birchard, Bell, sleigh, A. Harrison, Belt clamp, Minich & Lohnes, Blackboard, F. G. Huot, Blasting, G. Frisbee, Blasting plug, G. Frisbee, Boiler flue, steam, C. B. Stilwell, Boiler, sectional steam, J. Harrison, Jr., Boiler, sectional steam, E. B. Jucker, Boiler, steam, M. W. Shapley, Boiler safety valve, E. F. Steele, Bolt threading machine, A. Wood, Book binding, C. S. Murphy, Boot heels, molding, Simonds & Emery, Boring machine, G. W. McCready, Bosom pad and protector, J. E. Hodgkins, Box for transporting eggs, etc., H. A. Knight, Box, letter, J. D. Stewart, Brush and mop holder, M. J. A. Keane, Brush, hat, F. Hickman, Brush, marking, E. W. Hitchings, Brush, tooth, J. G. La Fonte, Buckle, harness, B. D. Jessup, Buckle, suspender, H. A. House, Burial casket, M. M. & S. G. Hersman, Burner, gas, C. C. Bingham, Butter package, F. A. Lane, Can, oil, K. Kiltroe, Car axle, G. W. C. timore.